816 Second Ave
Suite 200
Seattle, WA 98104

future wise

(206) 343-0681 Ext. 118
fax (206) 709-8218
**futurewise.org**

March 25, 2016

Mr. Albert Roberts, Chair
Okanogan County Regional Planning Commission
Office of Planning and Development
123 – 5th Ave. N. Suite 130
Okanogan, Washington 98840

Dear Chair Roberts and Planning Commissioners:

Subject: Comments on Planning Commission Public Hearing on "Zoning OCC Title 17A" Code Amendment 2015-1 on March 28, 2016.
Sent via U.S. Mail and email to: planning@co.okanogan.wa.us

Thank you for the opportunity to comment on "Zoning OCC Title 17A" Code Amendment 2015-1. We very much appreciate Okanogan County sending us notice of the public hearing. This letter first summarizes our recommendations and then includes detailed documentation of the needed changes to the proposed zoning code.

Futurewise is working throughout Washington State to create livable communities, protect our working farmlands, forests, and waterways, and ensure a better quality of life for present and future generations. We work with communities to implement effective land use planning and policies that prevent waste and stop sprawl, provide efficient transportation choices, create affordable housing and strong local businesses, and ensure healthy natural systems. We are creating a better quality of life in Washington State together. Futurewise has members across Washington State, including Okanogan County.

## Summary

As we document and explain in the detailed recommendations below, we recommend:

- That nonagricultural development should be directed away from the urban/rural fringe and the zoning regulations should adopt the Firewise principles. Please see page 3 of this letter for more information.

- The zoning should take water availability into account in setting densities and include requirements to protect water quality, water quantity, and senior water rights holders. Specifically, we recommend that:
  - Densities greater than one dwelling unit per five acres should not be allowed outside areas designated for urban development. So the Rural 1 and Minimum Requirements Zones should be eliminated and densities in other zones should be capped at one dwelling unit per five acres.
  - Do not allow the limited divisions for each lot existing on January 1, 2016, in the Rural 5 and Rural 20 zones.[1] The county does not have the water resources to create this

[1] Proposed Okanogan County Code (OCC) 17A.050.110 and proposed OCC 17A.060.110.

many lots. It also does not have the firefighting resources to protect houses on this many lots from wildfires.[2]

- Highly polluting uses should not be allowed in aquifer recharge areas.
- Any development proposing to use a permit-exempt well shall be limited to one permit-exempt well withdrawal system limited to withdrawing no more than 5,000 gallons per day.
- Applicants for building permits and subdivisions of land shall demonstrate that sufficient water is both legally and actually available to serve the proposed uses and activities including providing water necessary for fire protection.
- The sources of water for building permits and subdivisions of land shall not interfere with required minimum instream flows and senior water rights.
- The densities adopted in the zoning regulations shall be consistent with available water supplies.
- Increases in density shall only be approved if sufficient water is both legally and actually available and the sources will not interfere with required minimum instream flows and senior water rights.
- Sufficient water shall be reserved to maintain the agricultural industry in Okanogan County.

Please see page 5 of this letter for more information.

- Require that conditional uses comply with the Planning Enabling Act and be compatible with the uses in the vicinity. Please see page 10 of this letter for more information.

- Retain the current landscape requirements and limit impervious surfaces. Please see page 11 of this letter for more information.

- Amend proposed OCC 17A.330.010 to comply with and not violate the state platting statutes. Please see page 12 of this letter for more information.

- The Neighborhood Commercial (NC) zones should be limited to existing commercial areas and the areas of documented need. Please see page 13 of this letter for more information.

- Designate and conserve agricultural and forest land of long-term commercial significance. Please see page 13 of this letter for more information.

- Do not increase densities in the area formerly covered by the Molson Overlay. Please see page 15 of this letter for more information.

- Do not allow accessory dwelling units on lots smaller than one acre. Please see page 15 of this letter for more information.

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[2] *Okanogan County, Washington Community Wildfire Protection Plan* p. 88 (2013) accessed on March 24, 2016 at: http://file.dnr.wa.gov/publications/rp_burn_okanogan_cwpp_2013update.pdf and enclosed with the paper original of this letter. The cover and page 88 are also enclosed with the pdf version of this letter.

- The special development provisions currently in the Methow planning area zones should not be repealed. Please see page 15 of this letter for more information.

- The setbacks for the Rural 1, Rural 5, and Rural 20 zones should not be weakened. Please see page 16 of this letter for more information.

- RV parks, campgrounds, hotels, motels, and similar uses should require a conditional use permit and require lots larger than the minimum lot size and appropriate to the intensity of the proposed use. Please see page 16 of this letter for more information.

- The changes to the District Use Chart (Chapter 17A.220 OCC) should be modified and the dangerous uses not allowed in rural areas where the public facilities and services, including fire services, cannot support them. Please see page 16 of this letter for more information.

# Detailed Recommendations

## Direct nonagricultural development away from the urban/rural fringe and require Firewise principles

The increased residential development in the rural, forest, and agricultural areas of Okanogan County is creating significant problems for fire districts and firefighters. As the C*ommunity Wildfire Protection Plan* states:

> One challenge Okanogan County faces is the large number of houses in the urban/rural fringe compared to twenty years ago. Since the 1970s, a segment of Washington's growing population has expanded further into traditional forest or resource lands and other rural areas. The "interface" between urban and suburban areas and unmanaged forest and rangelands created by this expansion has produced a significant increase in threats to life and property from fires and has pushed existing fire protection systems beyond original or current design or capability. Many property owners in the interface are not aware of the problems and threats they face and owners have done very little to manage or offset fire hazards or risks on their own property. Furthermore, human activities increase the incidence of fire ignition and potential damage.[3]

And Okanogan County has experienced Washington State's two largest wildfires in history back to back.[4] To minimize more development that is beyond the capability of the fire protection systems, we recommend that the following changes be made to the proposed zoning.

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[3] *Okanogan County, Washington Community Wildfire Protection Plan* p. 88 (2013).
[4] Gary DeVon, *Largest Fire in State History* Gazette-Tribune (Aug. 26, 2015) accessed on March 22, 2016 at: http://www.gazette-tribune.com/news/largest-fire-in-state-history/70863/ and enclosed with the paper original of this letter.

First, the areas identified in *Community Wildfire Protection Plan's Figure 4.2. Wildland-Urban Interface Map in Okanogan County, Washington* as having the three lowest density "wildland-urban interface (WUI)" conditions and the "Intermix Condition" should be zoned R-20 or as agricultural or forest lands of long-term commercial significance.[5] The multi-family densities allowed by proposed Okanogan County Code (OCC) 17A.060.060A and the densities and land divisions allowed by Proposed OCC 17A.060.110, Special provisions, shall not be allowed.

Second, the areas identified in *Community Wildfire Protection Plan's* Figure 4.2 as having the "Rural" condition should be zoned as agricultural and forest lands of long-term commercial significance. Third, areas served with a one lane road or with only one way in and out should also be zoned R-20 or as agricultural or forest lands of long-term commercial significance. The multi-family densities allowed by proposed OCC 17A.060.060A and the densities and land divisions allowed by Proposed OCC 17A.060.110, Special provisions, shall not be allowed in these areas. These changes will reduce increases in densities in the WUI which already has more residential development than can be protected by the existing firefighting system.[6]

Fourth, as also recommended by the *Community Wildfire Protection Plan*, the zoning and subdivision regulations should "[a]dopt stringent regulations to insure fire-safe development of rural subdivisions (see FIREWISE or similar programs for specific recommendations)."[7] See the enclosed *Firewise Toolkit A Guide to Firewise Principles* enclosed with this letter and downloaded on March 22, 2016 at: http://www.firewise.org/wildfire-preparedness/firewise-toolkit.aspx The Firewise Communities Program is a nationally recognized program to reduce the risk of damage from wildfires.[8]

The Firewise Principles recommend "'two ways out' of the neighborhood for safe evacuation during a wildfire emergency."[9] So does the U.S. Fire Administration.[10] Two ways out is important to protect the safety of property owners, residents, and firefighters. The three firefighters who died in Twisp River Fire in Okanogan County this last summer died on a relatively short dead end road serving six houses.[11] A fourth firefighter was severely injured in the fire and a three person bulldozer team was trapped on the same road.[12] If the area had two ways out, it is possible the firefighters would not have had to drive down a road in zero visibility[13] and would not have crashed.

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[5] *Okanogan County, Washington Community Wildfire Protection Plan* p. 39 (2013).
[6] *Id.* at p. 88.
[7] *Id.* at p. 97.
[8] About Firewise webpage accessed on March 24, 2016 at: http://www.firewise.org/about.aspx
[9] *Firewise Toolkit A Guide to Firewise Principles* p. *2 enclosed with both the pdf and paper originals of this letter.
[10] FEMA U.S. Fire Administration, *Wildfires: Protect Yourself and Your Community* enclosed with the paper original of this letter and accessed on March 24, 2016 at: http://www.usfa.fema.gov/downloads/pdf/publications/wildfires_protect_yourself_and_your_community.pdf
[11] Washington State Department of Natural Resources, *Twisp River Fire Fatalities and Entrapments Interagency Learning Review Status Report* pp. 8 –9 & pp. 15 – 18 of 24 (18 November 2015) accessed on March 24, 2016 at: http://wildfiretoday.com/documents/Twisp_River_Fire_Status_Report.pdf and enclosed with the paper original of this letter.
[12] *Id.*
[13] *Id.* at p. 15 of 24.

Some argue that the county should not require wildfire safety measures, it should be a personal choice. But the local, state, and federal firefighters have no choice. They are ordered in to save the structures whether the property owners or the county chose to undertake Firewise fire safety measures or not. And the federal government pays $3 billion a year fighting these fires,[14] not the property owners or counties that fail to take common sense steps to protect property owners and firefighters. As economist Ray Rasker said "[w]hen you read in the news that the federal agencies are spending up to $3 billion a year fighting fires, what they're really spending money on is defending private property from fires. Another way to say that is that the federal taxpayer pays for the land use decisions of local government."[15] And sometimes the firefighters pay for the land use decisions of local government too.

## Take water availability into account in setting densities and protect water quality, water quantity, and senior water rights holders

RCW 36.70.330(1) requires that "[t]he land use element shall also provide for protection of the quality and quantity of groundwater used for public water supplies …." In the Order Denying Cross Motions for Summary Judgment and/or Dismissal in *Methow Valley Citizens' Council and Futurewise v. Okanogan County*, the Honorable Judge Culp observed that "the trier of fact will have to determine whether the final zoning ordinance protects [county property owners] rights by including provisions adequate to protect the quality and quantity of ground water."[16] But there are no zoning regulations proposed to protect ground water quality and quantity.[17] As will be explained below, we recommend they be included to comply with state law.

In fact, the zoning is likely to lead to the pollution of ground water. Large areas of the county are zoned for densities of two housing units per acre.[18] Large areas are also zoned for one housing unit per 2.5 acres.[19] Most of the rural zones allow apartments and mobile home parks with densities of five dwelling units per acre outside parts of the Methow Valley.[20] The apartments are permitted uses in the Minimum Requirement, Rural 1, Rural 5, and Rural 20 zones.[21] Marylynn Yates, in a peer reviewed scientific journal, analyzed data and cases of ground water pollution from septic tanks. She concluded that septic tanks are major contributors of waste water, septic tanks are the most frequently reported cause of ground water contamination, and the most important factor influencing ground water contamination

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[14] Rowan Moore Gerety, *After A Bad Fire Season, Okanogan County Looks The Other Way On Land Use* Northwest Public Radio website (Dec 10, 2015) accessed on March 24, 2016 at: http://nwpr.org/post/after-bad-fire-season-okanogan-county-looks-other-way-land-use

[15] *Id.*

[16] *Methow Valley Citizens' Council and Futurewise v. Okanogan County,* Okanogan County Superior Court Case No. 15-2-00005-7 Order Denying Cross Motions for Summary Judgment and/or Dismissal p. 4 (March 11, 2016) enclosed with the paper original of this letter.

[17] Zoning Okanogan County Code Title 17A Draft: October 16, 2015 pp. 1 – 152 accessed on March 22, 2016 at: http://www.okanogancounty.org/planning/.

[18] Okanogan County Zoning – Draft – 10/15/2015 map; proposed OCC 17A.030.060A (Minimum Requirement [RM] Zone); Proposed OCC 17A.040.060A (Rural 1 [R1] Zone).

[19] Okanogan County Zoning – Draft – 10/15/2015 map; proposed OCC 17A.050.060A (Rural 5 [R5] Zone).

[20] Proposed OCC 17A.030.060A (Minimum Requirement [RM] Zone); Proposed OCC 17A.040.060B (Rural 1 [R1] Zone); proposed OCC 17A.050.060B (Rural 5 [R5] Zone); proposed OCC 17A.060.060B (Rural 20 [R20]).

[21] Proposed OCC 17A.220.010.

from septic tanks is the density of the systems.[22] Lot sizes associated with ground water contamination cases ranged from less than a quarter acre to three acres.[23] More recent studies support these conclusions. For example, an "observational study identified septic system density as a risk factor for sporadic cases of viral and bacterial diarrhea in central Wisconsin children."[24] The greater the density of septic tanks the greater the likelihood of diarrheal disease.[25] And the highest septic tank densities were one septic tank per 11 acres.[26] A study of the potential for nitrate pollution of ground water in Cedar Valley, Iron County, Utah lead to a recommendation that the minimum lot size for septic systems should be five areas in one part of the valley and 15 acres in three other parts.[27] So houses and apartments allowed by the proposed zoning will pollute the groundwater drinking water sources.

In addition to urban density apartments, other uses with a high potential to pollute ground water are allowed in unincorporated Okanogan County. Aircraft sales, repair, service and aircraft salvage, just to name a few, are permitted uses in the Minimum Requirement, Rural 1, Rural 5, and Rural 20 zones just to name a few.[28] Acid manufacturing, explosive manufacturing or storage, asphalt batch plants, petroleum bulk plants, auto wrecking yards, junk yards, cement and lime manufacturing, just to name a few, are conditional uses in the Minimum Requirement, Rural 1, Rural 5, and Rural 20 zones.[29] These are all potential sources of ground water contamination.[30]

Adverse impacts will also occur because the proposed densities are not matched to the available ground water resources. This is particularly important because a significant number

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[22] Marylynn V. Yates, *Septic Tank Density and Ground-Water Contamination* 23 GROUND WATER 586, p. 590 (1985). Accessed most recently on March 23, 2016 at: http://info.ngwa.org/gwol/pdf/852537546.PDF and enclosed in with the paper original of this letter. Ground Water is a peer-reviewed scientific journal. See the Ground Water Peer Review webpage enclosed with the paper original of this letter and accessed on March 23, 2016 at: http://www.ngwa.org/pubs/GW/Pages/Ground-Water-Peer-Review.aspx

[23] Marylynn V. Yates, *Septic Tank Density and Ground-Water Contamination* 23 GROUND WATER 586, p. 590 (1985).

[24] Mark A. Borchardt, Po-Huang Chyou, Edna O. DeVries, and Edward A. Belongia, *Septic System Density and Infectious Diarrhea in a Defined Population of Children* 111 ENVIRONMENTAL HEALTH PERSPECTIVES 742, p. 745 (2003). Accessed most recently on March 23, 2016 at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1241485/pdf/ehp0111-000742.pdf and enclosed with the paper original of this letter. Environmental Health Perspectives is a peer reviewed scientific journal. See the Environmental Health Perspectives Journal Information accessed on March 23, 2015 at: http://ehp.niehs.nih.gov/journal-information/ and enclosed with the paper original of this letter.

[25] Mark A. Borchardt, Po-Huang Chyou, Edna O. DeVries, and Edward A. Belongia, *Septic System Density and Infectious Diarrhea in a Defined Population of Children* 111 ENVIRONMENTAL HEALTH PERSPECTIVES 742, pp. 745 – 47 (2003).

[26] *Id.* at 747.

[27] Mike Lowe, Janae Wallace, and Walid Sabbah, and Jason L. Kneedy, *Science-Based Land-Use Planning Tools to Help Protect Ground-Water Quality, Cedar Valley, Iron County, Utah Special Study 134* pp. 27 – 28 (Utah Geological Survey, a Division of Utah Department of Natural Resources: 2010). Most recently accessed on March 23, 2016 at: http://geology.utah.gov/online/ss/ss-134/ss-134text.pdf and enclosed with the paper original of this letter.

[28] Proposed OCC 17A.220.010.

[29] Proposed OCC 17A.220.010.

[30] Laurie Morgan, *Critical Aquifer Recharge Areas Guidance Document* pp. 37 – 41 (Washington State Department of Ecology, Water Quality Program: Jan. 2005, Publication Number 05-10-028) enclosed with the paper original of this letter and accessed on March 23, 2016 at: https://fortress.wa.gov/ecy/publications/publications/0510028.pdf

of Okanogan County's subbasins and streams are already overappropriated.[31] The Washington State Department of Ecology has also concluded that "most if not all of the available water has already been allocated" in Water Resource Inventory Areas (WRIAs) 48 and 49, the Methow and Okanogan River Watersheds.[32] Water is in such short supply that:

> Ecology regularly sends out Administrative Orders under RCW 90.03 alerting water right holders they will be curtailed in favor of instream flows for the Methow and Okanogan Rivers. This has been a common occurrence in Okanogan County where users were curtailed or shut off four out of the last five years on the Methow and three out of the last five years on the Okanogan during times of low flow.[33]

Ecology also explained that:

> Demands of new water use reduce water legally available for existing, senior water rights including instream flows. Where hydraulic continuity is shown with surface water, new domestic uses established under RCW 90.44.050 are subject to curtailment to meet the needs of more senior water rights in water short years. If water supply becomes limited, water use could be curtailed by those with senior water rights, which includes instream flows established in Chapters 173-548, 173-549 and 173-563 WAC.
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> [The] Department of Health does not consider interruptible water rights an adequate and reliable water source consistent with WAC 246-290-420. For these reasons, future water source plans will likely not be a reliable supply for year round residential use and may be subject to interruption due to conflict with instream flows. As such, it will be questionable whether a plan would provide an appropriate provision for potable water supply under RCW 58.17.[34]

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[31] ENTRIX, Inc., *Level 1 Watershed Technical Assessment Final Report: Okanogan River Watershed Resource Inventory Area 49* p. ES-3 (Okanogan Watershed Planning Unit: Sept. 2006) accessed on March 23, 2016 at: http://www.okanogancd.org/sites/default/files/programs/owp/24_Technical%20Assessment.pdf and enclosed with the paper original of this letter.

[32] State of Washington Department of Ecology Water Resources Program, *Focus on Water Availability for the Methow Watershed, WRIA 48* p. 2 (Publication Number: 11-11-052, Revised August 2012) accessed on March 23, 2015 at: https://fortress.wa.gov/ecy/publications/summarypages/1111052.html and enclosed with the paper original of this letter; State of Washington Department of Ecology Water Resources Program, *Focus on Water Availability for the Okanogan Watershed, WRIA 49* p. 2 (Publication Number: 11-11-053, Revised August 2012) accessed on March 23, 2015 at:https://fortress.wa.gov/ecy/publications/summarypages/1111053.html and enclosed with the paper original of this letter.

[33] Letter from Washington State Department of Ecology to Perry Huston Okanogan County Planning p. 3 of 5 (April 7, 2011) enclosed with the paper original of this letter.

[34] *Id.* While Ecology's quote states that a determination that surface and ground water are in continuity must be made for ground water to be subject to the instream flow rules, in the Methow Basin the Washington State Department of Ecology must determine that the ground water is not hydraulically connected. WAC 173-548-050(4), part of the Methow Basin instream flow rule, provides that: "(4) If the groundwater being sought for withdrawal has been determined by the department not to be hydraulically connected with surface waters listed as closed, the department may approve a withdrawal. When insufficient evidence is available to the department to make a determination that ground and surface waters are not hydraulically connected, the department shall not approve the withdrawal of groundwater unless the person proposing to withdraw the groundwater provides

The very limited water availability is confirmed by the Methow Watershed Council. When Ecology adopted the instream flow rule for the Methow River, water was reserved for permit exempt wells. The council states that to their knowledge, this is the only non-interruptible water available in the Methow Sub basin.[35] The Council has projected that:

> Assuming future build-out with no new parcels and existing parcel size regulations, 6 reaches would have water remaining in their reserves. The Lower Methow would exceed its reserve, leaving 1,092 presently existing parcels out of a total of 2,913 presently existing parcels unable to be supplied by a well.
>
> Assuming full build-out of all possible parcels under present zoning, 5 reaches would have water remaining in their reserve. The Upper Methow and Lower Methow would exceed their reserves. The Upper Methow would have 127 parcels unable to be supplied by permit-exempt wells out of a total of 1,948 possible parcels. The Lower Methow would have 24,313 parcels out of a total of 26,133 possible parcels unable to be supplied by wells.[36]

The proposed zoning applies a "Rural 1" zone, which allows one-acre lots and apartments at densities of five dwellings per acre, along many Okanogan County streams that are already over appropriated.[37] The one acre lots and apartments are permitted uses in the Rural 1 zone.[38] These streams include Bonaparte Creek in the Osoyoos basin, 41,188 percent over appropriated in the summer; Johnson Creek in the Salmon basin, 2,913 percent over appropriated in the summer; the lower part of Sinlahekin Creek in the Sinlahekin basin, 3,015 percent over appropriated in the summer; Tonasket Creek in the Osoyoos basin, 54,143 percent over appropriated in the summer; and Tunk Creek in the Omak basin, 1,300 percent over appropriated in the summer.[39] In the Osoyoos and Salmon basins the 2006 ground water appropriations exceeded ground water recharge as it did for WRIA 49 as a whole.[40] "Groundwater and surface water interact throughout the [Okanogan River] watershed."[41] Allowing high densities along the over allocated creeks with a hydrologic connection to ground water will result in loss of water available to senior water rights holders that rely on these streams for irrigation and other uses.

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additional information sufficient for the department to determine that hydraulic continuity does not exist and that water is available."

[35] Methow Watershed Council Letter to the Okanogan County Commission Re: Okanogan Comprehensive Plan and watershed planning p. 1 (June 14, 2011) and enclosed with the paper original of this letter.

[36] *Id.* at p. 2.

[37] Okanogan County Zoning – Draft – 10/15/2015 map; proposed OCC 17A.040.060A & B; ENTRIX, Inc., *Level 1 Watershed Technical Assessment Final Report Okanogan River Watershed Resource Inventory Area 49* p. ES-9 & WRIA 49 Stream Monitoring Locations map (Sept. 2006).

[38] Proposed OCC 17A.220.010.

[39] ENTRIX, Inc., *Level 1 Watershed Technical Assessment Final Report Okanogan River Watershed Resource Inventory Area 49* p. ES-9 & WRIA 49 Stream Monitoring Locations map (Sept. 2006).

[40] *Id.* at ES-4.

[41] *Id.* at 2-24.

The Washington State Department of Ecology had to appeal a county subdivision approval because the County's SEPA determination failed to require the subdivision to comply with the requirements for permit exempt wells.[42] The Silver Spur North Ranch originally proposed to create 220 individual lots, a 15-site recreational vehicle park, an equestrian center, and recreational center with swimming pools that would withdraw 18,800 gallons of water per day from permit-exempt wells.[43] "That is well in excess of 5,000 gallons of water per day, the limit allowed by common subdivisions without water rights, as confirmed by the state Supreme Court's opinion in the 'Campbell and Gwinn' case."[44] In response to Ecology's appeal, the Silver Spur North Ranch was limited to 5,000 gallons a day from one permit-exempt well serving eleven housing units.[45] Any addition development will require "an off-site source of water …"[46] There have been other cases where Okanogan County's planning decisions disregarded these requirements.[47]

Okanogan County has a choice to make. It can allow many small rural lots and apartments outside cities and towns that greatly exceed the available water in the county. This will allow those that subdivide first to create new lots and new apartments, but condemn everyone else to existing lots that are unbuildable because all of the water is already used up under Washington's first in time, first in right water allocation system.[48] Or the county could attempt to equitably limit lots and development to those that can be served by the available water resources. The proposed zoning hews to the first approach, an approach that will create some winners, but many, many losers. We recommend another approach, one that seeks to attempt to match new development with available water resources. That is the fairer approach.

Protecting groundwater is important as Okanogan County residents and property owners are highly depended on ground water for drinking water supplies.[49] So we recommend the following modifications to the proposed zoning:

- Densities greater than one dwelling unit per five acres should not be allowed outside areas designated for urban development and served by municipal water systems. So the Rural 1

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[42] Department of Ecology News Release - March 26, 2010 10-054 *Water concerns prompt appeal of subdivision approval* accessed on Jan. 28, 2015 enclosed with the paper original of this letter.
[43] *Id.*
[44] *Id.*
[45] Okanogan County Resolution 10 – 201 Approving the Development Agreement for Silver Spur North Ranch and Adopting Findings of Fact and Conclusions of Law p. *2 – 3; Development Agreement by and Between Okanogan County and Caribou LLC, for the Silver Spur North Ranch Development pp. 8 – 9 accessed on March 23, 2016 at http://www.okanogancounty.org/planning/Docs%20and%20PDFs/Development%20Agreement-Silver%20Spur%20NR.pdf and cited pages enclosed with the paper original of this letter.
[46] Development Agreement by and Between Okanogan County and Caribou LLC, for the Silver Spur North Ranch Development pp. 8 – 9.
[47] Washington State Department of Ecology Letter to Okanogan County Planning Re: Eagle Canyon Estates (March 23, 2009) enclosed with this letter and the paper original of this letter.
[48] *Postema v. Pollution Control Hearings Bd.*, 142 Wn.2d 68, 79 – 80, 11 P.3d 726, 734 (2000).
[49] Tom Culhane and Dave Nazy, *Permit-Exempt Domestic Well Use in Washington State* p. 7 & p. 22 (Water Resources Program Washington State Department of Ecology, Olympia, Washington: Feb. 2015: Publication No. 15-11-006) accessed on March 23, 2016 at: https://fortress.wa.gov/ecy/publications/documents/1511006.pdf and enclosed with the paper original of this letter.

and Minimum Requirements Zones should be eliminated and densities in other zones be capped at one dwelling unit per five acres.

- Do not allow the limited divisions for each lot that existed on January 1, 2016, in the Rural 5 and Rural 20 zones.[50] As was documented above, the county does not have the water resources to serve this many lots. It also does not have the firefighting resources protect houses on this many lots from wildfires.[51]
- Highly polluting uses should not be allowed in aquifer recharge areas.
- Any development proposing to use a permit-exempt well shall be limited to one permit-exempt well withdrawal system limited to withdrawing no more than 5,000 gallons per day.
- Applicants for building permits and subdivisions of land shall demonstrate that sufficient water is both legally and actually available to serve the proposed uses and activities including providing water necessary for fire protection.
- The sources of water for building permits and subdivisions of land shall not interfere with required minimum instream flows and senior water rights.
- The densities adopted in the zoning regulations shall be consistent with available water supplies.
- Increases in density shall only be approved if sufficient water is both legally and actually available and the sources will not interfere with required minimum instream flows and senior water rights.
- Sufficient water shall be reserved to maintain the agricultural industry in Okanogan County.

## Require that conditional uses comply with the Planning Enabling Act and be compatible with the uses in the vicinity

The Planning Enabling Act, in RCW 36.70.020(7), defines a conditional use to mean

> a use listed among those classified in any given zone but permitted to locate only after review by the board of adjustment, or zoning adjustor if there be such, and the granting of a conditional use permit imposing such performance standards as will make the use compatible with other permitted uses in the same vicinity and zone and assure against imposing excessive demands upon public utilities, provided the county ordinances specify the standards and criteria that shall be applied.

Okanogan County plans under the Planning Enabling Act and must comply with RCW 36.70.020(7). The Planning Enabling Act requires that conditional uses must be compatible with the other permitted uses in the vicinity and zone and assure against imposing excessive demands upon public utilities. But the conditional use standards in proposed OCC 17A.310.080, 17A.310.090, and 17A.310.100 do not include these requirements. For example both proposed OCC 17A.310.080 and OCC 17A.310.090 require compatibility with the uses on the same property as the conditional use, but not with other permitted uses in the vicinity

[50] Proposed OCC 17A.050.110 and 17A.060.110
[51] *Okanogan County, Washington Community Wildfire Protection Plan* p. 88 (2013).

and the same zone as RCW 36.70.020(7) requires. This is both illegal and one-sided. Why should compatibility be required with uses on the same property, but not with uses on the neighboring properties? This is especially important when you remember the Minimum Requirement, Rural 1, Rural 5, and Rural 20 zones allow such potentially damaging uses as acid manufacturing, explosive manufacturing or storage, asphalt batch plants, petroleum bulk plants, auto wrecking yards, and junk yards as conditional uses.[52] And the decision maker only has to consider the standards in OCC 17A.310.080, they are not requirements for issuing a conditional use permit. The potential conditions listed in proposed OCC 17A.310.100 are only examples and are not required. These failures also violate RCW 36.70.020(7). Further, the conditions should not be onerous at all. So we recommend the following modifications to proposed OCC 17A.310.080 with our additions underlined and our deletions struck through.

**17A.310.080 Standards and criteria**

The hearing examiner or board of adjustment ~~shall~~ may allow a conditional use if all of ~~consider~~ the following standards and criteria are met ~~in evaluating the conditional use permit~~:

A. That the conditions imposed are reasonably calculated to insure the proposed conditional use is and will remain compatible with the comprehensive plan, zoning for the subject area, other land use actions including but not limited to plats, planned developments, and other conditions use permits; and
B. That the proposed activity is and will remain compatible with current and future uses on the subject property; and
C. The required performance standards and conditions will make the conditional use compatible with other existing and permitted uses in the same vicinity and zone ~~That such conditions are not unnecessarily onerous~~; and
D. That the proposed conditions will protect the public health, morals and general welfare, and environment; and
E. The required performance standards and conditions will assure the conditional uses will not imposing excessive demands upon public facilities, utilities, and services including the adopted transportation level of service standards.

The required performance standards and conditions shall be recorded in the real property records of Okanogan County as requirements applicable to the imposed through a CUP be recorded with the title of the property for which the permit is issued.

## Retain the current landscape requirements and limit impervious surfaces

Tourism and outdoor recreation are important parts of the Okanogan County economy. A recent study estimates the expenditures from outdoor recreation in Okanogan County total $222,002,000.[53] These expenditures contributed $151,343,000 and 1,819 jobs to the Okanogan

[52] Proposed OCC 17A.220.010.
[53] Tania Briceno and Greg Schundler, *Economic Analysis of Outdoor Recreation in Washington State* p. 83 (Earth Economics, Tacoma, WA: 2015) accessed on March 24, 2016 at: http://www.rco.wa.gov/documents/ORTF/EconomicAnalysisOutdoorRec.pdf and enclosed with the paper original of this letter.

County economy.[54] They also generate $18.6 million in state and local taxes.[55] Maintaining the county's attractiveness is necessary to maintain this industry and community's quality of life.

There are no limits on lot coverage or impervious surfaces for the Minimum Requirement, Rural 1, Rural 5, or Rural 20 zones.[56] These zones cover most of unincorporated Okanogan County. So uses can cover the entire lot with buildings and pavement. This is out of character with the county and can reduce the quantity of ground water recharge on which many Okanogan County residents and businesses depend for their water supplies.[57]

To address these problems, we recommend that current landscaping requirements Chapter 17.27 OCC be retained. We also recommend that impervious surfaces in the Minimum Requirement, Rural 1, Rural 5, or Rural 20 zones be limited to ten percent with an exception for existing lots smaller than two acres.

## Amend proposed OCC 17A.330.010 to comply with and not violate the state platting statutes

Boundary line adjustments are regulated by the state subdivision statutes. RCW 58.17.040(6) exempts the following from the requirement to be reviewed and approved as a long or short subdivision:

> A division made for the purpose of alteration by adjusting boundary lines, between platted or unplatted lots or both, which does not create any additional lot, tract, parcel, site, or division nor create any lot, tract, parcel, site, or division which contains insufficient area and dimension to meet minimum requirements for width and area for a building site[.]

As you can see from RCW 58.17.040(6), to be a legal boundary line adjustment the resulting lots must contain sufficient area and dimension to meet the minimum lot sizes and widths in the county zoning regulations.[58] However, proposed OCC 17A.330.010 specifically authorizes violations of RCW 58.17.040(6) which, of course, is illegal. So the provisions of RCW 58.17.040(6) which purport to allow boundary line adjustments to reduce the size of lots below the zoning minimum lots sizes and lot widths must be modified and deleted.

In addition, we support the Methow Valley Citizens Council recommendation to only allow single family dwellings, customary accessory buildings (including dwelling units), pre-existing uses, and agriculture and forestry on legally created lots that are nonconforming as to size. The Methow Valley Citizens Council detailed comments explain why this recommendation should be followed.[59]

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[54] *Id.*
[55] *Id.*
[56] Proposed OCC 17A.030.090; proposed OCC 17A.040.090; proposed OCC 17A.050.090, and proposed OCC 17A.060.090.
[57] Laurie Morgan, *Critical Aquifer Recharge Areas Guidance Document* p. 6 (Washington State Department of Ecology, Water Quality Program: Jan. 2005, Publication Number 05-10-028).
[58] *Island Cty. v. Dillingham Dev. Co.*, 99 Wn. 2d 215, 222 – 23, 662 P.2d 32, 37 (1983).
[59] See MVCC Comments and Recommendations on the Draft Zone Code and Maps "10."

Our recommended additions are underlined and our recommended deletions are struck through:

**17A.330.010 Legal pre-existing lots**
~~Those uses and structures which are permitted or conditional on a conforming lot within a zone district shall also be permitted or conditional on a~~A legal pre-existing lot may be used for single family dwellings, customary accessory buildings (including dwelling units), pre-existing uses, and agriculture and forestry where those uses are allowed by the zone in which the lot is located ~~within the same zone~~. Legal pre-existing lots which do not meet lot area and width requirements may not be reduced in size by use of the boundary line adjustment process (OCC 16.04.080). ~~These provisions shall apply even though such lot fails to meet the density requirements of the zone district, providing the lot meets current health district requirements for water and sewer.~~

## The Neighborhood Commercial (NC) zones should be limited to existing commercial areas and the areas of documented need

The proposed Okanogan County Zoning – Draft – 10/15/2015 map dramatically expands the Neighborhood Commercial (NC) zones, which allow high-density apartments and commercial use beyond the existing commercial areas. The *Methow Valley Citizens' Council* estimates these expansions as follows:

- Loomis—4 square miles
- Chesaw—more than 2 square miles
- Molson—1 square mile
- Monse and Malott— ½ mile by 1 mile
- Methow—almost 80 acres on each side of highway

As was documented above,[60] Okanogan County lacks the water to serve these areas. It also lacks the sewer services these densities require. There is also no need for such dramatic expansions and so we recommend they be limited to the existing commercial areas and the areas of documented need.

## Designate and conserve agricultural and forest land of long-term commercial significance

The Washington State Employment Security Department has documented that the "[a]griculture is a very important sector for Okanogan County, which mainly consists of various tree fruits and wheat."[61] Agriculture is Okanogan County's largest employer, providing jobs to 16 percent of county residents.[62] "In 2007, agriculture, forestry, fishing and hunting

[60] See page 2 of this letter.
[61] Mark A. Berreth, *Okanogan County Profile* p. 1 of 5 (Washington State Employment Security Department: Updated May 2012) and enclosed with the paper version of this letter.
[62] Marcy Stamper, *County to use public land base to satisfy state call for agriculture, resource lands* Methow Valley News Online (09-28-2010 | Volume: 108 | Issue: 19) enclosed with the paper version of this letter.

paid an annual average of $35,305 …"[63] This was a higher annual wage than those in the construction industry, although not as high as manufacturing workers who earned an average of $37,302.[64] Many of these manufacturing workers process agricultural and forest products.

Okanogan County has 129,232 acres in cropland and 78,819 acres in harvested crop land.[65] The county has 1,205,285 acres of land in farms.[66] In 2012, the county had 35,471 head of cattle and calves.[67] The county also had 1,527 head of sheep and lambs,[68] and 3,929 laying hens.[69]

Unlike residential uses which cost a county more than then they produce in taxes, farms and forestry generate more in taxes than they require in public services. As the *Washington Agriculture Strategic Plan 2020 and Beyond* documents,

> For each $1 paid in taxes by farm and forest lands in that [Skagit] county, those lands received back about 51 cents in services, contributing a 49 cent subsidy for the rest of the taxpayers in the county. For every $1 paid in taxes by residential properties, those properties received $1.25 in public services.[70]

Despite these impressive economic contributions, Okanogan County has not designated a single acre of agriculture lands of long-term commercial significance despite the Growth Management Act's requirement that the county do so by September 1, 1991.[71] The county should designate these lands. Futurewise's January 29, 2015, letter to the Okanogan County Board of Commissioners on the Okanogan County Comprehensive Plan for the February 2, 2015 Public Hearing explains how to designate agricultural lands and is enclosed with the paper original of this letter.

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[63] T. Baba Moussa, *Okanogan County Profile* p. 5 of 6 (Washington State Employment Security Department: January 2009) enclosed with the paper original of this letter.
[64] *Id.*
[65] United States Department of Agriculture, National Agricultural Statistics Service, *2012 Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 8. Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007 p. 274 (May 2014) accessed on March 24, 2016 at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Washington/wav1.pdf A copy of Chapter 2 and the appendices are enclosed with the paper version of this letter.
[66] *Id.*
[67] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 11. Cattle and Calves – Inventory and Sales: 2012 and 2007 p. 294 (May 2014).
[68] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 13. Sheep and Lambs – Inventory, Wool Production, and Sales: 2012 and 2007 p. 309 (May 2014).
[69] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 19. Poultry – Inventory and Sales: 2012 and 2007 p. 319 (May 2014).
[70] Washington State Department of Agriculture, *Washington Agriculture Strategic Plan 2020 and Beyond* p. 53 (2009) accessed on March 24, 2016 at: http://agr.wa.gov/fof/ and cited pages enclosed with the paper original of this letter.
[71] RCW 36.70A.170(1).

September 1, 1991, was also the deadline for the county to designate forest land of long-term commercial significance, a second deadline the county has missed.[72] The county should also designate these economically valuable lands. Futurewise's January 29, 2015, letter to the Okanogan County Board of Commissioners on the Okanogan County Comprehensive Plan for the February 2, 2015 Public Hearing also explains how to designate forest lands of long-term commercial significance.

## Do not increase densities in the area formerly covered by the Molson Overlay

We support the Methow Valley Citizens Council recommendation not to increase density in the former Molson Overlay for the reasons they explain.[73]

## Do not allow accessory dwelling units on lots smaller than one acre

We support the Methow Valley Citizens Council recommendation not to allow accessory dwelling units on lots smaller than one acre outside of areas planned for urban development. The Methow Valley Citizens Council detailed comments explain why existing regulations prohibit accessory dwelling units on one acre or smaller lots outside areas planned for urban growth.[74]

## The special development provisions currently in the Methow planning area zones should not be repealed

We strongly support the Methow Valley Citizens Council recommendation that the special development provisions currently in the Methow planning area zones should not be repealed. These provisions have been in place for years and have made the Methow a popular outdoor recreation area and protected its agricultural industry. The existing provisions have contributed to the county economy and tax base. As was documented above, outdoor recreation brings $222 million and 1,819 jobs to the Okanogan County economy. [75] Keeping the Methow attractive and functioning for agriculture and outdoor recreation is import to maintain this income and these jobs. The Methow Valley Citizens Council's detailed comments provide more explanation as to why these successful and time-tested provisions should not be repealed as is currently being proposed.[76]

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[72] *Id.*

[73] See MVCC Comments and Recommendations on the Draft Zone Code and Maps "7. A variety of changes under the draft Zone Code would substantially increase density in the former Molson Overlay and should be revised."

[74] See MVCC Comments and Recommendations on the Draft Zone Code and Maps "9. Accessory housing units should not be allowed on legal pre-existing lots less than one acre in area."

[75] Tania Briceno and Greg Schundler, *Economic Analysis of Outdoor Recreation in Washington State* p. 83 (Earth Economics, Tacoma, WA: 2015).

[76] See MVCC Comments and Recommendations on the Draft Zone Code and Maps "13. Special development provisions listed under the Methow planning area zones should be restored."

## The setbacks for the Rural 1, Rural 5, and Rural 20 zones should not be weakened

We support the Methow Valley Citizens Council recommendation that the setbacks for the Rural 1, Rural 5, and Rural 20 zones should not be weakened. The Methow Valley Citizens Council detailed comments explain why this recommendation should be followed.[77]

## RV parks, campgrounds, hotels, motels, and similar uses should have standards that require a conditional use permit and lots larger than the minimum lot size and appropriate to the intensity of the proposed use

We support the Methow Valley Citizens Council recommendation that RV parks, campgrounds, hotels, motels, and similar uses have standards like the standards in MRD zones countywide including requiring a conditional use permit and lots larger than the minimum lot size and appropriate to the intensity of the proposed use. The Methow Valley Citizens Council detailed comments explain why this recommendation should be followed.[78]

## The changes to the District Use Chart (Chapter 17A.220 OCC) should be modified and the dangerous uses not allowed in rural areas where the public facilities and services, including fire services, cannot support them

We support the Methow Valley Citizens Council recommendation that the changes to the District Use Chart (Chapter 17A.220 OCC) should be modified and the dangerous uses not allowed in rural areas. As we documented above, acid manufacturing, explosive manufacturing and storage, petroleum bulk plants, and junk yards, just to name a few, are conditional uses in the Minimum Requirement, Rural 1, Rural 5, and Rural 20 zones.[79] In a wildfire, how would the overburdened fire districts, state agencies, and federal agencies even protect these facilities? They cannot protect the existing residences in the "'interface' between urban and suburban areas and unmanaged forest and rangelands" now.[80] Image the damage to neighboring properties from a wildfire burning an explosive manufacturing or petroleum bulk plant on a one acre or five acre lot. These uses need to be dropped from these zones. The Methow Valley Citizens Council detailed comments provide more explanation as to why these recommendations should be followed.[81]

Thank you for considering our comments. If you require additional information please contact me at 206-343-0681 Ext. 118 or tim@futurewise.org.

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[77] See MVCC Comments and Recommendations on the Draft Zone Code and Maps "16. Setback requirements in the rural zones (R1, R5, R20) should not be reduced, as outlined under the proposed code. Zoning Code setback requirements and lot coverage limits should be reviewed for all zones to better conform to rural conditions and mitigate impacts to groundwater recharge."

[78] See MVCC Comments and Recommendations on the Draft Zone Code and Maps "17. Outside Methow planning area, density of RV parks, campgrounds, hotels, motels, etc. is determined by Okanogan County Health District standards for on-site treatment."

[79] Proposed OCC 17A.220.010.

[80] *Okanogan County, Washington Community Wildfire Protection Plan* p. 88 (2013).

[81] See MVCC Comments and Recommendations on the Draft Zone Code and Maps "19. New uses added and other changes made to the District Use Chart (Chapter 17A.220) raise concerns. Agricultural related industry should be made a conditional use."

Very Truly Yours,

Tim Trohimovich, AICP
**Director of Planning & Law**

Enclosures

# A guide to Firewise principles

THE FIREWISE COMMUNITIES PROGRAM provides homeowners with simple and easy steps to help reduce a home's wildfire risk by preparing ahead of a wildfire. These steps are rooted in principles based on solid fire science research into how homes ignite. The research comes from the world's leading fire experts whose experiments, models and data collection are based on some of the country's worst wildland fire disasters.

Below are Firewise principles and tips that serve as a guide for residents:

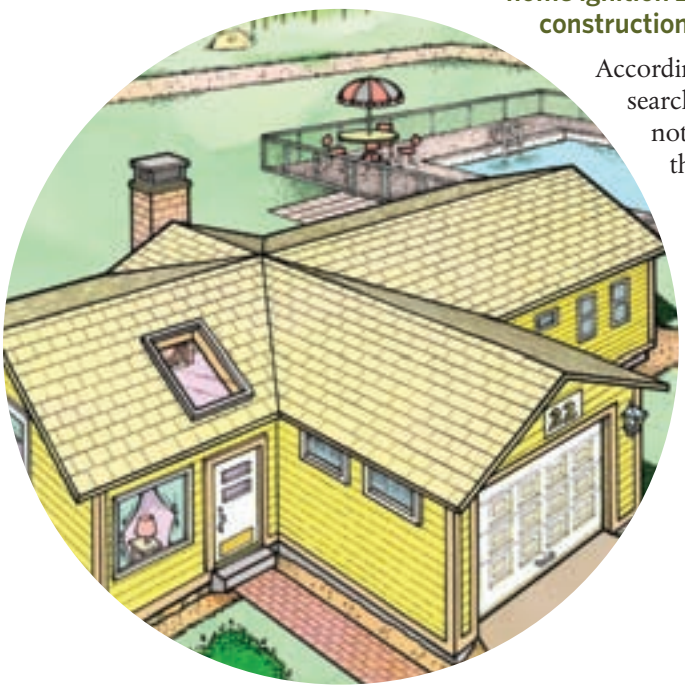
## When it comes to wildfire risk, it is not a geographical location, but a set of conditions that determine the home's ignition potential in any community.

Wildfire behavior is influenced by three main factors: topography (lie of the land), weather (wind speed, relative humidity and ambient temperature) and fuel (vegetation and man-made structures). In the event of extreme wildfire behavior, extreme weather conditions are normally present, like extended drought, high winds, low humidity and high temperatures, coupled with excess fuel build up including the accumulation of live and dead vegetation material. Additionally, the inherent lie of the land influences the intensity and spread a fire takes. Fires tend to move upslope, and the steeper the slope the faster it moves.

Of these three factors, **fuel** is the one we can influence.

Debris like dead leaves and pine needles left on decks, in gutters and strewn across lawns can ignite from flying embers. Fire moving along the ground's surface can "ladder" into shrubs and low hanging tree limbs to create longer flames and more heat. If your home has flammable features or vulnerable openings, it can also serve as fuel for the fire, and become part of a disastrous chain of ignitions to other surrounding homes and structures.

## A home's ignition risk is determined by its immediate surroundings or its "home ignition zone" and the home's construction materials.



According to fire science research and case studies, it's not where a home is located that necessarily determines ignition risk, but the landscape around it, often referred to as the "home ignition zone." The home ignition zone is defined as the home and its immediate surroundings up to 200 feet (60 m).

The Firewise Communities Program provides tips for reducing wildfire risk based on the home ignition zone concept:

**Home Zone:** Harden your home against wildfire. This includes fences, decks, porches and other attachments. From the point of view of a fire, if it's attached to the house it is a part of the house. Non-flammable or low flammability construction materials—especially for roofs, siding and windows—are recommended for new homes or retrofits. Keep any flammables, including plantings and mulch out of the area within 5 feet of your home's perimeter.

**Zone 1:** This well-irrigated area encircles the structure for at least 30 feet on all sides including decks and fences, and provides space for fire suppression equipment in the event of an emergency. Lawns should be well maintained and mowed. Plantings should be limited to carefully-spaced low flammability species. In particularly fire prone areas, non-flammable mulch should be considered.

**Zone 2:** This area encircles 30 – 100 feet from the home. Low flammability plant materials should be used here. Plants should be low-growing and the irrigation system should extend into this section. Shrubs and trees should be limbed up and spaced to prevent crowns of trees from touching.

**Zone 3:** This area encompasses 100 – 200 feet from the home. Place low-growing plants and well-spaced trees in this area, remembering to keep the volume of vegetation (fuel) low.

**Zone 4:** This furthest zone from the structure is a natural area. Selectively prune and thin all plants and remove highly flammable vegetation.

### Homeowners can and must take primary responsibility for wildfire safety action around the home.

There are not enough fire fighting resources to protect every house during severe wildfires, and with shrinking budgets it means we need to do more with less. Fire fighters are trained to safely and efficiently suppress wildland fires, but their effectiveness is reduced when they must sweep decks, move wood piles and patio furniture while trying to fight a fire. According to fire science research, individual efforts do make a difference even in the face of a catastrophic wildfire.

The following steps are outlined by the Firewise program to reduce home ignition risk, based on this principle:

- Prune low hanging limbs to reduce ladder fuels
- Clean roofs and gutters of pine needles and dead leaves
- Keep flammable plants and mulches at least 5 feet away from your home's perimeter
- Use low-growing, well pruned and fire-resistive plants around home
- Screen or box-in areas below patios and decks with wire screening no larger than 1/8-inch mesh
- Sweep decks and porches clear of fallen leaves
- Move woodpiles away from the home during non-winter months
- Bring doormats and furniture cushions inside when an area is threatened by a wildfire
- Close garage doors when leaving your home in the event of an evacuation

### We all have a role to play in protecting ourselves and others.

Your home ignition zone extends up to 200 feet—and it's quite common to have neighbors whose home ignition zone overlaps yours. Buildings closer than 100 feet apart can ignite one another if they are in flames. In addition, many communities have commonly owned property, including natural or wooded areas that can pose fire risks to all. This means that to be most effective, neighbors need to work together and with their local fire service to achieve greater wildfire safety.

Together, community residents can work with agencies and elected officials to accomplish the following:

- Ensure that homes and neighborhoods have legible/clearly marked street names and numbers
- Create "two ways out" of the neighborhood for safe evacuation during a wildfire emergency
- Create phone trees to alert residents about an impending fire
- Review any existing community rules or regulations on vegetation management and construction materials to see if they are "Firewise-friendly"
- Use the "Ready, Set, Go!" program with the fire department to educate neighbors
- Use the Firewise Communities/USA® Recognition Program to create and implement an ongoing action plan that will also earn the neighborhood national recognition for their efforts

LEARN MORE about how to keep families safe and reduce homeowners' risk for wildfire damage at www.firewise.org.

ADDITIONALLY, complimentary brochures, booklets, pamphlets, videos and much more can be found on the information and resources page of the website and ordered online through the Firewise catalog.

FIREWISE COMMUNITIES NFPA

# About Firewise

**About the Firewise Communities Program**

Brush, grass and forest fires don't have to be disasters. NFPA's Firewise Communities Program encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. Firewise is a key component of Fire Adapted Communities – a collaborative approach that connects all those who play a role in wildfire education, planning and action with comprehensive resources to help reduce risk.

The program is co-sponsored by the USDA Forest Service, the US Department of the Interior, and the National Association of State Foresters.

To save lives and property from wildfire, NFPA's Firewise Communities program teaches people how to adapt to living with wildfire and encourages neighbors to work together and take action now to prevent losses. We all have a role to play in protecting ourselves and each other from the risk of wildfire.

**About the National Fire Protection Association (NFPA)**

Founded in 1896, NFPA is a global, nonprofit organization devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards. The association delivers information and knowledge through more than 300 consensus codes and standards, research, training, education, outreach and advocacy; and by partnering with others who share an interest in furthering the NFPA mission. For more information visit www.nfpa.org. All NFPA codes and standards can be viewed online for free at www.nfpa.org/freeaccess.

**Learn more**

- Get to know the people of NFPA's Wildland Fire Operations Division and Firewise Communities Program
- Firewise at NFPA: A brief history



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# Wildfires: Protect Yourself and Your Community

## Personal Responsibility

You can protect your family and home from wildfires by following these safety tips:

Make and frequently practice a family evacuation plan that includes meeting locations, a communication plan and pet accommodations.

Create an emergency bag of personal items that you will need if you are asked to leave your home.

Leave your home when asked to do so.

Use building and yard materials that won't burn easily.

Keep an area up to 200 feet around your home lean, clean and green.

Clean your roof, gutters and deck of dead leaves and pine needles often.

FEMA | U.S. Fire Administration

Insert Logo Here

Fire is Everyone's Fight™

# Wildfires: Protect Yourself and Your Community

## Community Preparedness

Work with your neighbors to protect your community from wildfires by following these preparedness tips:

Follow evacuation instructions from your local emergency officials.

Hold community meetings and work with neighbors to prepare the neighborhood for wildfires.

Practice two ways out of your neighborhood; you will be more prepared if roads are blocked.

Meet with your local fire department. Find out how department personnel can help you prepare for wildfires.

Make sure driveways and house numbers are clearly marked and can be seen from the road.

**Always stay aware of your environment, and when asked to leave by your local emergency officials, please do so. A delay could cost your life!**

**For more information, visit http://www.usfa.fema.gov/prevention/outreach/wildfire.html.**

FEMA | U.S. Fire Administration

Fire is Everyone's Fight™

# Twisp River Fire Fatalities and Entrapments

## *Interagency Learning Review Status Report*

WASHINGTON STATE DEPARTMENT OF
Natural Resources

FOREST SERVICE
U S
DEPARTMENT OF AGRICULTURE

# Twisp River Fire Fatalities and Entrapments


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**18 November 2015**

# Purpose of the Status Report

On August 19, 2015, the Twisp River Fire (Twisp) in the State of Washington tragically cost the lives of U.S. Department of Agriculture, Forest Service firefighters Rick Wheeler, Andrew Zajac, and Tom Zbyszewski. The fire also severely injured another Forest Service firefighter and resulted in the injury of three other firefighters[1] working for the Washington Department of Natural Resources. As we started reviewing this event, it became apparent that more lives could have been lost.

The Forest Service, Okanogan County Fire District 6, and Washington Department of Natural Resources responded to Twisp in a combined effort to suppress the fire while simultaneously protecting several houses, which were believed to be threatened.

The outcome of this event generated an interagency response, and members of these agencies are now working together to produce a Learning Review. This review is intended to understand the event from multiple perspectives in order to develop insights that may reduce the chance of a similar entrapment event in the future. Because the final report will take many months to complete, we have decided to publish this Status Report.

The initial interagency review is in its early stages. We do not have all the information, and there will likely be aspects of what occurred on August 19 that we will never know. The process has already shown that there are things that we can learn as a community. Most of these represent opportunities to learn that cannot be addressed through simple fixes alone. We are obligated to reflect on the events of that day and begin to ask ourselves questions that challenge how we organize to meet the complexities of wildland fire operations. The things that we learn from this reflection may indicate the need for a shift in our interagency firefighting culture. Research has shown that reflection and honest inquiry are integral steps in any cultural change.

This Status Report is designed to share what we know at this stage of the review and to explain the process we are using. It introduces the Learning Review, which was adopted by the Forest Service in 2013, to guide the study of serious accidents. This report presents an abridged narrative designed to show the complex nature of Twisp (the full narrative is being developed and will be released with the final report). The Status Report will also provide a brief description of the next steps.

As we study this and other incidents, it is important to relate what we do know to the larger scope of operations and the work environment so that we can proactively collaborate to create systemic improvements.

The information in the narrative contained in this Status Report is preliminary; information is still emerging regarding the events surrounding the incident.

[1] One of these employees was a contract dozer operator.

# Twisp and the System of Wildland Firefighting

At the Twisp River Fire (Twisp), conditions came together in an adverse and unintended outcome. Our preliminary work on the Twisp review has found that firefighters and agency administrators face many of the same influencing factors throughout the system of wildand fire operations. While similar factors exist on other fires, the outcomes have been very different. Because we are dedicated to prevention, we have to consider whether conditions within the agencies represent vulnerabilities in our organizational approach to wildland fire, opportunities to improve our greater firefighting system, or a combination of both.

There is a deep need after any fatality event to understand what happened so that everything possible can be done to prevent another occurrence. Prevention is not as easy as learning what people should or should not have done at a specific incident. It requires a thorough examination of the system that put people in positions where they felt that their actions were the best option. Between 1910 and 2014[2] the wildland firefighting community lost 1,075 firefighters. This unacceptable loss forces us to reflect on our processes and system of work.

We have a process to evaluate actions and decisions to determine if malicious intent caused the accident. The Coordinated Response Protocol (CRP) begins with a Law Enforcement review to determine if any illegal actions contributed to the outcome. Any indication of illegal activity will initiate a full Law Enforcement investigation. In the case of the Twisp River accident, the Forest Service Law Enforcement investigation is ongoing but has not revealed any indication of criminal activity or malicious intent.

A fundamental premise of the Learning Review (LR) process is that our people are well intended and are doing the best they can in a complex work environment. We recognize mistakes and errors are normal aspects of the human condition and represent opportunities to learn. As Professor James Reason wrote, “We cannot change the human condition, but we can change the conditions under which humans work.” The LR is designed to facilitate learning as much as possible from the event and to reveal the influences or context that shape actions and decisions—why the actions and decisions made sense to those involved. It is also designed to look beyond the incident and to compare what occurred to what we might consider ‘normal work’ so we can begin to understand the systemic influences on actions and decisions.

The LR involves a number of critical elements. First it guides us to create a complex narrative by capturing the stories that surrounded the accident. Then we work to identify key actions and decisions, which commonly represent learning moments. To learn from actions and decisions, we have to understand their context. This is where we begin to connect the influences with decisions and actions. We call upon fire specialists within the agencies (subject-matter experts), who can help us determine if the conditions were unique

[2] This total number of fatalities does not include off-duty deaths.

to Twisp or if they are prevalent throughout normal operations. We also bring in specialists from academic and professional organizations outside the fire suppression communities. Outsiders bring fresh eyes and a different perspective on how our system works. These perspectives help us to question our assumptions, what we are learning, and the conclusions we form during reviews. By incorporating external specialists we have an opportunity to recognize and overcome our biases and to challenge our cultural norms. On the basis of our analysis and a variety of other perspectives, we then offer meaningful recommendations for improvement in our approach to wildland fire and for prevention of accidents.

The LR is designed to recognize that safety is created in multiple places and through multiple methods in any organization; in other words, there are many contributors to the creation and maintenance of a safe work environment. For this reason our organizational response to incidents and accidents includes multiple learning products designed for a range of audiences from the field to top leadership. In order to improve our wildland fire response system, we all have to take the time to reflect and learn from the event.

Accidents are much more than problems to be solved. They are moments in time that reflect networks whose interactions and influences must be mapped and understood. The LR process is not designed to judge individual actions or decisions as good or bad. Instead, it is specifically designed to learn everything possible from the event by looking at it through multiple lenses, or perspectives, to determine if the observed interactions are widespread in normal work. This examination may result in small changes to process or equipment, or it could lead to an agency-wide review and change, such as a shift in organizational culture. We have learned that in order to create relevant cultural change, we have to start by recognizing opportunities and encouraging dialogue and sensemaking across organizational levels.

# Twisp River Fire - Abridged Narrative

## Learning Review Team Perspective

All of us in the wildland fire community want to understand what happened at Twisp River on August 19, 2015. We want to know what the members of our extended wildland fire family experienced that day, and most importantly, we want to learn from the tragic events so that we can prevent a similar event from occurring in the future. Unfortunately, the story behind the events is not an easy one to tell. How and why Rick Wheeler, Andrew Zajac, Tom Zbyszewski, and several other people found themselves in the position they did is incredibly complex. The narrative we share here is intended to answer some of the basic questions that we all have about what happened that fateful day on the Twisp River Fire (Twisp). As members of the Learning Review (LR) team, we want to be transparent, honest, and open about where we are in the learning process and acknowledge that more questions are emerging as we begin to make sense of the event.

This status report represents an early assessment of what we are learning. We have to keep in mind that many things remain unclear. We have produced this status report that represents key aspects of the event and points to a number of areas that we can further explore in Phase 3 of the Learning Review (see "Next Steps" at the end of this report). All of the details that we uncover will be shared in the final Learning Review, which will be available on the Wildland Fire Lessons Learned Web site.[3]

As you read this abridged story of Twisp, you may feel like the lens through which you are reading is fuzzy and that details are missing. It may seem as though you are looking down on the incident from 30,000 feet above the ground. You should feel this way. We all feel this way. We are still focusing the lens through which we look.

It is important for readers to know certain facts in advance: The entire incident that we describe below happened in three to four hours. The fire more than doubled in size in approximately 15 minutes. Three Forest Service (FS) fatalities and one critical injury occurred on Engine 642. Two Washington Department of Natural Resources (DNR) employees and a contract dozer operator were also entrapped in the fire but survived with minor injuries; all three sought refuge in a garage and then later deployed their fire shelters. Several other engines encountered severe fire conditions. All the firefighters engaged in operations at Twisp were exposed to the trauma associated with the fatalities.

What follows is an abridged narrative of the Twisp incident.

[3] Go to www.wildfirelessons.net.

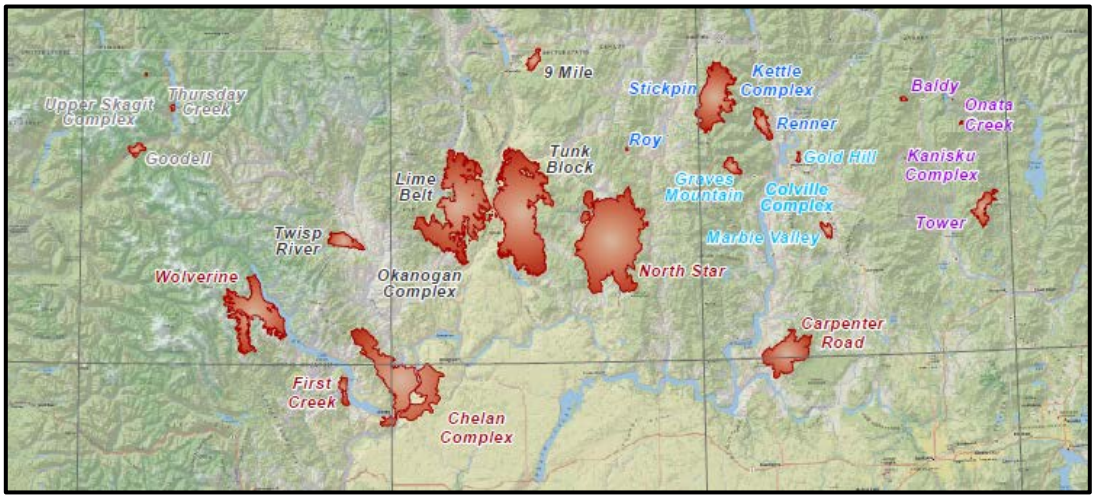


**Figure 1—Location of large fires near the Twisp River Fire.**

## Twisp River Fire, August 19, 2015

It was fire season near Twisp, Washington, and August 19, 2015 was a day much like those that preceded it. It was incredibly hot and dry. Experts in climate, weather, and fuels classified the area as being in "extreme drought." The local interagency dispatch centers were very busy. There were several very large fires in the area (Figure 1), as well as many small fires that resulted from earlier lightning storms. The Twisp River Fire (Twisp) started about five miles west of the town of Twisp. About 20 homes were scattered throughout the area near where the fire started.

Fires in the Twisp area commonly burn across different land management and firefighting jurisdictions. Twisp started on land in the vicinity of mixed protection areas and eventually burned onto private, state, and federal land. As a result, multiple agencies were responsible for managing the fire. The Washington Department of Natural Recourses (DNR), Okanogan County Fire District 6 (FD6), and the U.S. Department of Agriculture, Forest Service (FS) ultimately sent resources to help fight the fire.

Twisp became a complex incident as soon as multiple agencies were dispatched to this fire in the wildland-urban interface. More complex and longer duration fires are commonly called Type 2 and Type 1. These types of fires are staffed with pre-established teams, whose members know each other's roles and responsibilities. Smaller and less complex initial attack fires (Type 4 and 5) are not staffed with these pre-established organizational support teams. Type 1 or 2 organizations typically have command positions including logistics, operations, finance, and planning, and staff positions such as safety, information, and liaison.

According to common firefighting practice, all three agencies involved (FS, DNR, and FD6) provided an incident commander (IC) to manage Twisp (two of which were Incident Commander Type 3 qualified). The Forest Service also provided an ICT3 (Incident Commander Type 3 trainee). It is normal practice to have trainees work with qualified fire line positions. In fact, this is a key component of the wildland fire training system. The three different agencies all have slightly different training programs, radio frequencies, and agency cultures.

The ICT3 position serves as the bridge or transition point from Type 5 or 4 fires (which are not managed by teams) to Type 2 or 1 fires (which are always managed by teams). Type 3 ICs often find themselves in situations where they are asked to coordinate fires that are increasing in complexity while a Type 2 or Type 1 team can be assembled and mobilized to take over management of the fire. In some instances, ICT3s are surrounded by a predetermined team of people who regularly work together and have a clear division of responsibilities. In other instances, they are ordered through the dispatch system as a standalone IC who takes charge of an incident. It is not unusual for these standalone ICs to use leadership from available suppression resources (such as engines and crews) to help out with the planning, operational, and logistical demands. This was the way that the "points of contact" referenced later in the narrative were staffed at Twisp.

When fires spread across jurisdictions (such as when Twisp burned across private, state, and federal land), the responding agencies often create a "unified command structure" in which representatives from each agency join together to make decisions. This unified command often requires extra time for coordination of resources and to build a shared mental picture of what is occurring on the fire. Each agency involved in a unified command structure sends its available resources to assist, such that the response becomes an interagency operation. During Twisp, the three ICs and one ICT3 trainee from the different agencies entered into unified command in response to a very complex fire.

Adding to the complex nature of the emerging fire organization, these ICs had to negotiate extreme drought conditions in an area where structures were threatened while building a team from the resources that were on scene. They were also dealing with the challenge of working with three different dispatch centers (two interagency wildland fire dispatch centers and one 911 dispatch center) that had dispatched resources to this fire.

Standard fire operating procedures in this area of Washington State require local dispatch centers work together to provide the three ICs with as many resources as they could so that the ICs could "catch the fire" as quickly as possible.

These ICs were expected to manage the following interagency resources from various agencies:

- 3 structure (Type 1) engines
- 2 medium (Type 3) structure/wildland fire engines
- 9 light (Type 6) wildland fire engines

- 2 water tenders
- 2 FD6 division chiefs
- 2 dozers with crew (a crew of 2 for 1 dozer; a crew of 3 for the other dozer)
- 1 hand crew (16 people)
- 1 4-person helitack crew
- 1 light helicopter
- 2 medium helicopters (one did not arrive on scene until after the entrapment)
- 1 heavy helicopter
- 1 air attack (to provide eyes over the fire)
- 3 heavy air tankers (carrying retardant)
- 1 lead plane (to help guide the retardant tanker)

As the complexity of the incident increased, the ICs realized that they needed to establish an ad hoc command structure. They identified two engine bosses and assigned them as "points of contact" to help with fire suppression oversight and to establish a manageable span of control for the ICs.

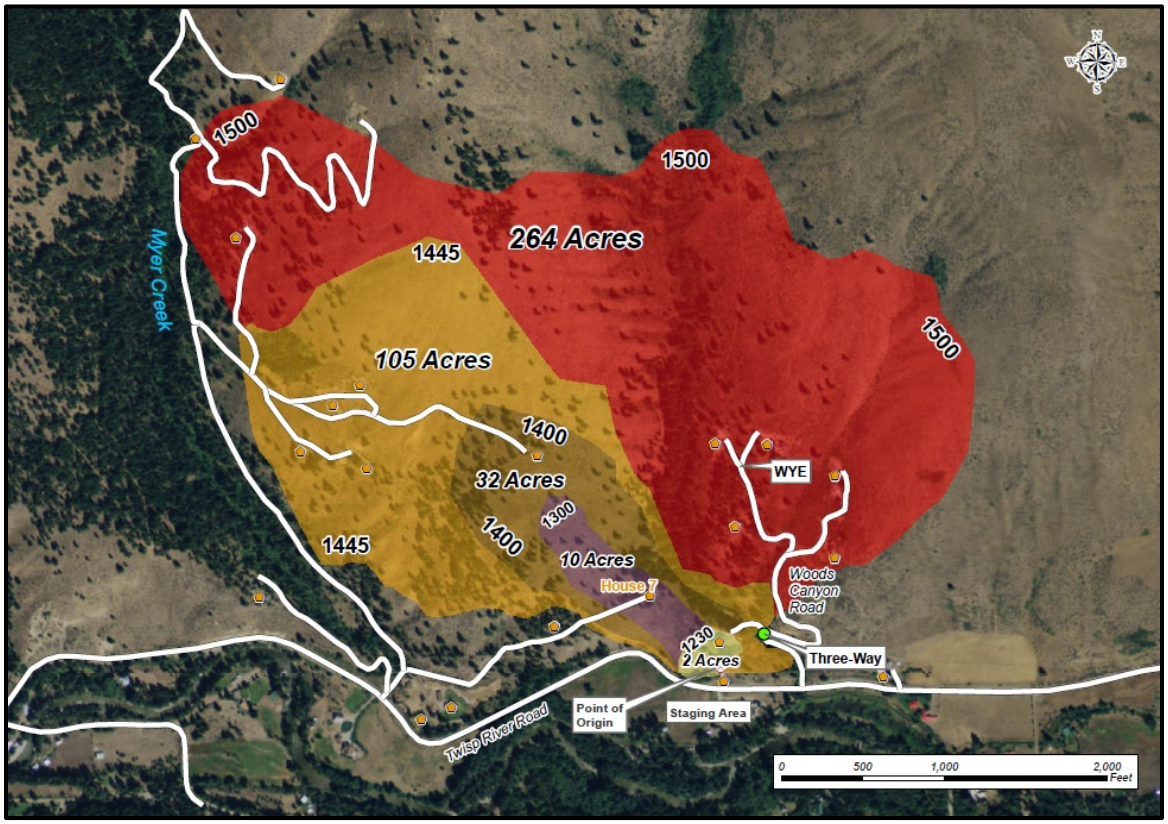


**Figure 2—Estimated progression map from 12:30 p.m. to 3:00 p.m. (1500) of the Twisp River Fire on August 19, 2015.**

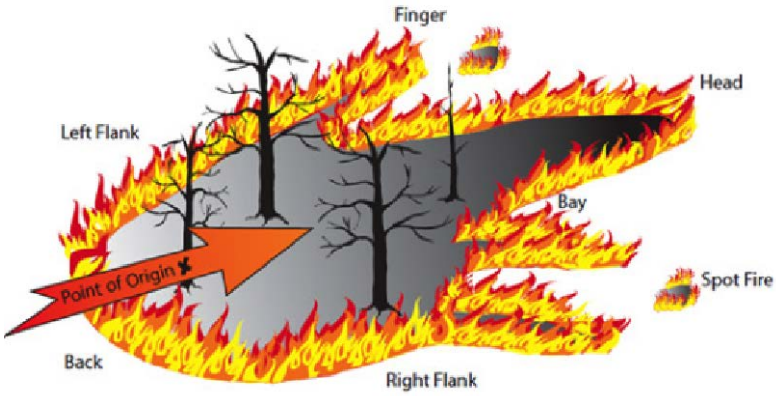


**Figure 3—Depiction of parts of fire with common terms.**

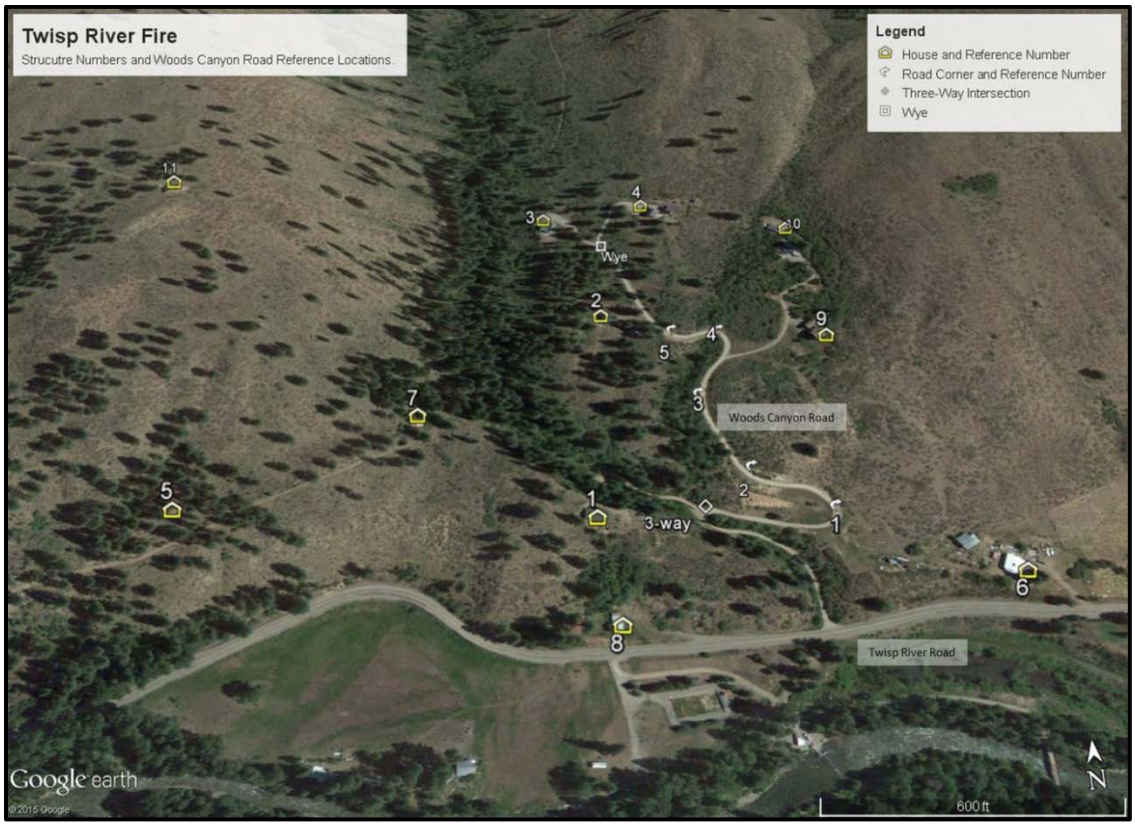


**Figure 4—Area map with vegetation; staging area is below house 8 (Google Earth map).**

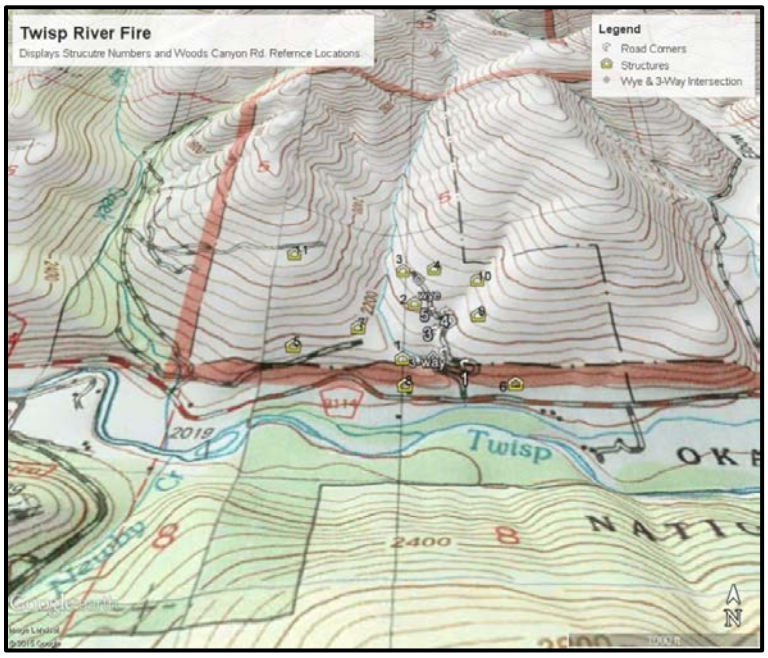


**Figure 5—Topographic map of the area around the Twisp River Fire.**

The first firefighters on scene stated they saw three- to four-foot flame lengths at the head of the fire. The fire was terrain driven; the wind was light out of the southeast; and the fire was roughly two to three acres in size. As the fire progressed, the fire on the left side burned more quickly. This rate of spread was mainly due to the uphill slope on the left side (Figure 5, Figure 3). Within four hours, the fire had spread dramatically over the area. Figure 2 shows that the fire more than doubled in size in approximately 15 minutes.

The FD6 IC was the first to reach the scene. As he was driving he caught site of the fire from about a mile and a half away. He knew the area and told his resources to stay down near the highway and deploy at the back (or heel) of the fire. When he got on scene, he drove up the fairly steep, winding Woods Canyon Road and told residents in the structures along the road to evacuate. He established a staging area along Twisp River Road at the back (or heel) of the fire to brief incoming resources (Figure 4). He was worried that he would not be able to get additional resources because of all the surrounding fire activity (Figure 1).

The ICs arrived at different times within the first hour and a half of the initial dispatch. As these and other resources met at the staging area, it was determined that the FS ICT3 would take the lead under the unified command structure (see Page 8 Resources List). The fire leadership[4] met and discussed a tactical plan to fight the fire and ordered heavy air tankers for retardant application.

The fire had started in an area covered by two interagency wildland fire dispatch centers. Resources arrived on scene with different repeater frequencies loaded in their radios. After

[4] Fire leadership at this point consisted of the FD6 IC, FS ICT3, and FS ICT3 trainee; the DNR ICT3 was not yet on scene.

the location of the fire was plotted, this frequency confusion had to be sorted out. As the ICs organized to fight the fire, they began ensuring that the many resources they were leading had the correct frequencies programmed into their radios so everyone could communicate effectively (no reprogramming was necessary).

*Dispatch held the departure of the fixed-wing aerial resources (tankers and lead plane) at the airport until the air attack reported on scene. Ground resources and air attack were unaware that the fixed-wing resources were being held. When air attack arrived over the fire, the pilot noticed a lot of up-air—more than he had ever experienced before. He later wondered if the up-air he experienced was a precursor to the extreme fire behavior event to come.*

Some resources on the fire had access to the general fire zone forecast read over the radio that morning. Several firefighters were reassigned from other fires in the area where they had received a more locally specific fire weather forecast for the Chelan Complex, which was located about 40 miles away from Twisp. This localized forecast predicted a wind shift between 3 and 5 p.m. The ICs did not have access to this forecast. Other firefighters who had that information may have discounted the weather information based on their individual experience with perceived weather forecast inaccuracies in that area.

The fire had grown to about 10 acres and had a defined head and flanks. The FD6 IC, the FS ICT3, and the FS ICT3 trainee met and developed a plan. They observed three- or four-foot flame lengths at the head of the fire and about two-foot flame lengths on the flanks. The FS ICT3 and trainee discussed engaging the fire up Woods Canyon Road. The FD6 IC was feeling more comfortable moving up off of the highway now because the head of the fire had burned away from the Woods Canyon Road area; the right side was less active; and he trusted the expertise of the FS ICT3s.

The initial tactical plan that the ICs agreed on was a standard one. Their objectives were to protect life first, then property. The firefighters would "anchor and flank the fire, going direct." This means that the firefighters would start at the safe, already burned area at the heel of the fire and work their way around the fire, staying as close to the black (burned) area as possible. The fire was divided into a right side or flank and a left side. "Points of contact"[5] were identified as the leaders for each side (flank) of the fire and given resources to employ to suppress the fire. There were structures threatened on both sides of the fire.

Firefighters on the left side of the fire began using three helicopters (heavy, medium, and light) to make water drops. Another medium helicopter had been ordered and was still in

[5] "Point of contact" is the term used on the fire to describe personnel who assumed duties similar in nature to those of a Division/Group Supervisor (DIVS). DIVS is not a required position on Type 3 fires. The fact that firefighters recognized this need is further indication of how complex this fire was becoming.

route to the fire. The engines were deployed near the heel of the fire looking for spot fires and cooling things down along the fire's edge near Twisp River Road (Figure 4). The hand crew, two engine crews, and helitack crew were constructing direct line from the anchor point along the left side. One of the DNR engines drove up Twisp River Road to house 5 to see if they could protect it. Resources were committed to establishing and holding an anchor point along Twisp River Road.

Meanwhile the right side was being scouted and assessed. This side of the fire was less active than the left. Some engines began to scout the structures along Woods Canyon Road, a dead-end, one-lane dirt road (see Figure 4). One firefighter was dedicated to direct helicopter bucket drops to help with structure protection.

Resources on both the right and left sides of the fire were still trying to ensure that their radios were programmed with the correct frequencies so that they would all be able to communicate with each other. No adequate procedure exists to resolve this issue; crews adapted in real time to find a functional solution.

**Figure 6—Photo taken at 1:09 p.m. looking northwest on Twisp River Road. The house in the lower left corner is House 6 in figure 4.** (Photo courtesy of Marcy Stamper, Methow Valley News)

The firefighters assigned to the right flank conducted a briefing at the three-way intersection (Figure 4). They discussed LCES (Lookouts, Communications, Escape routes, Safety zones). The firefighters determined that "they would each be their own lookout," identified their communication frequency, and agreed that their escape route would be back down the road to the staging area (safety zone).

They also discussed the predicted wind shift "at 3:00 p.m." At the conclusion of this briefing, they agreed that the "point of contact" would go up Woods Canyon Road to assess what was above the three-way intersection. He was conducting his initial recon and was not aware that the FD6 had already evacuated the residents. Almost as soon as he began hiking, he realized how far the road went up the canyon and called for Rick Wheeler to drive him up the road in Engine 642. They scouted for potential dozer line, triaged houses, and checked to see if any residents were still in the area. The rest of the crew from Engine 642 remained in the three-way intersection area with firefighters from the other FS engine.

The DNR dozer group arrived on scene and began scouting for a place to put in dozer line. The group traveled cross-country on the right side, bypassing the three-way intersection, and found a bench that looked like a good place to put in dozer line. The dozer started constructing line from the Woods Canyon Road along a flat bench below house 2 and planned to connect the dozer line up to the driveway at house 3. In the process they tied in with the "point of contact" without realizing who he was or where he was in the hierarchy. They discussed the option of putting the dozer line right on the fire's edge (direct attack) but instead decided to stay on the bench (indirect attack) because they did not want to cross a drainage between the bench and the fire (Figure 2).

The "point of contact" decided that he did not want any engines besides Engine 642 on the Woods Canyon Road until the dozer finished building line between houses 2 and 3. The remaining firefighters on that side of the fire concentrated their efforts on the lower portion of Woods Canyon Road, watching for spot fires and securing the anchor. The firefighter who was working with the helicopter doing water drops was surprised when the helicopter he was working near the three-way with did not return with another bucket; he was unaware that the helicopter had left the fire to refuel.

After initially scouting the structures on the right flank, the "point of contact" called for three more firefighters to help Rick with structure protection at house 2. The "point of contact" continued scouting on foot. Rick left house 2 in Engine 642 and drove down to pick up the three firefighters and bring them to house 2. The reconfigured engine crew consisted of Rick, Andrew Zajac, Tom Zbyszewski, and another firefighter. They drove to house 2, parked the engine, and started structure protection operations.

The right side "point of contact" asked for two engines that were in the staging area to come up Woods Canyon Road to help with structure protection. Plans were changing rapidly, and the coordination of resources was becoming more complex. New resources had arrived, and organizational conditions were changing. After consulting the FD6 IC and agreeing on a tactical plan to engage in structure protection, the FS ICT3 offered an additional FD6 engine, bringing the total number of engines to four on Woods Canyon Road. The "point of contact" accepted the offer and briefed the FD6 engine crew shortly before they began structure protection at house 3.

Meanwhile on the left side of the fire, some of the firefighters noticed the smoke column shift from leaning over their flank of the fire to standing straight up. They also noted that

the wind had changed direction. The engines continued to work on putting out spot fires and noticed the work got slightly easier. The left flank "point of contact" recalled:

"Around 1445 I looked up and saw Air Attack and thought, 'That's weird.' I felt little wind and there was a forecasted wind [shift] out of the west that morning. We talked about it at some point in the day, so a lightbulb went off that this was probably the wind switch. I stood there and watched. My flank of fire had calmed down and was no longer the priority. I noticed the smoke starting to blow the other way; [it] wasn't cranking, but I got the feeling things [were] changing."

The "point of contact" for the left side called the "point of contact" for the right side and told him that he could have the air resources because it was beginning to look as if the right side of the fire was getting more intense fire behavior. Air attack was not aware that there were ground resources on the right side of the fire up Woods Canyon Road but did realize that the priority was shifting to the right side. Smoke also made it extremely difficult for aerial resources to be of use on the right side.

The dozer continued constructing line between houses 2 and 3 and was close to tying in to house 3 when fire burned up to the dozer line below house 2. One of the dozer crew members saw ash starting to fall, which he inferred to mean the wind had shifted above him; despite the observed two-foot flame lengths he recognized the potential for a change in fire behavior. He gave orders for the other two dozer group members to get to house 3 as quickly as possible.

As the right side "point of contact" was briefing an additional incoming engine at the "Y" (referred to as "Wye" on maps, Figure 4), the fire behavior drastically increased. The wind had shifted and increased speed. Correspondingly, extreme fire behavior was observed, which astounded even the most experienced firefighters at Twisp. Several firefighters reported the winds seemed more like a "strong breeze" than a heavy wind, adding to the surprising nature of the increased fire behavior.

One firefighter in the area saw the Engine 642 crew members scramble to get into their truck. He watched them drive up the road in the opposite direction of their safety zone. He noted there were 60-foot flame lengths and could feel the heat as the fire licked over house 2 moments after Engine 642 left. This firefighter, who was in his ninth year of firefighting in the local area, stated, "I have never seen fire move this fast."

The right side "point of contact" saw Engine 642 driving up to him, so he whistled and swung his hand over his head, indicating they needed to turn around and get out. The "point of contact" yelled, "RTO! [Reverse tool order!]," meaning that all crews needed to follow their escape route back down the road to the safety zone. Engine 642 turned around in the road and was the first engine to head toward the escape route. One of the other 3 engines turned around at the "Y," and another engine drove up to house 4 to turn around. The fourth engine remained at house 3.

As Engine 642 drove down toward the safety zone, the road was completely obscured by smoke. The engine jolted and dropped down as if a tire had popped. They kept driving downhill, but they had zero visibility, and the engine went off the road. The engine came to a stop, and the surviving firefighter got out and was immediately engulfed in flames. He went through the flames and made his way to the road.

The surviving engine crews said they had never seen or heard anything like the fire behavior they experienced. They could not hear anything due to the deafening noise, which one firefighter described as, “like a giant TV tuned to static and turned up full blast.” As one engine recounted their retreat to safety, “the smoke conditions were black as night, and at one point fire was over the top of the engine.”

The “point of contact” was on foot heading down the road with his hand on his fire shelter, contemplating deploying it, when the engine that turned around at house 4 stopped and yanked him into their engine. Once in the engine, the “point of contact” radioed, “Emergency traffic! Road compromised! Need aerial support!” The “point of contact” contacted firefighters back at the staging area to find out about the location of his resources and was told that Engine 642 was not there. During this period of evacuation the radio traffic was incredibly busy; too many firefighters were trying to use the radio at the same time for anyone to communicate effectively.

Further up Woods Canyon Road at house 3, the dozer group saw fire licking around the side of the house. The dozer operator still inside the open-cab dozer was not overly concerned and thought the crew could ride out the fire near the house. Soon, the cab of the dozer became too hot to stay in. The operator shut down the dozer but did not take his fire shelter because it was attached with a bungee cord to the dozer cage, and he did not think he would need it.

The three dozer crewmembers initially huddled between the garage and the dozer, but as it got hotter they pried open the roll-up garage door and went into the garage. Eventually they realized the structure was on fire, and it began getting hot in the garage. They called on the radio for the engine nearest to them to spray water on the garage, but they did not receive a response. They could not hear anything on the radio due to the deafening noise.

The engine crew at house 3 used most of its water to cool down the advancing fire; they targeted the house, dozer, and a small group of trees near the house. The engine crewmembers could no longer see the dozer crew, and in fear for their own lives, headed down the escape route. It was incredibly hot and smoky inside the cab of the engine, and they had to make their way down the road in “little chunks,” waiting for visibility to improve and the temperatures to cool down enough to continue driving.

The dozer crew had chosen to ride it out in the garage and did not feel abandoned by the engine that left the scene. Eventually, the three recognized that the garage was on the verge of collapse, so they opened the garage door and moved behind the dozer to shield themselves from the heat. It was immediately apparent that this was not enough

protection, so they moved quickly to the "Y" to deploy their fire shelters. The three men fit into two shelters (Figure 7).

**Figure 7—A depiction of how the dozer group was oriented while in the two shelters. The remnants of house 3 and dozer are in the background of the photo.**

Things were happening rapidly and nearly simultaneously as the fire grew.

Another firefighter who had escaped the fire blow-up on foot reached "switchback 1." He heard his name being screamed and someone yelling, "We need help up there! Please, we need help!" As he got closer, he realized the person yelling was one of the crewmembers from Engine 642. He was severely burned, had taken off his yellow shirt, and was no longer wearing a hardhat. Together the two firefighters ran down the road to meet with the engines near the "3-way," which were staffed by paramedics. After ensuring that the burned firefighter was receiving treatment from an Emergency Medical Technician Paramedic (EMTP), the uninjured firefighter ran down and alerted the FS ICT3 of the injury. The burn victim was evacuated from the fire in an ambulance and then flown via helicopter to Seattle's Harborview Medical Center burn unit.

On the left flank of the fire, resources began hearing that someone had been burned. The left side "point of contact" decided to suspend operations. At 3:08 p.m. the FS ICT3 ordered all resources to disengage from the fire and head to the staging area.

The ICs alerted dispatch that they had an entrapment on the right flank of the fire. At 3:09 p.m. the lead plane began directing retardant drops; first a C-130 split its load into two drops, and next a DC-10 dropped four loads. Finally a P2V dropped two more loads. At least one of the drops reduced the heat felt by the dozer crewmembers in their fire shelters.

Most of the air resources left the fire thinking that no one was seriously injured. There was a huge sigh of relief when the dozer group stated that no more retardant was needed in the entrapment area. Most of the resources on the fire thought disaster had been averted. It was not until the pilots landed that they found out there were fatalities on Twisp.

Back at the staging area, resources realized that Engine 642 had not made contact after the fire blew up. The FS ICT3, the right side "point of contact," and another experienced firefighter headed up Woods Canyon Road in a pickup truck to find the dozer group and look for Engine 642. At the "Y," they saw a fire shelter and watched the three members of the dozer group come out of their shelters. While taking the dozer group down the road for medical care, the FS ICT3 noticed what appeared to be skid marks leading off the road, near "switchback 3" (Figure 4). They saw Engine 642 off the road with the rear door on the driver's side wide open. The engine was still burning and the area was all black. The FS ICT3 continued to take the dozer group down the road to seek medical care while the "point of contact" and the other firefighter stayed at the engine to assess the scene. They confirmed that there were three fatalities.

A Type 1 incident management team was ordered, and shortly after that an evacuation was ordered for the towns of Twisp and Winthrop. The sheriff, a coroner, and a deputy arrived at the scene, and the FS ICT3 escorted them up the road to Engine 642.

One of the DNR engines cooled the area around Engine 642. Although emotionally affected, the FS ICT3 stayed on the fire to act as leadership and to transition to another ICT3 to manage resources at the fire until the Type 1 team could take over. The FS ICT3 trainee was tasked with caring for the other firefighters and getting them home, as there were many extremely traumatized people on the fire. The FS ICT3 acknowledged the emotional impact this incident had had on him, and although he made it clear that he wanted to transition with another IC, he was not relieved until 9:30 p.m.

**Figure 8—A photo of the post fire scene (paved road is Twisp River Road and the dirt road is Woods Canyon Road).**

## Questions to Initiate Dialogue

Like us, you certainly have unanswered questions about this incident. We do not know all the answers to the questions we are facing, and some questions may never be answered. This report is designed to provide readers with the best current information and to inspire reflection. We hope that this status report gives you the opportunity to examine some of the practices that we in the wildland firefighting community consider "normal."

The decisions and actions at Twisp appear to be part of normal work operations for our firefighters. We ask that you (the reader) make every effort to avoid finding fault in the decisions or actions that others made. We have blamed in the past and it has not led to prevention. Instead please focus your attention on the larger system that put these members of our firefighting community in this position. This examination of our system is what the Learning Review team will be undertaking over the next several months. We will be considering questions like the following as we start our sensemaking process.

- How do we fight fires differently if there are structures in the area? Should we as an organization and as a nation reconsider our objectives, strategies, and tactics in the wildland-urban interface?
- How and to what extent does the current firefighting system place ICT3 incident commanders in a position to be successful? What framework/processes/norms are inhibiting ICT3s from being successful? What framework/processes/norms are currently facilitating the success of ICT3s and how do we build on those?
- How might we enable ICT3s to work together to develop shared leadership in complex situations so that we are better able to adapt to and mitigate risk?
- How and when should firefighters communicate what they are going to do, how they are going to do it, and why? Who needs to be communicating about key issues before, during, and after a fire event?
- How did the weather prediction intended for another incident in another location affect decisions made on the Twisp River Fire? How can we share information that we receive during a fire event so that we can make sense of it and decide whether it is relevant or not?
- How do you incorporate risk in your decisions?
- In what ways are the fire operations at the Twisp River Fire common to firefighting operations that you have been part of (do they represent normal work)?

# Learning Review Process

We have to begin any learning-based study by recognizing that our employees intend to create successful outcomes and avoid accidents. Understanding incidents or accidents may lead to technical fixes (such as improvement to equipment or development of a new rule). Those will be enacted as quickly as they are identified. However, technical aspects of the incident rarely address the deeper social factors. For this reason we want to look beyond this incident to determine if there are widespread or systemic influences that we can identify and for which we can develop strategies to change. The Learning Review process is designed to help guide our understanding and to shape ways to affect meaningful change.

The Learning Review is divided into four phases.

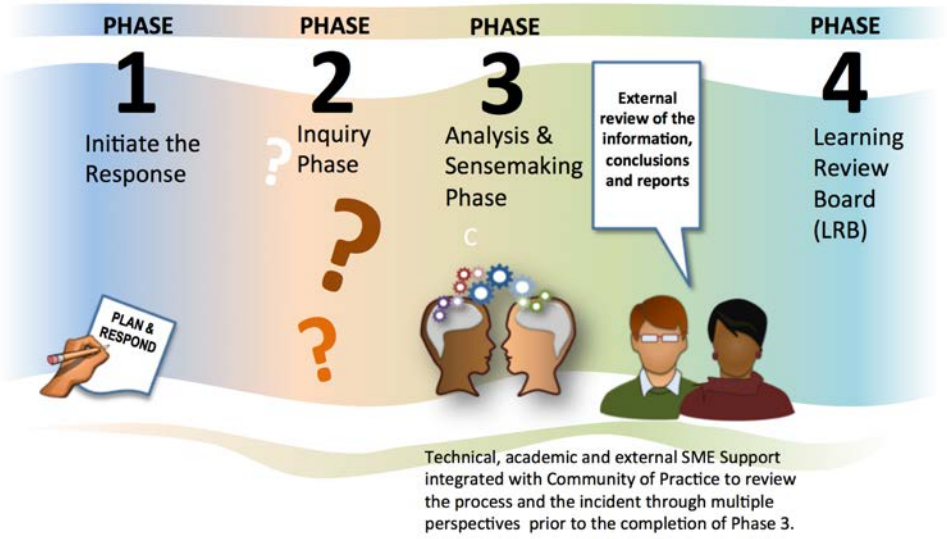


**Figure 9—The four phases of the Learning Review.**

**Phase 1—Initial Response to the Accident:** The Learning Review team is selected and dispatched through the Coordinated Response Protocol.

**Phase 2—Information Collection Phase:** During this phase, information is collected from a number of on-scene and off-scene sources. The interviews of the principal people involved add to an ever-growing understanding of the complex interactions that took place before and during the event. The result of this section is the creation of a narrative that attempts to capture the various perspectives of those involved. These perspectives are not resolved into a single story; rather they are each described in the narrative to help understand how different perspectives were, or were not, recognized and communicated during the event. The team then identifies key decisions and actions. Decisions and actions do not stand alone; they occur in the context of other aspects of the environment, which we call conditions or influences. We focus considerable attention on capturing the conditions that may have influenced the decisions and actions.

Prior to completing the narrative it is shared with the principal individuals involved in the incident to ensure that their perspectives are captured.

If the information gathered in Phase 2 suggests the need for a technical report to describe things like equipment malfunctions or failures, this will be initiated.

**Phase 3—Sensemaking and Analysis Phase:** During Phase 3, the LR team humbly recognizes that it can create a better product by asking for help from experts both inside and outside the organization. Using the narrative and conditions of influence, the team will first ask members of the community of practitioners (people who do, or have done, similar work as those involved in the incident) to help to build a more thorough understanding of the conditions that exist in the organization. This allows the process to look beyond the incident, and the focus shifts to understanding the influence and role of the culture and climate of the organization in the accident being reviewed. The team will research similar events from Forest Service and other agency history, looking for commonalities. This will help identify system-wide opportunities to improve.

Often people within an organization are so immersed in the dominant culture, or have biases, that make it difficult for them to see their own cultural pressures or organizational frailties. For this reason, outside experts are included in the review process. These experts are academic and industry specialists who are asked to critically review the information and the organization from their perspective. These external subject-matter experts will provide an important outside perspective.

Technical analyses will also be completed during this phase. This part of the review can examine equipment, information delivery systems, training systems, transportation systems, or any technical aspect of the incident and will point out needed corrections or fixes. This information may result in a separate technical report or chapter or appendix in the final report to the organizational leadership. The final report will be available to the public.

All the information collected will be presented in a draft report, which includes the suggested recommendations. These recommendations will be vetted through additional focus groups consisting of specialists in field operations, organizational leadership, and outside experts. This represents a form of quality control designed to ensure that the recommendations are meaningful and can be implemented (even if they represent long-term investments in change).

This work represents an examination of the system from multiple internal and external perspectives. Consulting our internal experts ensures that our workforce is represented and consulted in all phases of the process. External subject-matter experts provide a balanced approach that may force us to look critically at ourselves and our processes. The information is used to create recommendations regarding system-wide improvements to all aspects of the operation, including the upstream management of risk, preparation of our personnel at multiple levels, organizational weaknesses, and technical improvements.

**Phase 4—Agency Review and Approval Phase:** The Learning Review Board (LRB) consists of voting and non-voting members of the agencies. Voting members are agency senior-level managers and leaders. Non-voting members are program directors who will be influenced by the recommendations or who oversee safety programs, members of the team that created the report, union representative(s), and subject-matter experts as required. The LRB will be presented with the report in advance of the meeting. A presentation of critical information will be presented to the LRB, normally led by the Response Leader and the Team Leader. The LRB will review the report and recommendations and determine if additional work is necessary. Once the report and Safety Action Plan (recommendations) are accepted, then the report will be made available to the field and the public.

# Next Steps

## Twisp River Learning Review Phase 3

As we move into Phase 3, questions will arise that were not addressed in the narrative. As these issues are resolved, additional detail will be added to the full narrative. This expansive narrative will serve as corroborating information for any conclusions drawn during Phase 3 or presented in Phase 4. The full narrative will be released with any other learning products when the process is complete.

We are now engaged in Phase 3 of the Twisp River Fire Fatalities and Entrapment Learning Review. The LR team will use the narrative and conditions of influence (derived from interviews, on-scene inspection, review of participants' background, assessment of work/task loads, fire behavior, information available to crews and leadership, and any other relevant information) to build a thorough understanding of the event from the perspectives of those involved. As described in Phase 3 (above), this becomes the starting point for a thorough examination of the system and how it can be improved.

In order to look beyond the incident, the team will present the narratives and conditions that influenced decisions and actions to a variety of specialists. We will start this process by creating focus groups made up of subject-matter experts who have a deep understanding of the kind of work that was being done at Twisp when this accident occurred. The initial focus groups will first engage engine captains and their assistants, ICT3s, heavy equipment bosses, hand crew supervisors, dispatchers, aerial supervision people (air attack and lead plane pilots), fire management officers, predictive services people, and organizational leaders (line officers).

The information received from each focus group will inform the next in a growing understanding of the actions leading up to the accident and the influences that made those actions make sense to those involved at the time. The focus groups will also explore if the conditions are widespread throughout the organization or if they were unique to Twisp.

The narrative will not be changed by these discussions; however, the list of conditions of influence will be added to or reduced as the focus groups enhance the existing body of knowledge around the incident. This process helps the team to build a more extensive map of the pressures associated with normal work—what it is like to be placed in a situation like Twisp. A large part of mapping the pressures of normal work comes from understanding what our people face in the performance of their duties. This mapping effort will inform us regarding how well we prepare, communicate, train, and equip our personnel to complete their missions.

The team will take this information to outside specialists. These professors or industry professionals provide different perspectives, or lenses, that will help us to evaluate the information collected by the team. We have already selected professors who conduct research in policy, training, communication, adult education, team building, and system

complexity to review the Twisp River information. Viewing the information through these different lenses will help the agencies to look critically at our operations.

This outside view is very important; outsiders commonly ask questions about aspects of our daily work and culture that we may not think to ask ourselves or even see. Additionally, these outside perspectives are informed by years of research that would not otherwise be available to a traditional "investigation" team. This becomes a critical review of what we have learned and informs the next part of Phase 3, the development of recommendations. Research has shown that the knowledge resides throughout the communities of practice (the workforce and leadership). Therefore, we will involve cross-sections of the organization and academic or other professional specialists in focus groups to help shape recommendations that emerge from a Learning Review.

## Twisp River Learning Review Phase 4

Phase 4 is the presentation of reports, recommendations for field learning products (or presentation of field learning products if they are completed), and recommendations for systemic improvements to the leadership of the organization. The Twisp River Fire is the first time the Learning Review has been applied to an interagency accident. As a result, the Learning Review Board will include members of both the Forest Service and the Washington Department of Natural Resources.

# Okanogan County, Washington

# Community Wildfire Protection Plan

## 2013

UPDATE

***Buckhorn Fire, Okanogan County, Washington – September 2012***

This plan was developed by the Okanogan County Community Wildfire Protection Plan committee in cooperation with the Okanogan County Department of Emergency Management, Washington Department of Natural Resources, and Northwest Management, Inc.

# Acknowledgments

This Community Wildfire Protection Plan represents the efforts and cooperation of a number of organizations and agencies working together to improve preparedness for wildfire events while reducing factors of risk.

Okanogan County Commissioners
and the employees of Okanogan County

Washington State Department of Natural Resources

USDI Bureau of Land Management

USDA Forest Service

USDI Bureau of Indian Affairs

USDI Fish & Wildlife Service

Confederated Tribes of the Colville Reservation

Federal Emergency Management Agency

Washington Military Department
Emergency Management Division

City of Omak
City of Okanogan
City of Oroville
City of Tonasket
City of Brewster
City of Pateros

Okanogan C. D. C.

Town of Conconully
Town of Nespelem
Town of Elmer City
Town of Coulee Dam
Town of Riverside
Town of Twisp
Town of Winthrop

Okanogan County Fire Districts #1 - 16
City of Omak Fire Department
City of Okanogan Fire Department
Town of Conconully Fire Department
Town of Coulee Dam Fire Department

Okanogan County Sheriff's Department
Okanogan County Public Utilities District
Okanogan Conservation District
&
Local Businesses and Citizens of Okanogan County

To obtain copies of this plan contact:

Okanogan County
Sheriff's Office
123 Fifth Avenue North, Room 200
Okanogan, Washington 98840

Phone: 509-422-7206
Fax: 509-422-7217
Website: www.okanogandem.org

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# Forward

The process of developing a Community Wildfire Protection Plan (CWPP) can help a community clarify and refine its priorities for the protection of life, property, and critical infrastructure in the wildland–urban interface on both public and private land. It also can lead community members through valuable discussions regarding management options and implications for the surrounding land base. Local fire service organizations help define issues that may place the county, communities, and/or individual homes at risk. Through the collaboration process, the CWPP planning committee discusses potential solutions, funding opportunities, and regulatory concerns and documents their resulting recommendations in the CWPP. The CWPP planning process also incorporates an element for public outreach. Public involvement in the development of the document not only facilitates public input and recommendations, but also provides an educational opportunity through interaction of local wildfire specialists and an interested public.

The idea for community-based wildfire planning and prioritization is neither novel nor new. However, the incentive for communities to engage in comprehensive forest planning and prioritization was given new and unprecedented impetus with the enactment of the Healthy Forests Restoration Act (HFRA) in 2003. This landmark legislation includes the first meaningful statutory incentives for the US Forest Service (USFS) and the Bureau of Land Management (BLM) to give consideration to the priorities of local communities as they develop and implement forest management and hazardous fuel reduction projects. In order for a community to take full advantage of this new opportunity, it must first prepare a CWPP.

A countywide CWPP planning committee generally makes project recommendations based on the issue causing the wildfire risk, rather than focusing on individual landowners or organizations. Thus, projects are mapped and evaluated without regard for property boundaries, ownership, or current management. Once the CWPP is approved by the county board of commissioners, the planning committee will begin further refining proposed project boundaries, feasibility, and public outreach as well as seeking funding opportunities.

*The **Okanogan County Community Wildfire Protection Plan** was updated in 2013, and supersedes the 2009 version, by the Okanogan County CWPP committee, the Okanogan County Conservation District, and the Washington Department of Natural Resources with project facilitation and support provided by Northwest Management, Inc. of Moscow, Idaho. Funding for the project was provided by Title III Funds. This Community Wildfire Protection Plan will be reviewed bi-annually and updated at least every five years starting from the year of adoption.*

*The Community Wildfire Protection Plan was developed in compliance with the Federal Emergency Management Agency requirements for a wildfire mitigation plan, a chapter of a countywide Multi-Hazard Mitigation Plan.*

# Chapter 1

## Overview of this Plan and its Development

This Community Wildfire Protection Plan (CWPP) for Okanogan County, Washington, is the result of analyses, professional collaboration, and assessments of wildfire risks and other factors focused on reducing wildfire threats to people, structures, infrastructure, and unique ecosystems in Okanogan County. Agencies and organizations that participated in the planning process included:

- Okanogan County Commissioners and County Departments
- City of Omak
- City of Okanogan
- City of Oroville
- City of Tonasket
- City of Brewster
- City of Pateros
- Town of Conconully
- Town of Nespelem
- Town of Elmer City
- Town of Coulee Dam
- Town of Riverside
- Town of Twisp
- Town of Winthrop
- Okanogan County Fire Districts
- City of Omak Fire Department
- City of Okanogan Fire Department
- City of Coulee Dam Fire Department
- Town of Conconully Fire Department
- Washington Department of Natural Resources
- Confederated Tribes of the Colville Reservation
- Colville Agency, Bureau of Indian Affairs
- Washington Department of Fish and Wildlife
- Okanogan County Public Utilities District
- Okanogan County Public Health
- USDI Bureau of Land Management
- Washington Military Department, Emergency Management Division
- Okanogan County Conservation District
- USDA Forest Service

- Okanogan County Sheriff's Department and Emergency Management
- Northwest Management, Inc.

The Okanogan County CWPP steering committee solicited competitive bids from companies to lead the assessment and writing of the **Okanogan County Community Wildfire Protection Plan**. Northwest Management, Inc. (NMI) was selected to provide this service to the county. The project manager from NMI was Mr. Brad Tucker.

## Goals and Guiding Principles

### Planning Philosophy and Goals

The goals of the planning process include integration with the National Fire Plan, the Healthy Forests Restoration Act, and the Disaster Mitigation Act. The plan utilizes the best and most appropriate science from all partners as well as local and regional knowledge about wildfire risks and fire behavior, while meeting the needs of local citizens and recognizing the significant impact wildfires can have to the regional economy.

**Mission Statement**

The Okanogan County Community Wildfire Protection Plan identifies wildfire response capability, educates homeowners to reduce the ignitability of structures, evaluates critical infrastructure throughout the County, identifies prioritized areas for hazardous fuel reduction treatments on Federal, State, and Private land, and builds on existing efforts to restore healthy forest conditions within the County. This plan will clarify our priorities for the protection of life, property, and critical infrastructure as well as identify wildland-urban interface areas.

**Vision Statement**

Promote a Countywide wildfire hazard mitigation concept through leadership, professionalism, and excellence, guiding the way to a safe, sustainable Okanogan County.

**Goals**

1. To reduce the area of WUI land burned and losses experienced because of wildfires
2. Prioritize the protection of people, structures, infrastructure, and unique ecosystems contributing to our way of life and the sustainability of the local and regional economy
3. Educate communities about the unique challenges of wildfire in the wildland-urban interface (WUI)
4. Establish mitigation priorities and develop mitigation strategies in Okanogan County
5. Strategically locate and plan fuel reduction projects
6. Provide recommendations for alternative treatment methods, such as modifying forest stand density, herbicide treatments, fuel reduction techniques, and disposal or removal of treated slash
7. Meet or exceed the requirements of the National Fire Plan and FEMA for a County-level Wildfire Protection Plan

### United States Government Accountability Office (GAO)

Since 1984, wildland fires have burned an average of more than 850 homes each year in the United States and, because more people are moving into fire-prone areas bordering wildlands,

the number of homes at risk is likely to grow. The primary responsibility for ensuring that preventative steps are taken to protect homes lies with homeowners. Although losses from fires made up only 2 percent of all insured catastrophic losses from 1983 to 2002, fires can result in billions of dollars in damages.

The GAO was asked to assess, among other issues, (1) measures that can help protect structures from wildland fires, (2) factors affecting use of protective measures, and (3) the role technology plays in improving firefighting agencies' ability to communicate during wildland fires.

The two most effective measures for protecting structures from wildland fires are: (1) creating and maintaining a buffer, called defensible space, from 30 to 100 feet wide around a structure, where vegetation and other flammable objects are reduced or eliminated; and (2) using fire-resistant roofs and vents. In addition to roofs and vents, other technologies – such as fire-resistant windows and building materials, chemical agents, sprinklers, and geographic information systems mapping – can help in protecting structures and communities, but they play a secondary role.

Although protective measures are available, many property owners have not adopted them because of the time or expense involved, competing concerns such as aesthetics or privacy, misperceptions about wildland fire risks, and lack of awareness of their shared responsibility for fire protection. Federal, state, and local governments, as well as other organizations, are attempting to increase property owners' use of protective measures through education, direct monetary assistance, and laws requiring such measures. In addition, some insurance companies have begun to direct property owners in high risk areas to take protective steps (GAO 2005).

### State and Federal CWPP Guidelines

This Community Wildfire Protection Plan will include compatibility with FEMA requirements for a Hazard Mitigation Plan, while also adhering to the guidelines proposed in the National Fire Plan, and the Healthy Forests Restoration Act (2004). This Community Wildfire Protection Plan has been prepared in compliance with:

- The National Fire Plan: A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan–December 2006.
- Healthy Forests Restoration Act (2003).
- The Federal Emergency Management Agency's Region 10 guidelines for a Local Hazard Mitigation Plan as defined in 44 CFR parts 201 and 206, and as related to a fire mitigation plan chapter of a Multi-Hazard Mitigation Plan.
- National Association of State Foresters – guidance on identification and prioritizing of treatments between communities (2003).

The objective of combining these complementary guidelines is to facilitate an integrated wildland fire risk assessment, identify pre-hazard mitigation activities, and prioritize activities and efforts to achieve the protection of people, structures, the environment, and significant infrastructure in Okanogan County while facilitating new opportunities for pre-disaster mitigation funding and cooperation.

Additional information detailing the state and federal guidelines used in the development of the Okanogan County Community Wildfire Protection Plan is included in Appendix 5.

## Integration with Other Local Planning Documents

During development of this Community Wildfire Protection Plan, several planning and management documents were reviewed in order to avoid conflicting goals and objectives. Existing programs and policies were reviewed in order to identify those that may weaken or enhance the mitigation objectives outlined in this document. The following sections identify and briefly describe some of the existing Okanogan County planning documents and ordinances considered during development of this plan.

### Okanogan County Multi-Hazard Mitigation Plan – 2013

In the 2013 Draft of the Multi-Hazard Mitigation Plan, the Task Force was developing ways to raise the community awareness of the natural hazards that threaten the public health and safety, the economic vitality of businesses, and the operational capability of important facilities and institutions. The draft plan identified the hazards threatening Okanogan County and provided an assessment of the risks posed. It also detailed the specific vulnerabilities of Okanogan County and many of the facilities that are important to the community's daily life. The plan included proposals to avoid or minimize those vulnerabilities. This information assisted individuals in understanding how the community could become safer from the impacts of future disasters. The work done and community supported garnered during the 2012-13 planning process has been incorporated in this Community Wildfire Protection Plan.

### Okanogan County Comprehensive Plan

The Okanogan County Comprehensive Plan (Plan) is a 20-year guide for the future of Okanogan County. The Plan provides a framework to support growth, development, and public decision-making in the County. It provides the vision of how residents want the County to grow and evolve over time. It establishes the goals, policies, priorities, and actions that the County will pursue to allow maintenance and enhancement of the quality of life, preservation of the rural character, sustainability of agricultural and natural resource industries, provision of recreational opportunities for residents and visitors, and protection of environmentally sensitive areas.

A comprehensive plan is a document that can benefit private property owners, local businesses, County staff, cities and towns in the County, state and federal agencies, Tribes, community organizations and other interested parties. It is an effective management tool for elected officials, empowers community members to help define the future vision and character of the County, guide development patterns of the County, and provide predictability to property owners regarding the future use and enjoyment of their land.

The Okanogan County Comprehensive Plan has been updated throughout 2012 and the most recent edition is the Revised Final Draft that came out in May of 2013. The Okanogan County Community Wildfire Protection Plan will be incorporated as a tool for decision makers to further their knowledge of specific high risk areas in order to make more informed decisions on how development should occur in those areas. Although land use designations are expected to be revised, specific recommendations regarding the vulnerability or potential dollar losses of future buildings, infrastructure, and critical facilities is not possible at this time.

### Okanogan County Hazard Identification and Vulnerability Assessment

The Hazard Identification and Vulnerability Assessment (HIVA) dated February 2004 describes natural and technological (human-made) hazards, which can potentially impact the people,

economy, environment, and property of Okanogan County. It serves as a basis for County-level emergency management programs. It is the foundation of effective emergency management and identifies the hazards that organizations must mitigate against, prepare for, respond to, and recover from in order to minimize the effects of disasters and emergencies. The HIVA is not a detailed study, but rather a general overview of hazards that can cause emergencies and disasters. The Okanogan County Multi Hazard Mitigation Plan is a much more comprehensive approach, is more detailed, and provides specific plans to approach the County's problem areas.

### Okanogan County Comprehensive Emergency Management Plan (CEMP)

The Comprehensive Emergency Management Plan (CEMP) dated January 2011 considers the emergencies and disasters likely to occur, as described in the Okanogan County Hazard Identification and Vulnerability Assessment, and describes functions and activities necessary to implement the four phases of Emergency Management – mitigation, preparedness, response and recovery. The plan utilizes Emergency Support Functions, which identify primary and support agencies responsibilities/activities that County and local jurisdictions may need in order to implement all-hazard mitigation. It provides policies, information, recommendations and guidance to assist responsible officials making operational decisions. This plan is more the "who, what, when, where and why" activities in the event of an emergency. Emergency Support Functions (ESFs) = Transportation; Emergency Communications; Public Works & Engineering; Fire Protection; Information Analysis & Planning; Mass Care; Resource Management; Health & Medical Services; Search & Rescue; Hazardous Materials; Food & Water; Energy & Utilities; Military Support; Recovery & Restoration; Law Enforcement; and Damage Assessment**.** This plan does not conflict in any way with the Multi Hazards Mitigation Plan. CEMP updates will include support of initiatives and action items outlined in the Okanogan County Multi Hazard Mitigation Plan.

### Okanogan County Zoning Ordinance

This ordinance does not identify hazard areas in great detail although there are a few zoning districts in the Methow Valley that prohibit new residences within the floodplain. These zones are the "Methow Review District", the "Rural Residential District", and the "Low Density Residential District".

### Critical Areas Ordinance

This ordinance identifies protected and hazardous areas. Protected areas are fish and wildlife habitat conservation areas, aquifer recharge areas, and wetlands. Hazardous areas are frequently flooded areas, geologically hazardous areas, erosion hazard areas, landslide hazard areas, mine hazard areas, seismic hazard areas, and volcanic hazard areas.

### Open Space Timber/Open Space Open Space Plans

The Open Space Timber (OST) and Open Space Open Space (OSOS) Plans could be affected by some fuel reduction practices. The effects are more beneficial than hazardous, if handled appropriately. OST requires the sustenance of healthy commercial-grade timber. Fuels reduction has been shown to increase timber health. OSOS requires the sustenance of priority resources, other than timber. Landowners must ensure that fire-safety practices do not damage priority resources that keep them in the program in which they receive a property tax reduction.

### Master Program for Okanogan County Shoreline Management

The Master Program for Shoreline Management outlines allowed/prohibited uses within specific shoreline zoning designations. All shoreline designations allow forest practices within shoreline areas. Non-forestry related mitigation actions would be looked at individually, hopefully either allowed or allowed by permit. Most of the identified action items would have no effect on the shoreline areas such as road signs, evacuation plan, public education, fire-safe building materials etc. The shoreline ordinance is currently being revised and will conform to all existing regulations and plans. Upon approval of the Okanogan County Multi-Hazard Mitigation and Community Wildfire Protection Plans, the revised shoreline plan will acknowledge and support their adoption.

### Edelweiss Development Community Wildfire Protection Plan

Citizens in the Edelweiss Development of Okanogan County have been concerned about the effects of wildfire since development began in the early 1970's. The community was placed on a Level II Evacuation Order during the Whiteface Fire in 1994. The 2004 Fawn Peak Fire and recent major fires in the Pasayten Wilderness and in the Chewuch Drainage keep this concern alive. The 2003 Needles Fire, that threatened the entire upper Methow Valley, provided another scare, evacuation alert and increased emphasis for fire safety. The Edelweiss Maintenance Commission (EMC), the association management body, took action in 2001 and applied for a National Fire Plan grant. They were successful in acquiring a $145,700 grant to conduct a "Fire Wise" workshop and risk assessments, to develop a Community Wildfire Protection Plan, to develop a fuel break along the Goat Creek Road and begin fuels treatment on demonstration lots and on the first bench. In 2002 the grant was amended to add $300,050 to continue additional fuels treatments. These funds have provided for increased awareness and support for the program and fuels treatment on 134 high priority acres, on about 25% of the development. But blocks of high-risk fuels still exist and the community desires to continue the program. Proposed projects are outlined in this Community Wildfire Protection Plan (CWPP).

The primary goal of the Edelweiss Community Wildfire Protection Plan (CWPP) is to identify and implement projects that will protect people in the CWPP area, including residents, firefighters, and emergency personnel, from injury and loss of life. The secondary goal is to minimize or eliminate damage or loss of property and essential infrastructure due to wildfire.

### Pine Forest Community Wildfire Protection Plan

Citizens in the Pine Forest Development of Okanogan County [Methow Valley near Winthrop] have been concerned about the effects of wildfire since they began development in the early 1970's. This concern was amplified in 1995 when the Fire District, Department of Natural Resources and Forest Service conducted a fire simulation exercise that showed lives and the entire community would be lost during the simulated fire. Increased awareness and recent frequent fires in the Methow Valley provide the catalyst for reducing the fire risk. Pine Forest was the first community to address the fire risk conditions in the Methow Valley.

The Pine Forest Owners Association (PFOW), the association management body, took action in 1998 to develop a Forest Stewardship Plan to address the fuels loading and forest health conditions, starting with the community greenbelt areas. Initial treatments were commercial thinning, removing ladder fuels and hand piling and burning.

This was followed by three National Fire Program grants, totaling nearly $100,000, in 2001 and 2002 to continue the program. These funds provided for increased awareness and support for the program and fuels treatment on about 150 high priority acres, about 30% of the development. Current grants will complete the risk assessments, complete development of their local CWPP, and treat an additional 70 acres. Blocks of high-risk fuels will remain in the Pine Forest area; thus, the community desires to continue the program. Lack of safe ingress/egress continues to be a major concern.

### Havillah Community Wildfire Protection Plan

The Havillah community is an unincorporated area in the northeast corner of Okanogan County. There are no Rural Fire Districts within the area covered by the Havillah CWPP. The area has a history of large wildfires which have burned numerous residences and structures in the vicinity, destroyed private and public timber stands and damaged crops and grazing acreage. The fires generally have had a negative economic and social impact on the area. The residents of the area felt that creating and adopting a community wildfire protection plan would help them deal with fire issues on private land in the area and help them influence neighboring public agencies to reduce fire risks that exist on the neighboring public lands. Due to the nature of large wild land fires which have occurred in the area, it is evident that private land owners and government agencies such as the US Forest Service and Washington State DNR must work in a cooperative manner to reduce the risk of large destructive fires as well as working cooperatively in the suppression of wildfires when they occur.

The Havillah CWPP has been created collaboratively by a small team of local residents. It incorporates ideas, comments, advice and input from other local residents. The process for development of the plan included meetings and discussions with a variety of local residents, various groups, and sharing the plan with area government agency representatives to obtain their input and advice. Local residents, the Okanogan County Commissioners, and the State Forester have approved (without financial obligation or liability) the contents of the Havillah Community Wildfire Protection Plan. The plan will be updated and modified in this same manner as necessary.

### Methow Community Wildfire Protection Plan

The Methow Community Wildfire Protection Plan for the Methow Valley watershed of North Central Washington is the result of three years of voluntary collaborative work among no fewer than fifty individuals, representing approximately 24 agencies, fire districts, non-governmental organizations, businesses and community members. In a region renowned for contentious planning processes and controversial natural resource issues, this group's efforts serve as testimony that common objectives can produce effective results among even the most diverse participants.

This Plan is intended to operate as a work in progress, and to inform other planning efforts that address land use and natural resource planning by providing the most current information available concerning wildfire risk mitigation activities affecting public and private lands in the Methow Valley. The Plan will be an integral component to the Okanogan County CWPP.

Risk mitigation, fuels reduction, and ecosystem restoration activities are moving targets with ongoing needs for planning, prioritization and monitoring across ownerships. Consequently, the Methow CWPP is intended to be regularly updated and maintained through the collaborative

framework initially established with the Methow Community Fire Plan Coordinating Group and the Okanogan County Fire Plan Steering Committee.

# Chapter 2

## Documenting the Planning Process

Documentation of the planning process, including public involvement, is necessary to meet FEMA's DMA 2000 requirements (44CFR§201.4(c)(1) and §201.6(c)(1)). This section includes a description of the planning process used to develop the plan including how it was prepared, who was involved in the process, and how all of the involved agencies participated.

### Description of the Planning Process

The Okanogan County Community Wildfire Protection Plan was developed through a collaborative process involving all of the organizations and agencies detailed in Chapter 1 of this document. The planning process included five distinct phases which were in some cases sequential (step 1 then step 2) and in some cases intermixed (step 4 completed throughout the process):

1. **Collection of Data** about the extent and periodicity of the wildfire hazard in and around Okanogan County.
2. **Field Observations and Estimations** about risks, location of structures and infrastructure relative to risk areas, access, and potential treatments.
3. **Mapping** of data relevant to pre-wildfire mitigation and treatments, structures, resource values, infrastructure, risk assessments, and related data.
4. **Facilitation of Public Involvement** from the formation of the planning committee to news releases, public meetings, public review of draft documents, and acknowledgement of the final plan by the signatory representatives.
5. **Analysis and Drafting of the Report** to integrate the results of the planning process, provide ample review and integration of committee and public input, and signing of the final document.

### The Planning Team

Leading the planning effort from Okanogan County was Scott Miller representing the Okanogan County Emergency Management and representatives from the Washington Department of Natural Resources.

Northwest Management Project Manager was Brad Tucker, B.S. Mr. Tucker received a Bachelor of Science degree in wildlife resources from the University of Idaho.

The planning philosophy employed in this project included the open and free sharing of information with interested parties. Information from federal, state, and local agencies was integrated into the database of knowledge used in this project. Meetings with the committee were held throughout the planning process to facilitate a sharing of information between participants. When the public meetings were held, many of the committee members were in attendance and shared their support and experiences with the planning process and their interpretations of the results.

### Multi-Jurisdictional Participation

44 CFR §201.6(a)(3) calls for multi-jurisdictional planning in the development of Hazard Mitigation Plans which impact multiple jurisdictions. This Community Wildfire Protection Plan impacts the following jurisdictions:

- Okanogan County, Washington
- City of Brewster
- City of Okanogan
- City of Omak
- City of Oroville
- City of Pateros
- City of Tonasket
- Town of Conconully
- Town of Coulee Dam
- Town of Elmer City
- Town of Nespelem
- Town of Riverside
- Town of Twisp
- Town of Winthrop
- Okanogan Conservation District
- Okanogan County Public Utilities District
- Okanogan County Public Health
- City of Okanogan Fire Department
- City of Omak Fire Department
- City of Coulee Dam Fire Department
- Town of Conconully Fire Department
- Okanogan County Fire District #1
- Okanogan County Fire District #2
- Okanogan County Fire District #3
- Okanogan County Fire District #4
- Okanogan County Fire District #6
- Okanogan County Fire District #7
- Okanogan County Fire District #8
- Okanogan County Fire District #9
- Okanogan County Fire District #10
- Okanogan County Fire District #11
- Okanogan County Fire District #12
- Okanogan County Fire District #13
- Okanogan County Fire District #14
- Okanogan County Fire District #15
- Okanogan County Fire District #16

These jurisdictions were represented on the planning committee and in public meetings either directly or through their servicing fire department or district. They participated in the development of hazard profiles, risk assessments, and mitigation measures. The planning committee meeting was the primary venue for authenticating the planning record. However, additional input was gathered from each jurisdiction in the following ways:

- Planning committee leadership visits to local group meetings (e.g. county departmental meetings, city council meetings, fire district commission meetings) where planning updates were provided and information was exchanged.
- One-on-one visits between the planning committee leadership and representatives of the participating jurisdictions (e.g. meetings with county commissioners, city councilors and/or mayors, fire district commissioners, or community leaders).
- Written correspondence between the planning committee leadership and each jurisdiction updating the participating representatives on the planning process, making requests for information, and facilitating feedback.

Like other areas of Washington and the United States, Okanogan County's human resources have many demands placed on them in terms of time and availability. A few of the elected officials (county commissioners and city mayors) do not serve in a full-time capacity; some of them have other employment and serve the community through a convention of community service. Recognizing this and other time constraints, many of the jurisdictions decided to

identify a representative to cooperate on the planning committee and then report back to the remainder of their organization on the process and serve as a conduit between the planning committee and the jurisdiction.

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## Planning Committee Meetings

The following people participated in planning committee meetings, volunteered time, or responded to elements of the Okanogan County Community Wildfire Protection Plan's preparation.

| NAME | ORGANIZATION |
|---|---|
| Bill Vallance | City of Brewster and Okanogan County Fire District #15 |
| Brad Armstrong | Town of Riverside and Okanogan County Fire District #7 |
| Brad Tucker | Northwest Management, Inc. |
| Ray Campbell | Okanogan County Commissioner |
| Chris Branch | Cities of Oroville and Tonasket, North Central WA RC&D |
| David Dalstrom | Marshall Town of Winthrop |
| Ken Bajema | Deputy Marshall Town of Winthrop |
| Chuck Johnson | Washington DNR |
| Dale Swedberg | Washington DF&W and Okanogan County Fire District #10 |
| Rob Burks | Chief of Police City of Tonasket and Okanogan County Fire District #4 |
| Don Waller | Okanogan County Fire District #6 |
| Glenda Beauregard | Okanogan County Emergency Management |
| Gordon Hennigs | City of Okanogan and Okanogan County Fire District #3 |
| Greg Roberts | Washington DNR |
| Zac Claussen | Town of Conconully |
| Bob Bauer | Okanogan County Fire District #16 |
| Mike Woelke | Commissioner Fire District #16 |
| Renee Tillman | Town of Elmer City and Okanogan County Fire District #2 |
| John Foster Fanning | Okanogan County Fire District #14 and DNR |
| Kevan Roberts | Washington DNR |
| Kevin Bowling | City of Omak and Okanogan County Fire District #3 |
| Kristen Cook | Okanogan Conservation District |
| Mark Vine | Okanogan County Fire District #12 |
| Dave Hilton | Okanogan County Public Health |
| Phil Dart | Okanogan County Fire District #11 |
| Robert Jackson | Town of Coulee Dam |
| Rod Noel | City of Oroville and Okanogan County Fire District #1 |

- Darryl Peery Okanogan County Fire District #10
- Ron Wonch Washington DNR
- Roy Schwilke Okanogan County Public Utilities District
- Scott Miller Okanogan County Emergency Management
- Ted Murray Okanogan County GIS
- Tera King Northwest Management, Inc.
- Tim Vugteveen Washington DNR
- Mel Peterson Okanogan County Fire District #9
- Barbara Peterson Okanogan County Fire District #9
- Mike Solheim BLM Fuels
- Richard Parrish AFMO Fuels
- Paul Budrow Chief of Police Town of Twisp
- Perry Huston Okanogan County Planning Department
- Nobel Kelly Chiliwist Citizen
- Peggy Kelly Chiliwist Citizen
- Steve Cook DNR
- Kathy Busee USFS MV
- Donny Smith DNR South
- Greg Saltsman DNR South
- Cody Accord Okanogan Fire District #6
- Tim Tugaw Okanogan Fire District #9
- Bob Parten Okanogan County Public Works
- Ron Morris Citizen
- Sandy Morris Citizen
- Ed Townsend Okanogan Fire District #8
- Sarah Wilkinson US Army Corps of Engineers Chief Joseph Dam
- Jen Croft USFS Tonasket Ranger District
- Jeff Ayers USAF Tonasket Ranger District
- Steve Harris DNR NWR
- Monika Nicholson USFS Methow Valley

### Committee Meeting Minutes

The planning committee held a meeting in January of 2013. This meeting served to facilitate the sharing of information and to lay the groundwork for the Okanogan County CWPP. Following the committee meeting, information and concerns were shared via email and phone conversations.

Planning committee meeting minutes are included in Appendix 2.

## Public Involvement

Public involvement was made a priority from the inception of the project. There were a number of ways that public involvement was sought and facilitated. In some cases, this led to members of the public providing information and seeking an active role in protecting their own homes and businesses, while in other cases it led to the public becoming more aware of the process without becoming directly involved in the planning.

### News Releases

Under the auspices of the Okanogan County planning committee, news releases were submitted to Methow Valley News, Omak Chronicle, Quad-City Herald, and the Wenatchee World newspapers. KOZI –Radio Lake Chelan, KCSY-FM Radio, and KOMW-North Cascade Broadcasting Inc. were three radio stations that were also provided with information regarding the public meeting. Informative flyers were also distributed around town and to local offices within the communities by the committee members.

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**Figure 2.1. Press Release sent on November 14th, 2012.**

From North Cascades Broadcasting News - komw.net/news

**Local News**

**Okanogan County Set to Update Hazard Risk Plans**

By NCBI

Nov 14, 2012, 15:12

Okanogan County has launched a project to update the Okanogan County Multi-Hazard Mitigation Plan and Community Wildfire Protection Plan. Local agencies and organizations in Okanogan County have created a committee to complete the required 5-year updates of these documents as part of the FEMA Pre-Disaster Mitigation program and National Fire Plan and Healthy Forests Restoration Act. The project is being funded through a Title III grant.

The planning update will include risk analyses, vulnerability assessments, and mitigation recommendations for the hazards of flood, landslide, earthquake, severe weather, wildland fire, and extended power outages.

Northwest Management, Inc. has been retained by Okanogan County to provide risk assessments, hazard mapping, field inspections, interviews, and to collaborate with the planning committee to update the Plans. The committee includes representatives from local communities, rural and wildland fire districts, Washington Department of Natural Resources, U.S Forest Service, Bureau of Land Management, highway districts, private landowners, area businesses, various Okanogan County departments, and others.

One of the goals of the planning process will be to increase the participating jurisdictions' eligibility for additional grants that will help minimize the risk and potential impact of disaster events. The plan will be located on the main page of the Emergency Management website at okanogandem.org. The planning team will be conducting a public meeting to discuss preliminary findings and to seek public input on the Plans' recommendations. A notice of the dates and locations of this meeting will be posted in local newspapers. Once completed, the updated draft Plans will also be available for public review and comment. For more information on the Okanogan County Multi - Hazard Mitigation Plan and Community Wildfire Protection Plan updates, contact Glenda Beauregard, Okanogan County Emergency Management, at 509-422-7206 or gbeauregard@co.okanogan.wa.us.

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A record of articles published in local news media is included in Appendix 2.

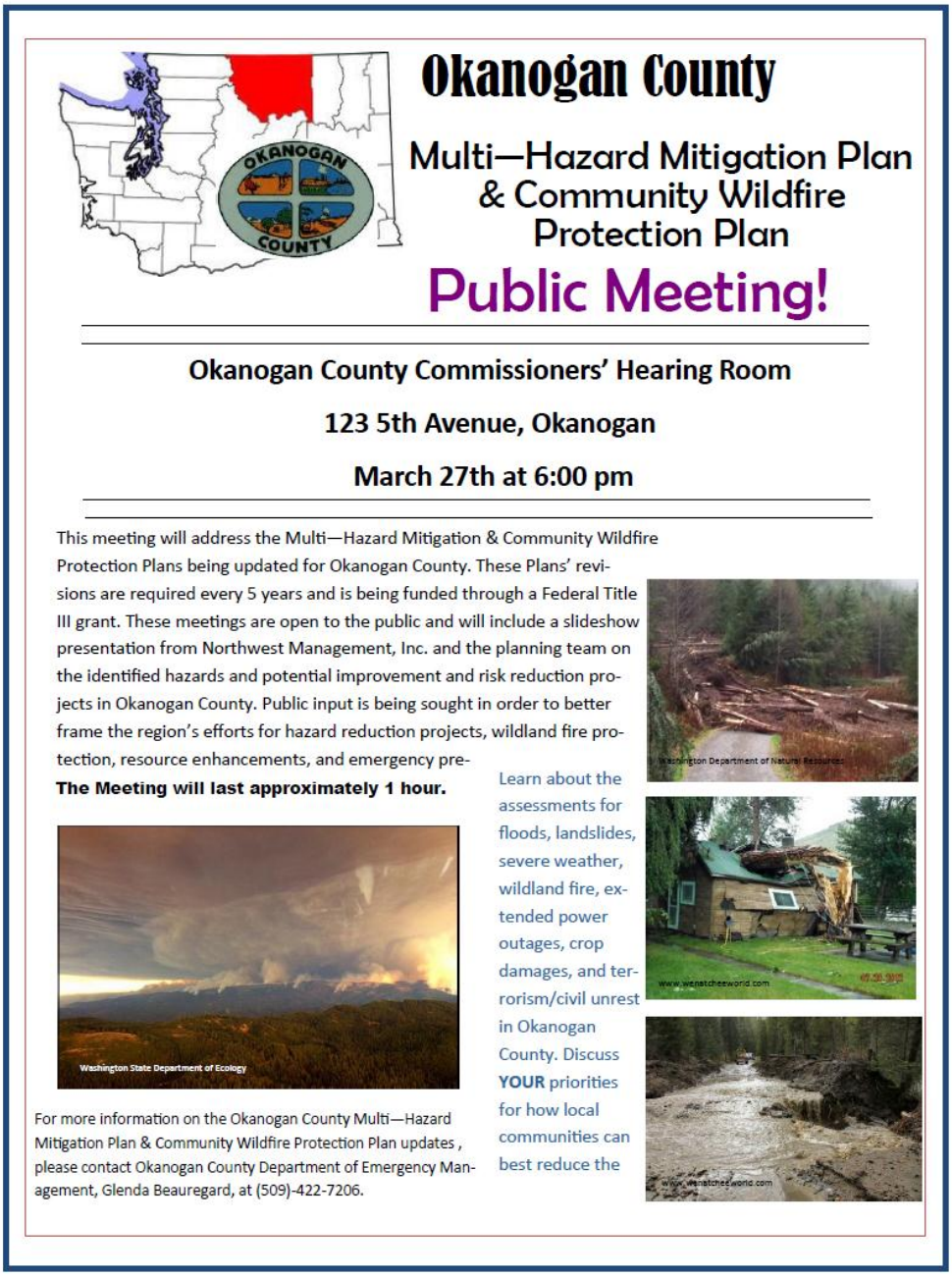
### Public Meetings

Public meetings were scheduled at the Okanogan County Commissioners' Hearing room in Okanogan during the hazard assessment phase of the planning process to share information on the planning process, obtain input on the details of the hazard assessments, and discuss potential

mitigation treatments. Attendees at the public meetings were asked to give their impressions of the accuracy of the information generated and provide their opinions of potential treatments.

The public meeting in Okanogan County included one location. It was attended by a number of individuals on the committee and from the general public. There was a total attendance eight individuals. The public meeting announcement sent to the local newspapers, local citizen participation organizations, county departments, fire district representatives, and distributed by committee members is represented in Figure 2.2.

**Figure 2.2. Public Meeting Flyer.**



# Okanogan County

## Multi—Hazard Mitigation Plan & Community Wildfire Protection Plan

## Public Meeting!

**Okanogan County Commissioners' Hearing Room**

**123 5th Avenue, Okanogan**

**March 27th at 6:00 pm**

This meeting will address the Multi—Hazard Mitigation & Community Wildfire Protection Plans being updated for Okanogan County. These Plans' revisions are required every 5 years and is being funded through a Federal Title III grant. These meetings are open to the public and will include a slideshow presentation from Northwest Management, Inc. and the planning team on the identified hazards and potential improvement and risk reduction projects in Okanogan County. Public input is being sought in order to better frame the region's efforts for hazard reduction projects, wildland fire protection, resource enhancements, and emergency pre-

**The Meeting will last approximately 1 hour.**

Washington State Department of Ecology

For more information on the Okanogan County Multi—Hazard Mitigation Plan & Community Wildfire Protection Plan updates , please contact Okanogan County Department of Emergency Management, Glenda Beauregard, at (509)-422-7206.

Learn about the assessments for floods, landslides, severe weather, wildland fire, extended power outages, crop damages, and terrorism/civil unrest in Okanogan County. Discuss **YOUR** priorities for how local communities can best reduce the

Washington Department of Natural Resources

www.wenatcheeworld.com

www.wenatcheeworld.com

### Documented Review Process

Review and comment on this plan has been provided through a number of venues for the committee members as well as the members of the general public.

During the scheduled committee meeting in 2013, the committee met to discuss findings, review mapping and analysis, and provide written comments on draft sections of the document. During the public meetings, attendees observed map analyses and photographic collections, discussed general findings from the community assessments, and made recommendations on potential project areas.

The first draft of the document was prepared and presented to the committee on July 19th, 2013 for a full committee review. The draft document was released for public review on September 2nd, 2013. The public review period remained open until September 16th, 2013.

### Continued Public Involvement

Okanogan County is dedicated to involving the public directly in review and updates of this CWPP. The Okanogan County Commissioners, working through the Okanogan County Department of Emergency Management, are responsible for review and update of the plan as recommended in chapter 6 of this document.

The public will have the opportunity to provide feedback about the plan at any time. Copies of the plan will be available at the Okanogan County Department of Emergency Management and on the Okanogan County website. Contact information for the project coordinator is listed on the Acknowledgements page.

A public meeting will also be held as part of each formal plan review or when deemed necessary by the planning committee. The meetings will provide the public a forum in which they can express concerns, opinions, or ideas about the plan. The Okanogan County Department of Emergency Management will publicize the public meetings and maintain public involvement through the County's webpage and newspapers.

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# Chapter 3

## Okanogan County Characteristics

Larger than several states, Okanogan Country is bordered on the north by the Canada, on the south by the Columbia River, on the east by Ferry County, and on the west by looming peaks of the North Cascade Mountains. The County covers 5,281 square miles, making it the largest County in Washington. Only 30% of the land within the County is in private ownership due to the amount of state and federal land. The Colville Indian Reservation, located in the southeast corner of the County, occupies approximately 700,000 acres and is an integral part of the heritage of the County.

The total area of Okanogan County is approximately 3,400,000 acres, of which 953,301 acres is privately owned and about 1,574,262 acres is federally owned. Over 95 percent of the federally owned land is encompassed within the jurisdiction of the United States Forest Service, primarily within the Okanogan National Forest, most of the Pasayten Wilderness, and portions of the Lake Chelan – Sawtooth Wilderness.

Only 30% of the land within the County is in private ownership due to the amount of state and federal land. The Confederated Tribes of the Colville Reservation) occupies approximately 675,000 acres in the County's southeast corner and is an integral part of the County's heritage.

Government, retail trade, services, and manufacturing are a few of the major employers within the County. Omak, the regional center for services and trade, is experiencing a great deal of growth. There is also increasing commercial development pressure in the area between the Canadian border and Oroville. The City of Coulee Dam is the location of Grand Coulee Dam, one of the largest concrete structures in the world, and largest electricity producer in the United States.

### Geography and Climate

Forested highlands, shrub covered hills, and valleys with fertile farmlands comprise Okanogan County, which is located east of the Cascades along the Canadian border in the north-central part of Washington. Bordering the County on the west are Whatcom, Skagit, and Chelan Counties, to the east is Ferry County, and to the south is Douglas County. The western half of the County is comprised of dense, rugged, mountainous terrain, much of which is within Okanogan National Forest. Similar topography also can be found in the northeast corner of the county. From the north part of the County, the land descends into rolling hills, grassy ranges, and fertile valleys that extend through the center of the county.

Summers, on the plains, are sunny, warm and dry with some hot days. During 4 or 5 months, in the lower elevations extreme highs may be 100°F, while, in the higher elevations 1 or 2 months may reach above 90°F. In winter, minimum temperatures of -10° to -20°F are common although a few stations report -25° to -30°F. Normally, precipitation is light in the summer and heaviest in the winter. Valleys and lowlands receive and average of 10 to 14 inches of precipitation; in the mountains, precipitation increases with elevation where 25 to 30 inches per year can be expected on the higher ridges, with the majority occurring as snow. Growing seasons vary from over 180 days in the southwest to less than 80 days in the forested highlands.

Okanogan County is a diverse ecosystem with a complex array of vegetation, wildlife, and fisheries that have developed with, and adapted to fire as a natural disturbance process. Nearly a century of wildland fire suppression coupled with past land-use practices (primarily timber harvesting and agriculture) has altered plant community succession and has resulted in dramatic shifts in the fire regimes and species composition. As a result, some forests and rangelands in Okanogan County have become more susceptible to large-scale, higher-intensity fires posing a threat to life, property, and natural resources including wildlife and plant populations. High-intensity, stand-replacing fires have the potential to seriously damage soils and native vegetation. In addition, an increase in the number of large, high-intensity fires throughout the nation's forest and rangelands has resulted in significant safety risks to firefighters and higher costs for fire suppression.

## Population and Demographics

Okanogan County grew in population over 220% around 1900 then 175% in 1910. Since the 1920 census, the average increase in population has averaged around 13% with the most recent census showing an increase of only about 4%.

The U.S. Census Bureau estimates that Okanogan County has only experienced a 3.9% increase in population since 2000 compared to a 14.1% increase statewide. The Census Bureau also reported that there were 1,164 private nonfarm establishments (2010) and 15,747 households (2010). The median income for a household in Okanogan County in 2010 was $40,537, which is less than the statewide median of $58,890.

**Table 3.1. Okanogan County Historical Population Data.**[1]

| Census | Population |
|---|---|
| 1890 | 1,467 |
| 1900 | 4,689 |
| 1910 | 12,887 |
| 1920 | 17,094 |
| 1930 | 18,519 |
| 1940 | 24,546 |
| 1950 | 29,131 |
| 1960 | 25,520 |
| 1970 | 25,867 |
| 1980 | 30,639 |
| 1990 | 33,350 |
| 2000 | 39,564 |
| 2010 | 41,120 |

[1] http://en.wikipedia.org/wiki/Okanogan_County,_Washington. Okanogan County. Accessed October, 2012.

### Land Ownership

The vast majority of Okanogan County is federally owned. Much of the privately owned land is used for ranching and farming purposes; although, more and more residents are moving into the rural areas along the Lake Roosevelt shoreline. Numerous subdivisions and housing clusters are developing along the northern border of the county.

**Table 3.2. Ownership Categories in Okanogan County.**

| Land Owner | Acres | Percent |
|---|---|---|
| USFS | 1,502,860 | 44% |
| Private | 767,803 | 23% |
| Tribal | 669,286 | 20% |
| State | 385,473 | 11% |
| BLM | 58,865 | 2% |
| Water | 12,111 | <1% |
| FWS | 2,891 | <1% |
| Other | 1,183 | <1% |
| **Total** | 3,400,472 | **100%** |

A map of the land ownership pattern in Okanogan County is included in Appendix 1.

## Natural Resources

Okanogan County is a diverse ecosystem with a complex array of vegetation, wildlife, and fisheries that have developed with, and adapted to fire as a natural disturbance process. Nearly a century of wildland fire suppression coupled with past land-use practices (primarily timber harvesting and agriculture) has altered plant community succession and has resulted in dramatic shifts in the fire regimes and species composition. As a result, some forests and rangelands in Okanogan County have become more susceptible to large-scale, higher-intensity fires posing a threat to life, property, and natural resources including wildlife and plant populations. High-intensity, stand-replacing fires have the potential to seriously damage soils and native vegetation. In addition, an increase in the number of large, high-intensity fires throughout the nation's forest and rangelands has resulted in significant safety risks to firefighters and higher costs for fire suppression (House of Representatives, Committee on Agriculture, Washington, DC, 1997).

### Vegetation

Vegetation in Okanogan County is a mix of forestland and agricultural ecosystems. An evaluation of satellite imagery of the region provides some insight to the composition of the vegetation of the area. The full extent of the county was evaluated for cover type by the USDA Forest Service in 2001 as determined from Landsat 7 ETM+ imagery in tabular format.

The most represented vegetated cover type is Douglas-fir at approximately 18% of the total area. The next most common vegetation cover types represented are a Herbacious at 16%, Shrub at 14%, Subalpine Forest Mix at 9%, and Ponderosa Pine at 9%. Urban areas and agriculture represents approximately 4.3% of the total area (Table 3.1).

| Table 3.3. Vegetative Cover Types in Okanogan County. | | |
|---|---|---|
| Cover | Acres | Percent |
| Douglas-fir | 617,979 | 18.2% |
| Herbacious | 555,344 | 16.3% |
| Shrub | 461,886 | 13.6% |
| Subalpine Forest Mix | 317,536 | 9.3% |
| Ponderosa Pine | 291,774 | 8.6% |
| Lodgepole Pine | 244,267 | 7.2% |
| Ponderosa Pine/Douglas-fir | 193,040 | 5.7% |
| Agriculture | 140,819 | 4.1% |
| Rock | 139,852 | 4.1% |
| Dry Mixed Forest | 116,988 | 3.4% |
| Low Canopy Closure Tree | 44,811 | 1.3% |
| Deciduous | 41,797 | 1.2% |
| Whitebark Pine | 41,385 | 1.2% |
| Subalpine Fir | 37,474 | 1.1% |
| Western Larch | 34,355 | 1.0% |
| Water | 33,090 | 1.0% |
| Englemann Spruce | 26,871 | 0.8% |
| Subalpine Larch | 14,895 | 0.4% |
| Burned Areas | 13,372 | 0.4% |
| Snow | 13,187 | 0.4% |
| Conifer/Deciduous Mixed | 7,575 | 0.2% |
| Urban | 5,174 | 0.2% |
| Moist Mixed Forest | 4,833 | 0.1% |
| Pacific Silver Fir | 1,889 | 0.1% |
| Mountain Hemlock | 1,058 | 0.0% |
| **Total** | **3,401,252** | **100.0%** |

### Hydrology

The Washington Department of Ecology & Water Resources Program is charged with the development of the Washington State Water Plan. Included in the State Water Plan are the statewide water policy plan and component basin and water body plans, which cover specific geographic areas of the state (WDOE 2005). The Washington Department of Ecology has prepared general lithologies of the major ground water flow systems in Washington.

The state may assign or designate beneficial uses for particular Washington water bodies to support. These beneficial uses are identified in section WAC 173-201A-200 of the Washington Surface Water Quality Standards (WQS). These uses include:

- **Aquatic Life Uses:** char; salmonid and trout spawning, rearing, and migration; nonanadromous interior redband trout, and indigenous warm water species
- **Recreational Uses:** primary (swimming) and secondary (boating) contact recreation

- **Water Supply Uses:** domestic, agricultural, and industrial; and stock watering

While there may be competing beneficial uses in streams, federal law requires protection of the most sensitive of these beneficial uses.

A correlation to mass wasting due to the removal of vegetation caused by high intensity wildland fire has been documented. Burned vegetation can result in changes in soil moisture and loss of rooting strength that can result in slope instability, especially on slopes greater than 30%. The greatest watershed impacts from increased sediment will be in the lower gradient, depositional stream reaches.

Of critical importance to Okanogan County will be the maintenance of the domestic watershed supplies in the Lower Spokane Watershed (WRIA 54), Lower Lake Roosevelt Watershed (WRIA 53), and Upper Crab-Wilson Watershed (WRIA 43).

### Air Quality

The primary means by which the protection and enhancement of air quality is accomplished is through implementation of National Ambient Air Quality Standards (NAAQS). These standards address six pollutants known to harm human health including ozone, carbon monoxide, particulate matter, sulfur dioxide, lead, and nitrogen oxides (USDA Forest Service 2000).

The Clean Air Act, passed in 1963 and amended in 1977, is the primary legal authority governing air resource management. The Clean Air Act provides the principal framework for national, state, and local efforts to protect air quality. Under the Clean Air Act, OAQPS (Office for Air Quality Planning and Standards) is responsible for setting standards, also known as national ambient air quality standards (NAAQS), for pollutants which are considered harmful to people and the environment. OAQPS is also responsible for ensuring these air quality standards are met, or attained (in cooperation with state, Tribal, and local governments) through national standards and strategies to control pollutant emissions from automobiles, factories, and other sources (Louks 2001).

Smoke emissions from fires potentially affect an area and the airsheds that surround it. Climatic conditions affecting air quality in northern Washington are governed by a combination of factors. Large-scale influences include latitude, altitude, prevailing hemispheric wind patterns, and mountain barriers. At a smaller scale, topography and vegetation cover also affect air movement patterns. Air quality in the area is generally moderate to good. However, locally adverse conditions can result from occasional wildland fires in the summer and fall, and prescribed fire and agricultural burning in the spring and fall. All major river drainages are subject to temperature inversions which trap smoke and affect dispersion, causing local air quality problems. This occurs most often during the summer and fall months and would potentially affect all communities in Okanogan County. Winter time inversions are less frequent, but are more apt to trap smoke from heating, winter silvicultural burning, and pollution from other sources.

### Washington State Smoke Management Plan

The Department of Natural Resources (DNR), Department of Ecology (DOE), U.S. Forest Service (USDA), National Park Service (NPS), Bureau of Land Management (BLM), U.S Fish and Wildlife Service (USDI), participating Indian nations, military installations (DOD), and small and large forest landowners have worked together to deal with the effect of outdoor burning on air.

Protection of public health and preservation of the natural attractions of the state are high priorities and can be accomplished along with a limited, but necessary, outdoor burning program. Public health, public safety, and forest health can all be served through the application of the provisions of Washington State law and this plan, and with the willingness of those who do outdoor burning on forest lands to further reduce the negative effects of their burning.

The Washington State Smoke Management Plan pertains to DNR-regulated silvicultural outdoor burning only and does not include agricultural outdoor burning or outdoor burning that occurs on improved property. Although the portion of total outdoor burning covered by this plan is less than 10 percent of the total air pollution in Washington, it remains a significant and visible source.

The purpose of the Washington State Smoke Management Plan is to coordinate and facilitate the statewide regulation of prescribed outdoor burning on lands protected by the DNR and on unimproved, federally-managed forest lands and participating tribal lands. The plan is designed to meet the requirements of the Washington Clean Air Act.

The plan provides regulatory direction, operating procedures, and advisory information regarding the management of smoke and fuels on the forest lands of Washington State. It applies to all persons, landowners, companies, state and federal land management agencies, and others who do outdoor burning in Washington State on lands where the DNR provides fire protection, or where such burning occurs on federally-managed, unimproved forest lands and tribal lands of participating Indian nations in the state.

The plan does not apply to agricultural outdoor burning and open burning as defined by Washington Administrative Code (WAC) 173-425-030 (1) and (2), nor to burning done "by rule" under WAC 332-24 or on non-forested wildlands (e.g., range lands). All future reference to burning in this plan will refer only to silvicultural burning unless otherwise indicated.

# Chapter 4

## Risk and Preparedness Assessments

### Wildland Fire Characteristics

An informed discussion of fire mitigation is not complete until basic concepts that govern fire behavior are understood. In the broadest sense, wildland fire behavior describes how fires burn; the manner in which fuels ignite, how flames develop and how fire spreads across the landscape. The three major physical components that determine fire behavior are the fuels supporting the fire, the topography in which the fire is burning, and the weather and atmospheric conditions during a fire event. At the landscape level, both topography and weather are beyond our control. We are powerless to control winds, temperature, relative humidity, atmospheric instability, slope, aspect, elevation, and landforms. It is beyond our control to alter these conditions, and thus impossible to alter fire behavior through their manipulation. When we attempt to alter how fires burn, we are left with manipulating the third component of the fire environment; fuels which support the fire. By altering fuel loading and fuel continuity across the landscape, we have the best opportunity to control or affect how fires burn.

A brief description of each of the fire environment elements follows in order to illustrate their effect on fire behavior.

#### Weather

Weather conditions contribute significantly to determining fire behavior. Wind, moisture, temperature, and relative humidity ultimately determine the rates at which fuels dry and vegetation cures, and whether fuel conditions become dry enough to sustain an ignition. Once conditions are capable of sustaining a fire, atmospheric stability and wind speed and direction can have a significant effect on fire behavior. Winds fan fires with oxygen, increasing the rate at which fire spreads across the landscape. Weather is the most unpredictable component governing fire behavior, constantly changing in time and across the landscape.

#### Topography

Fires burning in similar fuel conditions burn very differently under varying topographic conditions. Topography alters heat transfer and localized weather conditions, which in turn influence vegetative growth and resulting fuels. Changes in slope and aspect can have significant influences on how fires burn. Generally speaking, north slopes tend to be cooler, wetter, more productive sites. This can lead to heavy fuel accumulations, with high fuel moistures, later curing of fuels, and lower rates of spread. In contrast, south and west slopes tend to receive more direct sun, and thus have the highest temperatures, lowest soil and fuel moistures, and lightest fuels. The combination of light fuels and dry sites leads to fires that typically display the highest rates of spread. These slopes also tend to be on the windward side of mountains. Thus these slopes tend to be “available to burn” a greater portion of the year.

Slope also plays a significant role in fire spread, by allowing preheating of fuels upslope of the burning fire. As slope increases, rate of spread and flame lengths tend to increase. Therefore, we can expect the fastest rates of spread on steep, warm south and west slopes with fuels that are exposed to the wind.

### Fuels

Fuel is any material that can ignite and burn. Fuels describe any organic material, dead or alive, found in the fire environment. Grasses, brush, branches, logs, logging slash, forest floor litter, conifer needles, and buildings are all examples. The physical properties and characteristics of fuels govern how fires burn. Fuel loading, size and shape, moisture content, and continuity and arrangement all have an effect on fire behavior. Generally speaking, the smaller and finer the fuels, the faster the potential rate of fire spread. Small fuels such as grass, needle litter and other fuels less than a quarter inch in diameter are most responsible for fire spread. In fact, "fine" fuels, with high surface to volume ratios, are considered the primary carriers of surface fire. This is apparent to anyone who has ever witnessed the speed at which grass fires burn. As fuel size increases, the rate of spread tends to decrease due to a decrease in the surface to volume ratio. Fires in large fuels generally burn at a slower rate, but release much more energy and burn with much greater intensity. This increased energy release, or intensity, makes these fires more difficult to control. Thus, it is much easier to control a fire burning in grass than to control a fire burning in timber.

When burning under a forest canopy, the increased intensities can lead to torching (single trees becoming completely involved) and potential development of crown fires. That is, they release much more energy. Fuels are found in combinations of types, amounts, sizes, shapes, and arrangements. It is the unique combination of these factors, along with the topography and weather, which determines how fires will burn.

The study of fire behavior recognizes the dramatic and often-unexpected effect small changes in any single component have on how fires burn. It is impossible to speak in specific terms when predicting how a fire will burn under any given set of conditions. However, through countless observations and repeated research, some of the principles that govern fire behavior have been identified and are recognized.

## Wildfire Hazards

In the 1930s, wildfires consumed an average of 40 to 50 million acres per year in the contiguous United States, according to US Forest Service estimates. By the 1970s, the average acreage burned had been reduced to about 5 million acres per year. Over this time period, fire suppression efforts were dramatically increased and firefighting tactics and equipment became more sophisticated and effective. For the 11 western states, the average acreage burned per year since 1970 remained relatively constant at about 3.5 million acres per year.

The severity of a fire season can usually be determined in the spring by how much precipitation is received, which in turn, determines how much fine fuel growth there is and how long it takes this growth to cure out. These factors, combined with annual wind events in late summer, drastically increase the chance a fire start will grow and resist suppression activities. Furthermore, harvest is also occurring at this time. Occasionally, harvesting equipment causes an ignition that can spread into populated areas and timberlands.

Fire was once an integral function of the majority of ecosystems in northcentral Washington. The seasonal cycling of fire across the landscape was as regular as the July, August, and September lightning storms plying across the mountains. Depending on the plant community composition, structural configuration, and buildup of plant biomass, fire resulted from ignitions with varying intensities and extent across the landscape. Shorter return intervals between fire events often resulted in less dramatic changes in plant composition (Johnson 1998). The fires

burned from 1 to 47 years apart, with most at 5- to 20-year intervals (Barrett 1979). With infrequent return intervals, plant communities tended to burn more severely and be replaced by vegetation different in composition, structure, and age (Johnson *et al.* 1994). Native plant communities in this region developed under the influence of fire, and adaptations to fire are evident at the species, community, and ecosystem levels. Fire history data (from fire scars and charcoal deposits) suggest fire has played an important role in shaping the vegetation in the Columbia Basin for thousands of years (Steele *et al.* 1986, Agee 1993).

### Wildfire Ignition Profile

Detailed records of fire ignitions and extents have been compiled by the Washington Department of Natural Resources. Using the data on past fire extents and ignition, the occurrence of wildland fires in the region of Okanogan County has been evaluated.

Detailed records of fire ignition and extent have been compiled by the Washington Department of Natural Resources of fire ignitions dating from 1972 to 2006. The Confederated Tribes of the Colville Reservation maintain detailed fire ignition and extent data for this region from 1983 to 2004. In addition the U.S. Forest Service has also maintained a database of fire ignitions and extent on their jurisdiction in Okanogan County from 1910 thru 2001. Using these data on past fire extents and fire ignition data, the occurrence of wildland fires in the region of Okanogan County has been evaluated.

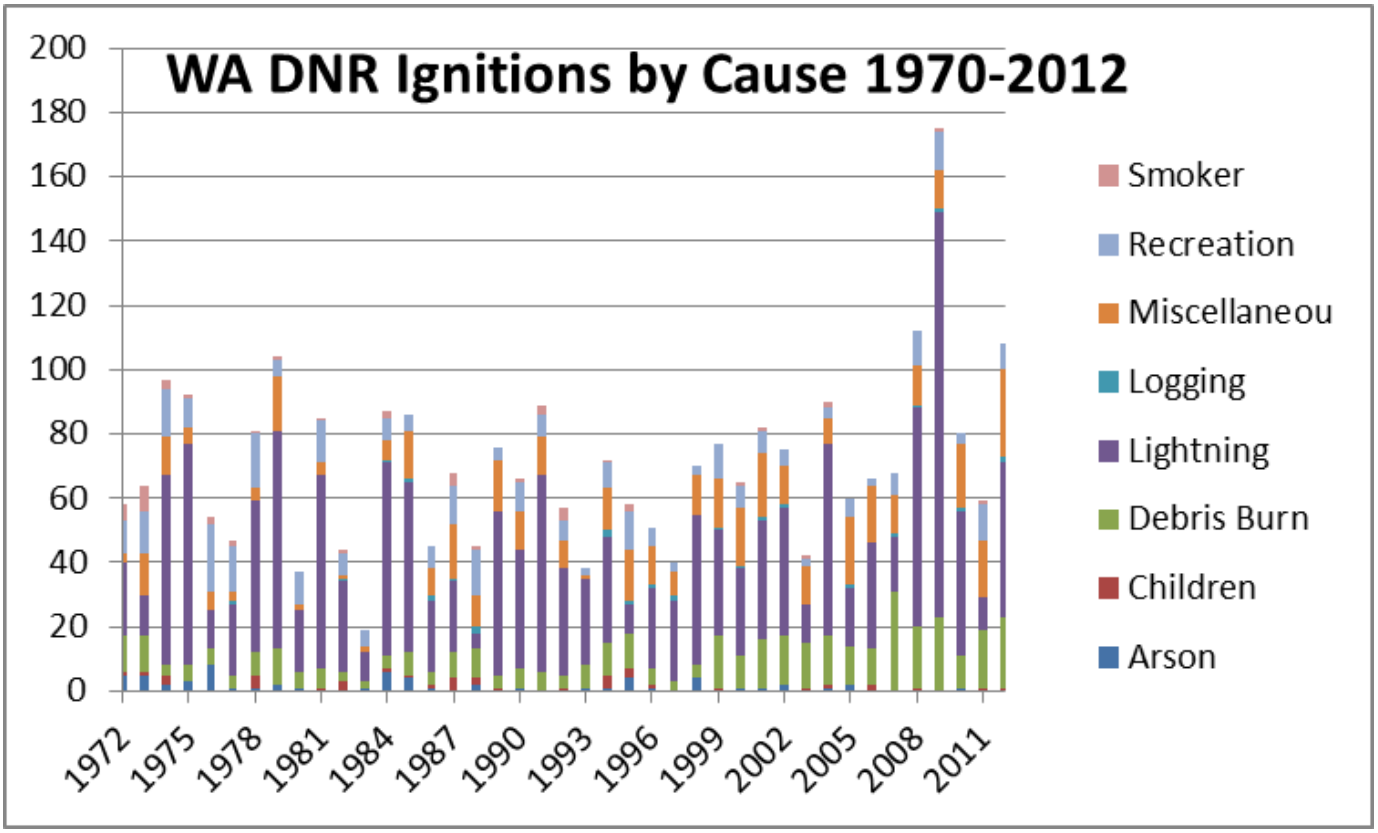
The Washington Department of Natural Resources database of wildfire ignitions for those areas where the Washington Department of Natural Resources provides primary wildfire suppression services includes data from 1972 through 2012. An analysis of the wildfire ignitions in Okanogan County reveals that during this period approximately 169,485 acres have burned as a result of 2,889 wildfire ignitions in Okanogan County on DNR protected lands Table (4.1).

**Table 4.1. Summary of Okanogan County Wildfire Ignitions.**

| Cause | Acres Burned | Percent | Number of Ignitions | Percent |
|---|---|---|---|---|
| Children | 1,608 | <1% | 40 | 1% |
| Debris Burning | 10,394 | 6% | 396 | 14% |
| Arson | 444 | <1% | 62 | 2% |
| Lightning | 99,168 | 59% | 1,513 | 52% |
| Logging | 13 | <1% | 26 | <1% |
| Miscellaneous | 52,710 | 31% | 463 | 16% |
| Recreation | 4,056 | 2% | 339 | 12% |
| Smoker | 1,093 | <1% | 50 | 2% |
| **Total** | **169,485** | **100%** | **2,889** | **100%** |

The "Miscellaneous" category includes ignitions originating from structure fires, burning material from aircraft, burning material from auto (other than smoking), burning vehicle, electric fence, equipment crash, fireworks (other than children), hot ashes, power lines, sparks from auto exhaust, sparks from cutting torch or welder, sparks from farm tractors, spontaneous combustion (other than sawdust piles), use of fire (other than logging), woodcutting, and an "other" category

**Figure 4.1. Washington DNR Recorded Ignitions 1970-2012.**




Ideally, historical fire data would be used to estimate the annual probability for fires in Okanogan County. However, current data are not adequate to make credible calculations because the data for local, state, and federal responsibility areas are not reported by the same criteria. Nevertheless, the data reviewed above provide a general picture of the level of wildland-urban interface fire risk for Okanogan County overall.

### Wildfire Extent Profile

Across the west, wildfires have been increasing in extent and cost of control. Data summaries for 2006 through 2012 are provided and demonstrate the variability of the frequency and extent of wildfires nationally.

**Table 4.2. National Fire Season Summaries.**

| Statistical Highlights | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| Number of Fires | 96,385 | 85,705 | 78,979 | 78,792 | 71,971 | 74,126 | 67,315 |
| 10-year Average ending with indicated year | 78,174 | 80,125 | 79,919 | 78,549 | 76,521 | 75,526 | 74,912 |
| Acres Burned | 9,873,745 | 9,328,045 | 5,292,468 | 5,921,786 | 3,422,724 | 8,711,367 | 9,211,281 |
| 10-year Average ending with indicated year | 5,858,403 | 6,505,511 | 6,901,788 | 6,931,357 | 6,534,250 | 7,048,296 | 7,250,953 |
| Structures Burned | Not Reported | Not Reported | Not Reported | Not Reported | Not Reported | Not Reported | Not Reported |
| Estimated Cost of Fire Suppression (Federal agencies only) | $1.93 billion | $1.84 billion | $1.85 billion | $1.24 billion | $1.13 billion | $1.73 billion | $1.9 billion |

The National Interagency Fire Center maintains records of fire costs, extent, and related data for the entire nation. Tables 4.3 and 4.4 summarize some of the relevant wildland fire data for the nation and some trends that are likely to continue into the future unless targeted fire mitigation efforts are implemented and maintained. According to these data, the total number of fires and total number of acres burned are trending upward. Since 2000 there has been a significant increase in the number of acres burned.

**Table 4.3. Total Fires and Acres 1983 - 2012 Nationally. (National Interagency Fire Center 2012)**

| Year | Fires | Acres | Year | Fires | Acres |
|---|---|---|---|---|---|
| **2012** | 67,315 | 9,211,281 | **1997** | 66,196 | 2,856,959 |
| **2011** | 74,126 | 8,711,367 | **1996** | 96,363 | 6,065,998 |
| **2010** | 71,971 | 3,422,724 | **1995** | 82,234 | 1,840,546 |
| **2009** | 78,792 | 5,921,786 | **1994** | 79,107 | 4,073,579 |
| **2008** | 78,979 | 5,292,468 | **1993** | 58,810 | 1,797,574 |
| **2007** | 85,705 | 9,328,045 | **1992** | 87,394 | 2,069,929 |
| **2006** | 96,385 | 9,873,745 | **1991** | 75,754 | 2,953,578 |
| **2005** | 66,753 | 8,689,389 | **1990** | 66,481 | 4,621,621 |
| **2004** | 65,461 | 8,097,880 | **1989** | 48,949 | 1,827,310 |
| **2003** | 63,629 | 3,960,842 | **1988** | 72,750 | 5,009,290 |
| **2002** | 73,457 | 7,184,712 | **1987** | 71,300 | 2,447,296 |
| **2001** | 84,079 | 3,570,911 | **1986** | 85,907 | 2,719,162 |
| **2000** | 92,250 | 7,393,493 | **1985** | 82,591 | 2,896,147 |
| **1999** | 92,487 | 5,626,093 | **1984** | 20,493 | 1,148,409 |
| **1998** | 81,043 | 1,329,704 | **1983** | 18,229 | 1,323,666 |

These statistics are based on end-of-year reports compiled by all wildland fire agencies after each fire season. The agencies include: Bureau of Land Management, Bureau of Indian Affairs, National Park Service, US Fish and Wildlife Service, Forest Service, and all state agencies.

Figure 4.3 above shows the extent of wildfires by acreage burned per year in Okanogan County. The various fire suppression agencies in Okanogan County respond to many wildland fires each year, but few of those fires grow to a significant size. According to national statistics, only 2% of all wildland fires escape initial attack however, that 2% accounts for the majority of fire suppression expenditures, which also threaten lives, properties, and natural resources. These large fires are characterized by a size and complexity that requires special management organizations, drawing suppression resources often from across the nation. It is these big fires that gobble acres and leave the most lasting effects. They create unique challenges to local communities by their quick development and the scale of their footprint. Okanogan County is located within an area where natural vegetation and weather combine to make dangerous fire conditions. Natural ignitions from lightning have been part of the history of the County and will continue to be. Even though firefighters understand this potential, it is impossible for agencies to guarantee 100% success in fire suppression. It is important for fire planners to understand what has happened in the past in order to be more effective in the future when preparing for the inevitable.

## Wildfire Hazard Assessment

Okanogan County was analyzed using a variety of models managed on a Geographic Information System (GIS) system. Physical features of the region including roads, streams, soils, elevation, and remotely sensed images were represented by data layers. Field visits were conducted by specialists from Northwest Management, Inc. and others. Discussions with area residents and local fire suppression professionals augmented field visits and provided insights into forest health issues and treatment options. This information was analyzed and combined to develop an objective assessment of wildland fire risk in the region.

### Historic Fire Regime

Historical variability in fire regime is a conservative indicator of ecosystem sustainability, and thus, understanding the natural role of fire in ecosystems is necessary for proper fire management. Fire is one of the dominant processes in terrestrial systems that constrain vegetation patterns, habitats, and ultimately, species composition. Land managers need to understand historical fire regimes, the fire return interval (frequency) and fire severity prior to settlement by Euro-Americans, to be able to define ecologically appropriate goals and objectives for an area. Moreover, managers need spatially explicit knowledge of how historical fire regimes vary across the landscape.

Many ecological assessments are enhanced by the characterization of the historical range of variability, which helps managers understand: (1) how the driving ecosystem processes vary from site to site; (2) how these processes affected ecosystems in the past; and (3) how these processes might affect the ecosystems of today and the future. Historical fire regimes are a critical component for characterizing the historical range of variability in fire-adapted ecosystems. Furthermore, understanding ecosystem departures provides the necessary context for managing sustainable ecosystems. Land managers need to understand how ecosystem processes and functions have changed prior to developing strategies to maintain or restore sustainable systems. In addition, the concept of departure is a key factor for assessing risks to

ecosystem components. For example, the departure from historical fire regimes may serve as a useful proxy for the potential of severe fire effects from an ecological perspective.

**Table 4.4. Assessment of Historic Fire Regimes in Okanogan County.**

| Description | Percent | Acres |
|---|---|---|
| 0-35 Year Return Interval, Low and Mixed Severity | 15% | 512,664 |
| 0-35 Year Return Interval, Replacement Severity | 3% | 101,394 |
| 35-200 Year Fire Return Interval, Low and Mixed Severity | 59% | 2,006,498 |
| 35-200 Year Return Interval, Replacement Severity | 16% | 557,726 |
| 200+ Year Return Interval, Any Severity | 2% | 82,376 |
| Water | <1% | 147 |
| Barren | <1% | 17,671 |
| Sparsely Vegetated | <1% | 1,812 |
| Indeterminate Fire Regime | <3% | 90,401 |
| **Total** | **100%** | **3,401,253** |

The table above shows the amount of acreage in each defined historic fire regime in Okanogan County. The historic fire regime model in Okanogan County shows that much of the river basins historically had a 35 to 200-year fire return interval and typically experienced stand replacement severity fires, however the majority of the County experienced low to mixed severity fires with the same return interval which includes much of the lower elevation forests and shrub steppe. The higher elevation forested areas experienced fire every 35-200 years while some areas experienced fire every 200+ years. This difference is likely due to the more variable topography and presence of snowpack for longer duration in these areas.

A map of Historic Fire Regimes in Okanogan County as well as an explanation of how the data was derived is included in Appendix 1 and 3, respectively.

### Vegetation Condition Class

A natural fire condition is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). Coarse scale definitions for historic fire regimes have been developed by Hardy *et al.* (2001) and Schmidt *et al.* (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001).

A vegetation condition class (VCC) is a classification of the amount of departure from the historic regime (Hann and Bunnell 2001). The three classes are based on low (VCC 1), moderate (VCC 2), and high (VCC 3) departure from the central tendency of the natural (historical) regime (Hann and Bunnell 2001, Hardy *et al.* 2001, Schmidt *et al.* 2002). The central tendency is a composite estimate of vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated natural disturbances. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside.

An analysis of Fire Regime Condition Class in Okanogan County shows that approximately 33% of the County is in Condition Class 1 (low departure), about 13% is in Condition Class 2 (moderate departure), with 47% of the area in Condition Class 3 (Table 4.6).

**Table 4.5. Assessment of Current Vegetation Condition Class in Okanogan County.**

| | Condition Class | Percent | Acres |
|---|---|---|---|
| 1 | Condition Class 1 | 33% | 1,113,857 |
| 2 | Condition Class 2 | 13% | 456,952 |
| 3 | Condition Class 3 | 47% | 1,593,127 |
| 5 | Water | <1% | 28,884 |
| 6 | Urban | 1% | 39,883 |
| 7 | Barren | <1% | 17,680 |
| 8 | Sparsely Vegetated | <1% | 1,813 |
| 9 | Agriculture | 4% | 148,909 |
| | **Total** | **100%** | **3,401,253** |

Approximately one third of the acres in Okanogan County that have not been converted for agricultural uses or developed into urban areas, have retained their historic fire regime. Over two million acres are either moderately or highly departed from historical regimes. Most of the valleys in the forested western half of the County appear to be defined as Condition Class 3. The higher elevations in the western half of the county are Condition Class 1. The remainder of the County contains a scattered mix of all three levels of Condition Classes with Classes 2 and 3 surrounding population centers and travel corridors.

A map depicting the Vegetation Condition Class as well as a more in-depth explanation of Vegetation Condition Class is presented in the Appendix 1 and 3, respectively.

## Okanogan County's Wildland-Urban Interface

The wildland-urban interface (WUI) has gained attention through efforts targeted at wildfire mitigation; however, this analysis technique is also useful when considering other hazards because the concept looks at where people and structures are concentrated in any particular region.

A key component in meeting the underlying need for protection of people and structures is the protection and treatment of hazards in the wildland-urban interface. The wildland-urban interface refers to areas where wildland vegetation meets urban developments or where forest fuels meet urban fuels such as houses. The WUI encompasses not only the interface (areas immediately adjacent to urban development), but also the surrounding vegetation and topography. Reducing the hazard in the wildland-urban interface requires the efforts of federal, state, and local agencies and private individuals (Norton 2002). "The role of [most] federal agencies in the wildland-urban interface includes wildland firefighting, hazard fuels reduction, cooperative prevention and education, and technical experience. Structural fire protection [during a wildfire] in the wildland-urban interface is [largely] the responsibility of Tribal, state, and local governments" (USFS 2001). The role of the federal agencies in Okanogan County is and will be much more limited. Property owners share a responsibility to protect their residences and businesses and minimize danger by creating defensible areas around them and taking other measures to minimize the risks to their structures (USFS 2001). With treatment, a WUI can provide firefighters a defensible area from which to suppress wildland fires or defend communities against other hazard risks. In addition, a WUI that is properly treated will be less likely to sustain a crown fire that enters or originates within it (Norton 2002).

By reducing hazardous fuel loads, ladder fuels, and tree densities, and creating new and reinforcing existing defensible space, landowners can protect the WUI, the biological resources of the management area, and adjacent property owners by:

- minimizing the potential of high-severity ground or crown fires entering or leaving the area;
- reducing the potential for firebrands (embers carried by the wind in front of the wildfire) impacting the WUI. Research indicates that firebrands from a crown fire can ignite additional wildfires as far as 1¼ miles away during periods of extreme fire weather and fire behavior (McCoy *et al.* 2001);
- improving defensible space in the immediate areas for suppression efforts in the event of wildland fire.

Three WUI conditions have been identified (Federal Register 66(3), January 4, 2001) for use in wildfire control efforts. These include the Interface Condition, Intermix Condition, and Occluded Condition. Descriptions of each are as follows:

- **Interface Condition** – a situation where structures abut wildland fuels. There is a clear line of demarcation between the structures and the wildland fuels along roads or back fences. The development density for an interface condition is usually 3+ structures per acre;
- **Intermix Condition** – a situation where structures are scattered throughout a wildland area. There is no clear line of demarcation; the wildland fuels are continuous outside of and within the developed area. The development density in the intermix ranges from structures very close together to one structure per 40 acres; and
- **Occluded Condition** – a situation, normally within a city, where structures abut an island of wildland fuels (park or open space). There is a clear line of demarcation between the structures and the wildland fuels along roads and fences. The development density for an occluded condition is usually similar to that found in the interface condition and the occluded area is usually less than 1,000 acres in size.

In addition to these classifications detailed in the Federal Register, Okanogan County has included two additional classifications to augment these categories:

- **Rural Condition** – a situation where the scattered small clusters of structures (ranches, farms, resorts, or summer cabins) are exposed to wildland fuels. There may be miles between these clusters.
- **High Density Urban Areas** – those areas generally identified by the population density consistent with the location of incorporated cities, however, the boundary is not necessarily set by the location of city boundaries or urban growth boundaries; it is set by very high population densities (more than 7-10 structures per acre).

Okanogan County's wildland-urban interface (WUI) is based on population density. Relative population density across the county is estimated using a GIS-based kernel density population model that uses object locations to produce, through statistical analysis, concentric rings or areas of consistent density. To graphically identify relative population density across the county, structure locations are used as an estimate of population density. For this analysis, physical addresses were used as an estimate of structure location. Okanogan County's GIS department

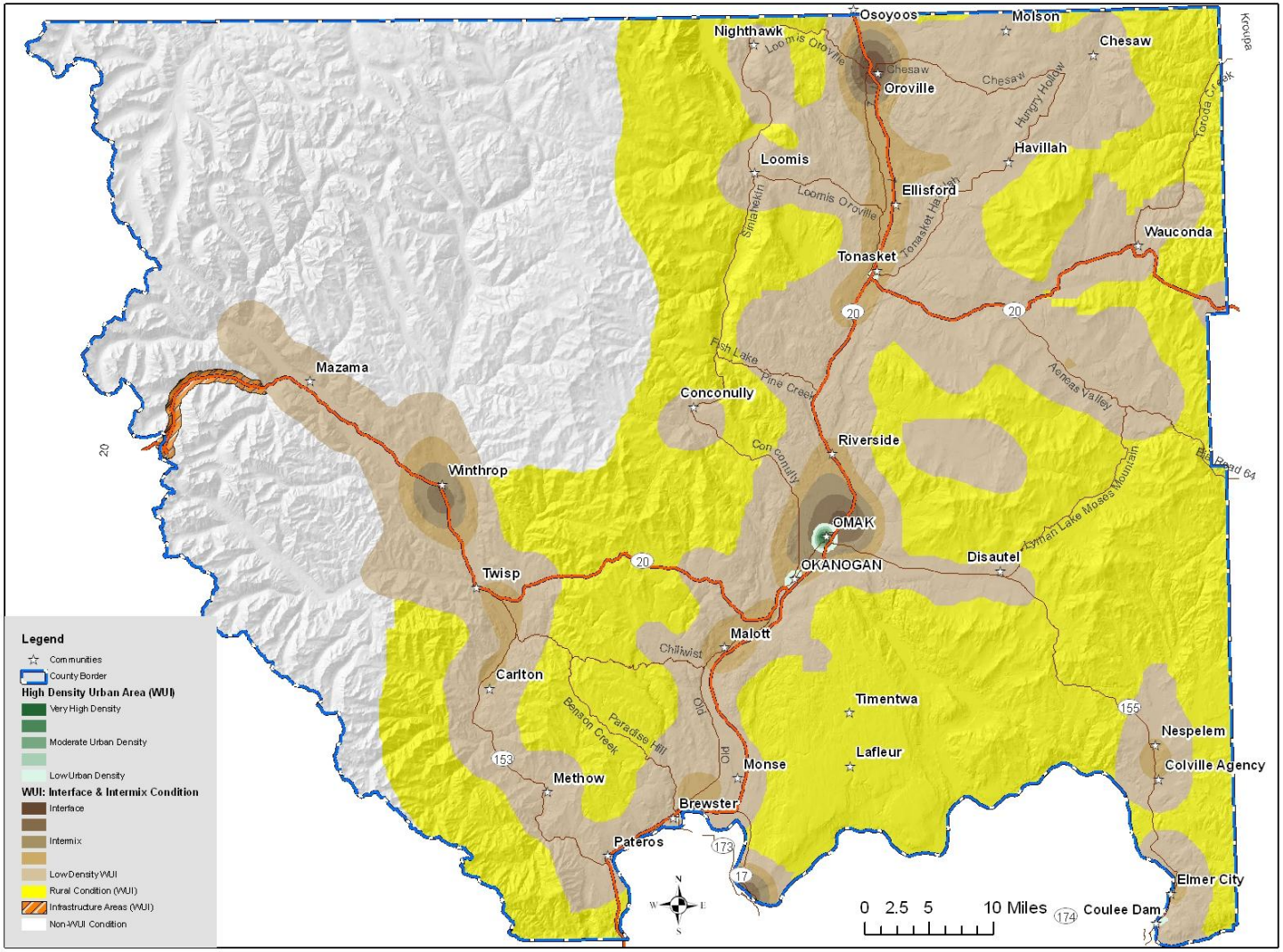
produced a 911 address data layer that was used to represent structure location as input for the model. The resulting output identified the extent and level of population density throughout the county. Highly populated areas are easily discernable from low population areas using this method, which enables the determination of urban verses rural populations. Rural areas of the WUI have an approximate density of one structure per 40 acres. The model also showed several small islands where no structures were recorded. Based on the planning committee's review and discussion, the final WUI boundary output was adjusted to incorporate the non-populated areas (no structures) due to their small size and scattered nature as well as their location in high fire risk areas.

By evaluating structure density in this way, WUI areas can be identified on maps by using mathematical formulae and population density indexes. The resulting population density indexes create concentric circles showing high density areas, interface, and intermix condition WUI, as well as rural condition WUI (as defined above). This portion of the analysis allows us to "see" where the highest concentrations of structures are located in reference to high risk landscapes, limiting infrastructure, and other points of concern.

The WUI, as defined here, is unbiased and consistent, allows for edge matching with other counties, and most importantly – it addresses all of the county, not just federally identified communities at risk. It is a planning tool showing where homes and businesses are located and the density of those structures leading to identified WUI categories. It can be determined again in the future, using the same criteria, to show how the WUI has changed in response to increasing population densities. It uses a repeatable and reliable analysis process that is unbiased.

The Healthy Forests Restoration Act makes a clear designation that the location of the WUI is at the determination of the county or reservation when a formal and adopted CWPP is in place. It further states that the federal agencies are obligated to use this WUI designation for all Healthy Forests Restoration Act purposes. The Okanogan County Community Wildfire Protection Plan planning committee evaluated a variety of different approaches to determining the WUI for the county and selected this approach and has adopted it for these purposes. In addition to a formal WUI map for use by the federal agencies, it is hoped that it will serve as a planning tool for the county, the Washington Department of Natural Resources, and local fire districts.

**Figure 4.2. Wildland-Urban Interface Map in Okanogan County, Washington.**



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### Potential WUI Treatments

The definition and mapping of the WUI is the creation of a planning tool to identify where structures, people, and infrastructure are located in reference to each other. This analysis tool does not include a component of fuels risk. There are a number of reasons to map and analyze these two components separately (population density vs. fire risk analysis). Primary among these reasons is the fact that population growth often occurs independent from changes in fire risk, fuel loading, and infrastructure development. Thus, making the definition of the WUI dependent on all of them would eliminate populated places with a perceived low level of fire risk today, which may in a year become an area at high risk due to forest health issues or other concerns.

By examining these two tools separately, the planner is able to evaluate these layers of information to see where the combination of population density overlays areas of high current fire risk and then take mitigative actions to reduce the fuels, improve readiness, directly address factors of structural ignitability, improve initial attack success, mitigate resistance to control factors, or (more often) a combination of many approaches.

It should not be assumed that just because an area is identified as being within the WUI, that it will therefore receive treatments because of this identification alone. Nor should it be implicit that all WUI treatments will be the application of the same prescription. Instead, each location targeted for treatments must be evaluated on its own merits: factors of structural ignitability, access, resistance to control, population density, resources and capabilities of firefighting personnel, and other site specific factors.

It should also not be assumed that WUI designation on national or state lands automatically equates to a treatment area. The federal and state agencies are still obligated to manage lands under their control according to the standards and guides listed in their respective land management plans. Their adopted management plans have legal precedence over the WUI designation until such a time as these plans are revised to reflect updated priorities.

Most treatments may begin with a home risk evaluation, and the implicit factors of structural ignitability (roofing, siding, deck materials) and vegetation within the treatment area of the structure. However, treatments in the low population areas of rural lands (mapped as yellow) may look closely at access (two ways in and out) and communications through means other than land-based telephones. On the other hand, a subdivision with densely packed homes (mapped as brown – interface areas) surrounded by forests and dense underbrush, may receive more time and effort implementing fuels treatments beyond the immediate home site to reduce the probability of a crown fire entering the subdivision.

## Landscape Risk Assessments

The total area of Okanogan County is approximately 3,400,000 acres, of which 953,301 acres is privately owned and about 1,574,262 acres is federally owned. Over 95 percent of the federally owned land is encompassed within the jurisdiction of the United States Forest Service, primarily within the Okanogan National Forest, most of the Pasayten Wilderness, and portions of the Lake Chelan – Sawtooth Wilderness.

Larger than several states, Okanogan Country is bordered on the north by the Canada, on the south by the Columbia River, on the east by Ferry County, and on the west by looming peaks of the North Cascade Mountains. The County covers 5,281 square miles, making it the largest

County in Washington. Only 30% of the land within the County is in private ownership due to the amount of state and federal land. The Colville Indian Reservation, located in the southeast corner of the County, occupies approximately 700,000 acres and is an integral part of the heritage of the County.

Forested highlands, shrub covered hills, and valley's with fertile farmlands comprise Okanogan County, which is located east of the Cascades along the Canadian border in the north-central part of Washington. Bordering the County on the west are Whatcom, Skagit, and Chelan Counties, to the east is Ferry County, and to the south is Douglas County. The western half of the County is comprised of dense, rugged, mountainous terrain, much of which is within Okanogan National Forest. Similar topography also can be found in the northeast corner of the County. From the north part of the County, the land descends into rolling hills, grassy ranges, and fertile valleys that extend through the center of the County.

Only 30% of the land within the County is in private ownership due to the amount of state and federal land. The Confederated Tribes of the Colville Reservation) occupies approximately 675,000 acres in the County's southeast corner and is an integral part of the County's heritage.

Government, retail trade, services, and manufacturing are a few of the major employers within the County. Omak, the regional center for services and trade, is experiencing a great deal of growth. There is also increasing commercial development pressure in the area between the Canadian border and Oroville. The City of Coulee Dam is the location of Grand Coulee Dam, one of the largest concrete structures in the world, and largest electricity producer in the United States.

In order to facilitate a mutual understanding of wildfire risks specific to commonly known areas in the county, the landscape-level wildfire risk assessments in the following sections are based on four predominant landscapes types that exhibit distinct terrain and wildland fuels. The four landscapes identified for the assessments are: agricultural lands, channeled scablands, western river breaks and eastern river breaks. These landscapes, although intermixed in some areas, exhibit specific fire behavior, fuel types, suppression challenges, and mitigation recommendations that make them unique from a planning perspective.

### Overall Fuels Assessment

The wide valley bottoms and availability of irrigation water throughout much of Okanogan County allows for extensive agricultural operations, particularly fruit orchards. Agricultural fields and orchards infrequently serve to fuel a fire. Most of the orchards within the valleys are irrigated until late in the fire season, which drastically reduces their likeliness of an ignition. Other agricultural products such as hay tend to burn in much the same manners of low growing grasses. Fires in grass and rangeland fuel types tend to burn at relatively low intensities, with moderate flame lengths and only short-range spotting. Suppression resources are generally quite effective in such fuels. Homes and other improvements can be easily protected from the direct flame contact and radiant heat through adoption of precautionary measures around the structure. Although fires in these fuels may not present the same control problems as those associated with large, high intensity fires in timber fuel types, they can cause significant damage if precautionary measures have not taken place prior to a fire event. Wind driven fires in short grass fuel types spread rapidly and can be difficult to control. During extreme drought and pushed by high winds, fires in grassland fuel types can exhibit extreme rates of spread, thwarting suppression efforts.

The Okanogan Highlands are a patch-work of dry Douglas-fir and ponderosa pine forests that, in many areas, have become overstocked, resulting in multistoried conditions with abundant ladder fuels. During pre-settlement times, much of this area was characterized by low intensity fires due to the relatively light fuel loading, which mostly consisted of small diameter fuels. Frequent, low intensity fires generally kept stands open; free of fire intolerant species and maintained seral species such as ponderosa pine as well as larger diameter fire resistant Douglas-fir. In some areas, low intensity fires stimulated shrubs and grasses, maintaining vigorous browse and forage. The shrub layer could either inhibit or contribute to potential fire behavior, depending on weather and live fuel moisture conditions at the time of the burn.

In general, large fires that start in the Okanogan Highlands start high in elevation and move downhill. As fires move down in elevation, they encounter drier and flashier fuels in the lower elevations. Rolling embers and spot fires are a common method of downhill fire spread. Spot fires ignited on slopes trigger uphill runs that throw more spot fires, expanding the downward fire progression. Modifying fuels to reduce the likelihood of torching and crowning trees will in turn reduce the likelihood of spot fires.

Increased activities by pathogens will continue to increase levels of dead and down fuel, as host trees succumb to insect attack and stand level mortality increases. Overstocked, multi-layered stands and the abundance of ladder fuels lead to horizontal and vertical fuel continuity. These conditions, combined with an arid and often windy environment, can encourage the development of a stand replacing fire. These fires can burn with very high intensities and generate large flame lengths and fire brands that can be lofted long distances. Such fires present significant control problems for suppression resources, often developing into large, destructive wildland fires.

A probability that needs to be planned for is the likelihood of extended spot fires. Large fires may easily produce spot fires from ½ to 2 miles away from the main fire. How fire suppression forces respond to spot fires is largely dependent upon the fuels in which they ignite. Stands of timber that are managed for fire resilience are much less likely to sustain torching and crowning behavior that produces more spot fires. The objective of fuel reduction thinning is to change the fuels in a way that will moderate potential fire behavior. If fire intensity can be moderated by vegetation treatments, then ground and air firefighting resources can be much more effective.

Areas that have recently burned, such as the Tripod Fire, will be at low risk of wildfires starting and spreading for several years because fine fuels were consumed. However, the overall reduction in hazardous fuels in these areas is minimal, particularly in dry Douglas-fir and ponderosa pine forests which were dense, multi-storied stands prior to wildfire. Dense stands of snags will become heavy dead and down branches and logs within 10-20 years. Fine fuels will return to these sites as understory species re-establish and these fuels combined with the accumulated large fuels will provide the opportunity for severe fire in 20-30 years after the initial wildfire. Examples of these types of fires include the Thirty-Mile Fire in 2001 and the Okanogan Complex in 2012.

### Overall Mitigation Activities

There are many specific actions that will help improve safety in a particular area; however, there are also many potential mitigation activities that apply to all residents and all fuel types. General mitigation activities that apply to all of Okanogan County are discussed below while area-specific mitigation activities are discussed within the individual landscape assessments.

The safest, easiest, and most economical way to mitigate unwanted fires is to stop them before they start. Generally, prevention actions attempt to prevent human-caused fires. Campaigns designed to reduce the number and sources of ignitions can take many forms. Traditional "Smokey Bear" type campaigns that spread the message passively through signage can be quite effective. Signs that remind people of the dangers of careless use of fireworks, burning when windy and leaving unattended campfires have been effective. Fire danger warning signs posted along access routes remind residents and visitors of the current conditions. It's impossible to say just how effective such efforts actually are; however, the low costs associated with posting of a few signs is inconsequential compared to the potential cost of fighting a fire.

**Burn Permits:** Washington State Department of Natural Resources is the primary agency issuing burn permits in forested areas of Okanogan County. The Washington DNR burn permits regulate silvicultural burning. Washington Department of Ecology (DOE) is the primary agency issuing burn permits for improved property and agricultural lands. All DOE burn permits are subject to fire restrictions in place with WA DNR & local fire protection districts. Washington DNR has a general burning period referred to as "Rule Burn" wherein a written burn permit is not required in low to some moderate fire dangers.

The timeframes for the Rule Burn are from October 16$^{th}$ to June 30$^{th}$. Washington DNR allows for Rule Burns to be ten foot (10') piles of forest, yard, and garden debris. From July 1$^{st}$ to October 15$^{th}$ if Rule Burns are allowed, they are limited to four foot (4') piles.

**Defensible Space:** Effective mitigation strategies begin with public awareness campaigns designed to educate homeowners of the risks associated with living in a flammable environment. Residents of Okanogan County must be made aware that home defensibility starts with the homeowner. Once a fire has started and is moving toward a structure or other valued resources, the probability of that structure surviving is largely dependent on the structural and landscaping characteristics of the home. "Living with Fire, A Guide for the Homeowner" is an excellent tool for educating homeowners as to the steps to take in order to create an effective defensible space. Residents of Okanogan County should be encouraged to work with local fire departments and fire management agencies within the county to complete individual home site evaluations. Home defensibility steps should be enacted based on the results of these evaluations. Beyond the homes, forest management efforts must be considered to slow the approach of a fire that threatens a community.

**Evacuation Plans:** Development of community evacuation plans are necessary to assure an orderly evacuation in the event of a threatening wildland fire. Designation and posting of escape routes would reduce chaos and escape times for fleeing residents. Community safety zones should also be established in the event of compromised evacuations. Efforts should be made to educate homeowners through existing homeowners associations or creation of such organizations to act as conduits for this information.

**Accessibility:** Also of vital importance is the accessibility of the homes to emergency apparatus. If a home cannot be protected safely, firefighting resources will not jeopardize lives to protect a structure. Thus, the fate of the home will largely be determined by homeowner actions prior to the event. In many cases, homes' survivability can be greatly enhanced by following a few simple guidelines to increase accessibility such as widening or pruning driveways and creating a turnaround area for large vehicles.

**Fuels Reduction:** Recreational facilities such as campgrounds and boat launches along the Columbia River should be kept clean and maintained. In order to mitigate the risk of an escaped

campfire, escape proof fire rings and barbeque pits should be installed and maintained. Surface fuel accumulations in forests and shrubland can be kept to a minimum by periodically conducting pre-commercial thinning, clearing, pruning and limbing, and possibly controlled burns. Other actions that would reduce the fire hazard would be creating a fire resistant buffer along roads and power line corridors and strictly enforcing fire-use regulations.

**Emergency Response:** Once a fire has started, how much and how large it burns is often dependent on the availability of suppression resources. In most cases, rural fire departments are the first to respond and have the best opportunity to halt the spread of a wildland fire. For many districts, the ability to reach these suppression objectives is largely dependent on the availability of functional resources and trained individuals. Increasing the capacity of departments through funding and equipment acquisition can improve response times and subsequently reduce the potential for resource loss.

**Other Activities:** Other specific mitigation activities are likely to include improvement of emergency water supplies, access routes, and management of vegetation along roads and power line right-of-ways. Furthermore, building codes should be revised to provide for more fire-conscious construction techniques such as using fire resistant siding, roofing, and decking in high risk areas.

### Upper Okanogan River Valley Risk Assessment

The communities of Oroville, Tonasket, and Crumbacher all lay within the immediate Upper Okanogan River Valley floor and foothills. For the most part, all of these neighborhoods have been largely developed for commercial, residential, and agricultural purposes with population clusters occurring around the incorporated communities of Oroville, Tonasket, and Riverside and the unincorporated communities of Crumbacher, and Ellisforde. Due to the obliging climate and availability of water throughout the valley, various types of orchards are grown extensively.

#### Wildfire Potential

Most of the neighborhoods in the Okanogan River Valley are heavily developed for residential, commercial, or agricultural use. Orchards, livestock pasture, hay, or other crops are grown on nearly every available acre that has access to irrigation water. During the summer and fall, this creates a mosaic of lush green vegetation where there is irrigation and cured sage and grass in areas where there isn't.

Wildland fuels within the valley floor of the Oroville Neighborhood are minimal due to extensive commercial and residential development as well as the proliferation of the orchards and other crops. The foothills rising out of the valley are typically covered by sage brush and bunchgrasses that form a continuous fuel bed. The steepness of the topography is variable; however, the foothills near the valley have low to moderate steepness, but the degree of slope tends to increase on the mid and upper slopes. The slope rising from the east side of the valley between the community of Oroville and Swanson Mill Road is much steeper and sparsely forested by ponderosa pine. This slope is characterized by sheer rock faces and outcroppings; however, the lack of vegetation does not generally help to slow the upslope spread of wildfire.

Around the communities of Tonasket and Ellisforde in the Tonasket Neighborhood, wildland fuels are limited to ditches or small bare lots due to the existence of numerous structures and agricultural development. The foothills and some non-irrigated areas along Highway 97 tend to be vegetated by sagebrush and lower growing grasses, particularly bunchgrasses. These fuels

form a continuous fuel bed with similar fuels on the mid and upper slopes surrounding the valley.

The area around Crumbacher is made up of fuels consisting of sagebrush and grasses both within the valley and in the surrounding foothills. An open stand of ponderosa pine with a grassy understory surrounds and intermixes with the small population cluster known as the Crumbacher community.

Wildland fuels within the community of Riverside are fairly limited to ditches, empty lots, and the riverbanks due to extensive urban and agricultural development. Orchards and other crops grow both within the valley and on many of the low benches where irrigation water is available. The surrounding foothills are vegetated primarily by sagebrush and various lower growing grasses. Sparse ponderosa pine can be found in a few of the nearby draws. The slope rising from the east side of the river near Omak is steep, almost vertical in some places; however, it appears to be nearly solid rock with little soil available for plant growth.

**Ingress-Egress**

The main arterial through these neighborhoods and all of the Okanogan River Valley is U.S. Highway 97 from the Okanogan – Chelan County border all the way to Canadian border. These neighborhoods contain many of the populated communities in the County; therefore, there is a multitude of County and city roads. State Routes 20, 215, 17, 153, 173, and 155 also cross through the Okanogan River Valley.

Residents living in the populated centers and most subdivisions surrounding the towns have access to municipal water supply systems with public fire hydrants. Outside these areas, development relies on individual, co-op, or multiple-home well systems. Creeks, ponds, and developed drafting areas provide water sources for emergency fire suppression in the rural areas to a limited extent. Irrigation systems are capable of providing additional water supply for suppression equipment on a limited basis. Additional water resources distributed and documented throughout the agricultural landscape are needed to provide water for fire suppression.

There are a numerous bridges in the agricultural landscape of Okanogan County. Bridge load rating signs are mostly in place for the existing bridges and do not impose a limitation to access for firefighting equipment.

Local public electrical and telephone utility lines travel both above and below ground along roads and highways with limited exposure to failure during a wildfire event. Cell phone service is well-established in most parts of the county with only limited dead zones.

**Infrastructure**

All of the residents within the city limits of Oroville, Tonasket, and Riverside have access to the municipal water systems. Those outside the city limits and in unincorporated communities typically rely on personal or multiple home well systems.

Tonasket, Oroville and Ellisforde are served by the Oroville-Tonasket Irrigation District.

Grand Coulee Dam generates power, which is then distributed by high tension lines across the Colville Indian Reservation to the substations in Okanogan and to a substation located near Coleman Butte. This transmission line continues north to the City of Tonasket generally following the State Route 97 corridor.

**Fire Protection**

The Okanogan Fire Protection District #1 provides both structural and wildfire protection for nearly all of the Oroville Neighborhood. Okanogan County Fire Protection District #4 covers much of the communities of Ellisforde, Tonasket, Crumbacher, and a narrow corridor east along State Route 20 to the Aeneas Valley Road. Okanogan County Fire Protection District #7 provides protection for an area extending from the community of Riverside and including a small part of Omak suburbs. Okanogan County Fire Protection District #7 protection area encompasses part of the Crumbacher area.

Mutual aid agreements between fire districts supplement wildland fire protection when needed. Additional fire protection is provided by the Washington DNR, which provides wildfire protection and suppression on privately owned forestland and state-owned forestland. The DNR does not provide structural fire suppression, but does provide wildfire protection on non-forested land that threatens DNR-protected lands. The BLM provides wildfire protection on their ownership within Okanogan County and has mutual aid agreements with the DNR for protection of forested land. BLM also does not provide structural fire suppression.

**Potential Mitigation Activities**

Mitigation measures needed in the Upper Okanogan River Valley include maintaining a defensible space around structures and access routes that lie adjacent to annual crops and other wildland fuels. Around structures, this includes maintaining a green or plowed space, mowing weeds and other fuels away from outbuildings, pruning and/or thinning larger trees, using fire resistant construction materials, and locating propane tanks, fuel tanks and firewood away from structures. Roads and driveways accessing rural residents may or may not have adequate road widths and turnouts for firefighting equipment depending on when the residences were constructed. Performing road inventories in high risk areas to document and map their access limitations will improve firefighting response time and identify areas in need of enhancement. Primitive or abandoned roads that provide key access to remote areas should also be maintained in such a way that enables access for emergency equipment so that response times can be minimized. Roads can be made more fire resistant by frequently mowing along the edges or spraying weeds to reduce the fuels. Aggressive initial attack on fires occurring along travel routes will help ensure that these ignitions do not spread to nearby home sites. Designing a plan to help firefighters control fires in CRP lands that lie adjacent to agricultural crops would significantly lessen a fire's potential of escaping to the higher value resource. Mitigation associated with this situation might include installing fuel breaks or plowing a fire resistant buffer zone around fields and along predesigned areas to tie into existing natural or manmade barriers or implementing a prescribed burning program during less risky times of the year.

Maintaining developed drafting sites (for fire engines), increasing access to water from irrigation facilities, and developing other water resources throughout the agricultural landscape will increase the effectiveness and efficiency of emergency response during a wildfire.

### South Central Landscape Risk Assessment

The channeled scablands are a dominant landscape in South Central Okanogan County. Major population centers within the South Central landscape include Malott, Monse, Brewster, Pateros, Okanogan, and Omak. This unique geological feature was created by ice age floods that swept across eastern Washington and down the Columbia River Plateau periodically during the Pleistocene era. The massive erosion caused by the flood events scoured the landscape down to the underlying basalt creating vast areas of rocky cliffs, river valleys, channel ways and pothole

lakes. Typical vegetation found throughout this landscape is grass, mixed shrub and sagebrush with areas of wetlands, marsh, ponderosa pine islands, cultivated crops and CRP fields. The channeled scablands landscape prevails in the southcentral portion of the county within the Colville Indian Reservation and along the major waterways of the Okanogan River, Columbia River, Tumwater Creek and Rice Canyon. Landownership is predominantly private or Tribal with areas owned by the State of Washington and the Bureau of Land Management occurring along the western fringes of the scablands. Tribal ownership includes numerous named and unnamed lakes that occur between the Okanogan River and Omak Lake. Private landownership includes cattle ranches and in holdings of cultivated farmland and CRP fields. New development occurs primarily near communities and along major roads. Most of the pressure for multi-housing subdivisions occurs in close proximity to the towns. Rural development is widely dispersed consisting primarily of isolated ranching headquarters, home sites, irrigation systems, and developed springs or wells. In nearly all developed areas, structures are in close proximity to vegetation that becomes a significant fire risk at certain times of the year.

**Wildfire Potential**

The channeled scablands landscape has a moderate to high wildfire potential due to a characteristically high occurrence of shrubby fuels mixed with grass, sloping terrain and somewhat limited access. Large expanses of open rangeland or pasture provide a continuous fuel bed that could, if ignited, threaten structures and infrastructure under extreme weather conditions. Cattle grazing will often reduce fine, flashy fuels reducing a fire's rate of spread; however, high winds increase the rate of fire spread and intensity of rangeland fires. A wind-driven fire in dry, native fuel complexes on variable terrain produces a rapidly advancing, very intense fire with large flame lengths, which enables spotting ahead of the fire front.

Wildfire risk in the channeled scablands landscape is at its highest during summer and fall when daily temperatures are high and relative humidity is low. Fires burning in some types of unharvested fields would be expected to burn more intensely with larger flame lengths due to the greater availability of fuels. Fields enrolled in conservation programs or managed for wildlife habitat, can burn very intensely due to an increased amount of fuel build-up from previous years' growth. Fires in this fuel type are harder to extinguish completely due to the dense duff layer, which often leads to hold-over fires that may reemerge at a later date causing additional fire starts.

**Ingress-Egress**

The main arterial through these neighborhoods and all of the Okanogan River Valley is U.S. Highway 97 from the Okanogan – Chelan County border all the way to Canadian border. These neighborhoods contain many of the populated communities in the County; therefore, there is a multitude of County and city roads. State Routes 20, 215, 17, 153, 173, and 155 also cross through the Okanogan River Valley.

County roads as well as rural ranch access roads are well distributed throughout most of the channeled scablands often following section lines or traversing the multitude of draws and drainage ways. In remote rural areas, county roads often change from a paved or maintained gravel surface to unimproved primitive roads making access possible only during certain times of the year. Limited access within remote areas and a lack of maintenance on existing travel routes, increases fire suppression response time and has a direct effect on fire spread leading to increased fire size and destructive potential.

**Infrastructure**

Residents living in the populated centers of Omak, Okanogan, Brewster, and Pateros have access to municipal water supply systems with public fire hydrants. Outside these areas, development relies on individual, co-op or multiple-home well systems. Creeks, ponds and developed drafting areas provide water sources for emergency fire suppression in the rural areas to a limited extent. Water tanks have been set up at several ranches throughout the area as a supplemental water supply during fire season. Irrigation systems are capable of providing additional water supplies for suppression equipment on a limited basis. Additional water resources distributed and documented throughout the agricultural landscape are needed to provide adequate water for fire suppression.

The bench west and north of Omak and Okanogan is served by the Okanogan Irrigation District. This is a pressurized system with two reservoirs; Lower Conconully Lake and Upper Conconully Lake. The water is released through a dam on the lower lake into Salmon Creek and then diverted from Salmon Creek about 3 miles upstream from its mouth at the Okanogan River. This water enters a concrete lined canal that takes it north and east across the Okanogan and Omak Flat where there are pumping stations. During periods of drought they can supplement this system by pumping from the Okanogan River. They also receive some water from Johnson Creek, which is diverted by pipe to Duck Lake on the North Omak Flat. There is also a small private water right (Swayze) that exists on Salmon Creek that covers several residences and small farms just west of the Okanogan city limits. This system also diverts water from Salmon Creek.

The Alta Vista Irrigation District is a small irrigation district within the boundaries of the City of Okanogan. This system draws its water from the Okanogan River and is dispersed into the neighborhood by buried pipe covering five blocks north of Pines Street to Irene Street west of the Okanogan River.

There are two electrical substations in close proximity to the City of Okanogan. They are both located on Van Duyn Street from which they distribute the power to various parts of the County. A transmission line to the upper Methow follows the same general route as State Route 20. This line terminates at a substation at the Town of Twisp. There is also a transmission line that goes south to the Brewster area following State Route 97 for 13 miles and then crosses the Okanogan River and ends in Brewster Flat.

Public utility lines travel both above and below ground along roads and cross-country to remote facilities. Many irrigation systems and wells rely on above ground power lines for electricity. These power poles pass through areas of dense wildland fuels that could be destroyed or compromised in the event of a wildfire. Cell phone service is well established in most parts of the county with only limited dead zones.

**Fire Protection**

Fire Protection District #3 covers a large part of the Okanogan River Valley including the majority of the Omak – Okanogan and Malott communities. Okanogan County Fire Protection District #15 provides structural and wildland fire protection for the communities of Pateros, Brewster, and Bridgeport Bar. Finally, Okanogan County Fire Protection District #8 provides structural and wildland fire protection for the Tribal land east of the Okanogan River which includes the communities of Timentwa and Lafleur. Mutual aid agreements between fire districts supplement the wildland fire protection response when needed. Additional fire protection is provided by the Washington DNR, which provides wildfire protection and

suppression on privately-owned forestland and state-owned forestland west of Highway 97 in Okanogan County. The DNR does not provide structural fire suppression, but it does provide wildfire protection on non-forested land that threatens DNR-protected lands. BLM provides wildfire protection on their lands within Okanogan County and has mutual aid agreements with the DNR for protection of forested land. BLM also does not provide structural fire suppression.

**Potential Mitigation Activities**

Mitigation measures needed in the channeled scabland landscape include maintaining a defensible space around structures and access routes that lie adjacent to wildland fuels. Around structures this includes maintaining a green or plowed space, mowing weeds and other fuels away from outbuildings, pruning and/or thinning larger trees, using fire resistant construction materials, and locating propane tanks and firewood away from structures. Roads and driveways accessing rural development need to be kept clear of encroaching fuels to allow escape and access by emergency equipment. Performing road inventories in high risk areas and documenting and mapping their access limitations will improve firefighting response time and identify areas in need of improvement. Primitive or abandoned roads that provide key access to remote areas should be maintained to allow access for emergency equipment so that emergency response times are minimized. Designing a plan to help firefighters control fires in conservation lands and wildlife habitat areas will significantly lessen a fire's potential of escaping to other areas. Mitigation associated with this situation might include managed grazing in designated fuel reduction areas, creating fuel breaks, and implementing a prescribed burning program during less risky times of the year.

Additional mitigation activities include installing more water storage sites, improving water access from irrigation facilities, and developing other water resources throughout the landscape. This will increase the effectiveness and efficiency of emergency response during a wildfire.

### Methow River Valley Risk Assessment

Methow, Twisp, Carlton, and Mazama are the major communities within this assessment area. Subdivision of land for recreational and home site development is widespread throughout the valley. In nearly all developed areas, structures are in close proximity to vegetation on steep slopes that become a significant fire risk at certain times of the year. Sagebrush and grasses cover the rolling hillsides on both the east and west slopes. Agricultural development is prominent in the valley bottom and lower benches, particularly in the south end of the neighborhood closer to the mouth of the river. Sparse stands of ponderosa pine and Douglas-fir begin to occur about mid-slope on the west side of the valley and become more continuous and much more dense as the elevation increases. The north aspect in several of the smaller drainages on the west side of the valley such as Gold Creek, Squaw Creek, McFarland Creek, and Black Canyon Creek are also moderately to densely forested by ponderosa pine and Douglas-fir. The sagebrush and grass fuel complex extends further east on the east side of the valley. In some areas the shrub steppe ecosystems transition to old growth bitterbrush, which contains extremely volatile compounds. Much of the Buckhorn Mountain area is covered with grass and sage with only occasional stands of sparse ponderosa pine. Stands of ponderosa pine become more continuous near the upper extent of the French Creek drainage. Many of these stands are old reforested rye fields that have become overgrown. High grading of the timber has also caused many stands in the French Creek area to become overpopulated with small diameter stems and excessive ladder fuels. French Creek, Gold Creek (all forks), Squaw Creek, and Black Canyon Creek are all primed for big fire events due to the excessive fuels.

Ponderosa pine and some Douglas-fir are also present on the slopes surrounding Alta Lake and Alta Lake State Park. Fires within the Methow River Valley in the Lower Methow Neighborhood would tend to be low to moderate intensity surface fires. Agricultural and residential development along the valley floor and lower slopes tends to break up the fuel continuity, which helps slow the spread of fire. The forest stands in much of this neighborhood would tend to support moderate intensity fires with occasional crowning, torching, and jackpotting in areas with higher accumulations of fuels.

**Wildfire Potential**

The community of Winthrop has a moderate risk of experiencing a large wildland fire due to the extensive development and conversion of the native fuels to pasture or other agricultural use. There is; however, a high potential for an ignition from various sources as a result of the density of recreation or other human activities. Recreational activities along the Methow and Chewuch Rivers and at Pearrygin Lake State Park have a high likelihood of an ignition from campfires, BBQs, ATVs, etc. Careful maintenance of the fuels within and surrounding the park reduces this potential risk and helps protect the park from fires spreading into the area from the surrounding area. In the event of a threatening fire, the town of Winthrop may be at high risk due to the use of wood building materials on many of the buildings. The plank board siding, wooden walkways, and wood shingled roofs would be very receptive to ignition from fire brands.

The Twisp-Carlton communities are at moderate to high risk of wildfires. The continuity of fuels along much of the Methow River Valley bottom are broken by alfalfa fields to the east, which helps slow the spread of fire. Most of the fire risk in this neighborhood occurs on the mid and upper slopes and in the developed drainages. Libby Creek and Texas Creek were identified in the Methow Community Wildfire Protection Plan as potential "hot spots" for fire activity. Economic values, fuel types, fire history, and access issues led to this designation. The riparian fuels along the river banks may also support a wildfire later in the summer as the water level goes down and the thick grass and brush begins to dry out. Fire spread along the waterway has the potential to threaten many homes as several structures are located along or near the water's edge.

Nearly all of the Upper Methow River valley including; Mazama, Twisp River, Pine Forest subdivision, Wolf Creek, and Edelweiss subdivision have a very high risk of experiencing a damaging wildfire. Homes in this area are often scattered along both sides of the river. In some cases, there are well constructed bridges accessing groups of the homes on the other side; however, there are also several unrated bridges that may not support large fire suppression apparatus. Wildfires burning in this area may funnel smoke and hot gases up canyon, which may cause health problems and makes safe fire suppression very difficult and dangerous. Homes on the mid and upper slopes, such as those in the Skyline Ranch Subdivision have an increased fire risk due to the limited accessibility and the likelihood of up-canyon and upslope fire spread. Homes along the Lost River Road and in the Lost River Subdivision are typically completely surrounded by thick stands of timber and underbrush. Very few structures have any kind of defensible space and those that do are not likely to be adequate. Canopy closure throughout this area has a high probability of carrying a running crown fire, which is very difficult to suppress. The Lost River Road is in need of fuels treatments in order to serve as a safe evacuation route, especially since this is the sole escape route. Visible addressing is almost non-existent on private driveways. It is highly probably that several homes in this area would be lost in the event of a wildfire.

The Methow River Valley through the Lower Methow area has a moderate risk of fire due to the extensive agricultural development, which breaks up the continuity of fuels. Nevertheless, there are several areas within this neighborhood that have a much higher fire risk. French Creek and Black Canyon Creek were identified as "hot spots" in the Methow Community Wildfire Protection Plan due to higher risk fuels, increased residential development, and access issues. Gold Creek, Squaw Creek, and McFarland Creek are also at higher risk. Many of the homes in these drainages directly abut forest-type fuels and have limited access. Visible addressing on homes and driveways is also lacking in many of the more rural areas in this neighborhood.

The Alta Lake area including the State Park has a very high potential fire risk. Homes and recreational facilities were built very close together along the lake shore and lower slopes with forestland fuels intermingled and overhanging roofs. Wood siding, decking, and roofing are popular construction materials in this are as many of the structures are recreational or seasonal homes. The Alta Lake Road around the lake is fairly narrow with high risk fuels immediately abutting the travel surface. In addition, this is a dead end road with few areas large enough to turn fire suppression equipment around. The potential for an ignition in this area is very high due to the intensity of the recreational use. In the event of a fire in this area, there would likely be severe damage to many of the structures.

The Methow River Valley has been discovered as a prime recreational area and as such has experienced rapid subdivision development and scrutiny by developers. Many of the new homes going in are located in what used to be rural areas and are being built as vacation or seasonal use homes. In many cases, homes are being built in high fire risk areas with no precautions taken to reduce the wildfire threat around the home. Log homes are very popular and many homeowners are adamant about maintaining the trees and other "natural" landscaping on their property. This leads to several potential problems. Not only are these types of homes difficult and dangerous for firefighters to protect in a wildfire situation, but they also require additional suppression resources that could be used more effectively elsewhere to help stop the spread of the fire.

The growing number of residents living on their own power sources (off the grid) has allowed homes to extend further into the rural and backcountry areas of the County. Many of these homes are also not addressed, which makes them difficult to locate in emergency situations. Furthermore, concern over protection of these homes in compounded by the lack of water availability as many of these homeowners rely on deep wells with limited recharge.

**Ingress-Egress**

The primary access route from Twisp south is State Route 153, which is a paved, two-lane highway. State Route 20 is also a paved, two-lane highway that travels over Loup Loup Summit from the Okanogan River Valley, turns north at Twisp, passes through Winthrop, then heads west over the mountains via the North Cascades Highway. There is also a multitude of secondary roads accessing homes and other more rural parts of these neighborhoods. These roads are typically well-maintained gravel routes that travel up drainages. The access route into Alta Lake is a paved, two-lane route. The Gold Creek Road is also paved for a few miles up, but mostly as a single lane with pullouts. The Gold Creek Road does connect to the Libby Creek drainage to the north; however, this is a dirt road bordered by forest type fuels.

Several of the roads accessing homes in some of the small tributaries dead end or become dirt forest routes. Of particular concern is the Alta Lake Road, which dead ends near the south end of Alta Lake. This is the sole access route into this heavily populated area. French Creek Road is the sole access route for residents in the upper French Creek drainage. This road does connect

to the Texas Creek Road to the north; however, part of this route is accessible by 4x4 vehicles only. The lack of an alternate escape route puts residents in these areas at much higher fire risk.

Many private homes and subdivisions are accessed via unimproved, single-lane roads accessible only by small emergency vehicles. Often, access roads and driveways are steep and/or lined with wildland fuels that can limit or prohibit safe access during a wildfire. Many of these roads have only one way in and one way out and lack adequate turnout and turn-around areas for emergency vehicles. The inability of emergency resources to safely access structures reduces or may even eliminate suppression response. Most of the roads in newer subdivisions have been designed to accommodate emergency vehicles with either loop roads or cul-de-sacs with wide turning radii and easily negotiable grades, which are better-suited to all types of emergency response equipment.

**Infrastructure**

Residents within the communities of Winthrop and Twisp have access to municipal water systems. All other residents in the Winthrop, Twisp, Carlton, and Lower Methow Neighborhoods rely on personal or multiple home well systems.

Okanogan Public Utility District (PUD) and Okanogan Electric Cooperative (OCEC) provide electrical service to the Methow Valley. Most of the Methow Valley's electricity needs are presently served by a single transmission line, which starts in Okanogan at a substation and follows the route of State Route 20 over Loup Loup Pass to the Twisp substation in the town of Twisp. Okanogan PUD is responsible for maintaining the transmission line under an agreement between the two utilities and the Bonneville Power Administration. Okanogan PUD is currently engaged in an environmental review process to determine whether to construct a second transmission line to serve the valley. This second route would either be located in the upland hills on the east side of the valley or along the valley floor adjacent to State Route 153. Additionally, the valley's residents are served by a network of distribution lines that connect the transmission line to homes and businesses. The Okanogan PUD and OCEC share maintenance of the distribution system. Both utilities maintain some percentage of underground lines in the Methow Valley. The OCEC has reported that 95% of new distribution line construction and feeder upgrades in their service area are being installed underground. There is also a growing number of residents living off the power grid by creating their own power source via solar, wind, or generators.

**Fire Protection**

Okanogan County Fire District #6 is responsible for structural and wildland fire protection within most of the populated areas of the Winthrop, Twisp, Mazama, and Carlton. Okanogan County Fire Protection District #15 provides protection for the populated areas bordering the Methow River through the Lower Methow communities including; Methow, Pateros, Brewster, and Monse area.

All of the Okanogan County fire districts have signed a "Memorandum of Understanding" to assist any of the other districts in the County with fire suppression to the utmost of their abilities. State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on state and private lands based on a reciprocal agreement with the DNR.

**Potential Mitigation Activities**

The best possible mitigation activity for all residents in the Winthrop, Twisp, Mazama, and Lower Methow communities is to construct and maintain a defensible space. In grass and sage dominated areas, this may include mowing and clearing grass and weeds away from structures. In forest areas, thinning undergrowth and pruning larger trees may also be necessary. Locating flammable items such as firewood and propane tanks away from structures will also help reduce their risk. Due to the proliferation of out-of-County homeowners, an in-depth educational outreach program may be necessary to convey wildfire prevention and mitigation information

Many of the smaller drainages throughout these neighborhoods are accessed by one-way in, one-way out roads. Insuring that these roads will be safe for an evacuation is critical. Fuels should be thinned away from the road surface. This not only creates a safe access corridor, but it can also serve as a potential fuel break. Private driveways should also be addressed with visible signs and safely accessible for fire suppression equipment. Longer driveways should have turnouts for vehicles to pass each other and an area large enough for a fire truck to turn around at the home site.

In general, due to the dispersed nature of the electrical infrastructure, all of the existing above ground power lines are exposed to varying levels of fire risk. Vegetation clearing under rights-of-way, multi-agency coordination of thinning adjacent to power line easements, and public education can help prevent this system from failure due wildfires as well prevent a potential ignition from these lines.

The Alta Lake State Park should be a high priority for fuels reduction and homeowner education. The slopes around the lake are in need of fuels reduction treatments to reduce the fire risk and trees and other vegetation around homes should be pruned or even evaluated for removal in some cases. Homeowners should be made aware that wood construction materials drastically increase the probability of ignition. Furthermore, due to the close proximity of homes and other structures, there is high possibility that one home burning could catch several others on fire. The Alta Lake Road should be either extended to form a loop around the lake or significantly widened to allow for a better and safer evacuation of residents and visitors in the area during any kind of emergency. Reducing the fuels along this road would also help protect people and structures by not only allowing for safer access, but could also serve as a fuel break.

The Methow Community Wildfire Protection Plan has been completed and approved (February 2006) for the Methow River Valley. Extensive local research and planning went into the development of this plan; therefore, specific recommendations outlined in that document should also be supported.

### Conconully and Loomis Risk Assessment

The fuels in Conconully are somewhat variable. Sparse to moderate density ponderosa pine and Douglas-fir stands are dominant around the shores of Salmon Lake, Conconully Dam Reservoir, and extending to the west towards the Okanogan National Forest boundary. The understory vegetation is a mixture of open grass and shrub transitioning to mostly shrub and conifer

regeneration as the elevation increases. Where homes occur some of the larger trees and understory vegetation in the immediate area has been thinned to allow for development. The south and west aspect slopes near the community are mostly covered with various grasses, a few sparse shrubs, and an occasional ponderosa pine. Due to the variable topography and vegetation, fire behavior will also tend to be variable. Fires will typically burn more intensely were forest fuels are more dense such as in the Salmon Creek drainages. On grass slopes and in open, well spaced forest stands, fires will typically move quickly through the flashy surface fuels, but burn with less intensity. Many of the structures within the Conconully community were built using wood materials for siding, decking, and or roofing, which because of its ignitability, adds to the potential fuel load.

In the Sinlahekin Valley, which includes the community of Loomis, sagebrush and grasses dominate the lower and mid slopes. This type of fuel tends to dry out early in the summer and support very rapidly spreading surface fires. The topography consists of moderate to steep slopes rising out of the drainages, which tends to encourage the quick spread of fires upslope.

Sparse stands of ponderosa pine and Douglas-fir can typically be found in some draws and along the upper slopes in these neighborhoods. This type of dry forestland fuels can also be found along the shores of Wannacut Lake and the surrounding hillsides. The steep slopes around Palmer Lake are also partially forested with sparse ponderosa pine and Douglas-fir. Fires in this type of fuel would be expected to move very quickly along the surface with occasional torching and crowning of the canopy. Fuel loading in stands that have not been burned or otherwise been managed for many years may burn more intensely and have a higher rate of tree mortality.

The landscape to the west of the Sinlahekin Valley towards the Okanogan National Forest boundary is very rugged and covered by forestland fuels. Fires in these mountains would likely burn very intensely and be difficult to suppress. Aggressive initial attack would likely be able to keep fires in these forestlands from moving into populated areas due to the transition to sage and grassland vegetation on the lower slopes; however, this is not guaranteed and residents should be made aware of the potential risk.

**Wildfire Potential**

Residents in the Conconully community have a very high risk of experiencing wildfire as was seen during the 2006 Tripod Fire. Not only are the fuels and topography in this area very conducive to fire, but there is a high likelihood of an ignition due to the extreme recreational use. Campfires and ATV's are just a few of the potential human-caused ignition sources. Further increasing the risk is the popularity of wood siding, decking, and roofing on homes throughout the area. Many homes and other structures are crammed onto small lots between the lake shores and the access routes with forest fuels on the slope above and among the structures. In the event of a fire, these homes would form a continuous fuel bed that could facilitate the spread the fire from home to home.

The community of Loomis has a high potential fire risk due to the abundance of recreational activity and increased residential development. The Gold Hill and Cecile Creek areas west of the Loomis townsite have experienced a significant increase in the number of both seasonal and permanent homes. Many of these new home builders in the Loomis area are unaware that their investments may be outside of local fire protection district boundaries. The fire risk in these areas is particularly high due to the steep topography, limited access, and forest fuels. The fuels bordering the Loomis-Oroville Road corridor and surrounding Spectacle and Whitestone Lake are very conducive to an ignition as well as rapid fire spread. Structures in this area should be

protected from wildfires by creation of a defensible space involving green and clean lawns, fire resistant landscaping, and fire resistant siding, roofing, and decking.

**Ingress-Egress**

The primary ingress/egress route through all of these neighborhoods is the Loomis-Oroville Road, which travels in a big loop from Oroville through Nighthawk and Loomis and reconnects with Highway 97 near Ellisforde. This is a paved, two-lane highway throughout its extent. The Similkameen, Loomis, and Wannacut areas all have reasonable amount of alternative escape routes other than the Loomis-Oroville Road in the event of a fire-involved evacuation. Due to the steep topography; however, residents in the Palmer Lake area are limited to the main Loomis-Oroville Road as their sole escape route. Nevertheless, this route is likely to be the safest escape route from Palmer Lake either to the north or the south.

The primary access into the community of Conconully is provided by the Conconully Road. This is a paved, two lane route between Omak and Conconully. The Sinlahekin Road and the West Fork Road also provide graveled access to the town site from the north and south, respectively. There are a minimal number of secondary roads in this neighborhood, but those that exist are typically gravel or dirt routes traveling through the forested areas to the north and west of the community.

Many private homes and subdivisions are accessed via unimproved, single-lane roads accessible only by small emergency vehicles. Often access roads and driveways are steep and/or lined with wildland fuels that can limit or prohibit access during a wildfire. Many of these roads have one way in and one way out and lack adequate turnout and turn-around areas for emergency vehicles. The inability of emergency resources to safely access structures reduces or may even eliminate suppression response. Roads in newer subdivisions have been designed to accommodate emergency vehicles with either loop roads or cul-de-sacs with wide turning radii and easily negotiable grades, which are better-suited to all types of emergency response equipment.

**Infrastructure**

Residents near the Loomis community center and Conconully have access to a municipal water system, but all other residents in the Similkameen, Palmer, Pine Creek, Happy Hill, Cook Mountain, and Wannacut communities rely on personal or multiple home well systems. Irrigation water is provided to the Loomis, Spectacle Lake, and Whitestone Lake areas by the Whitestone Irrigation District.

The main transmission line extends from Tonasket to Oroville where it is distributed to the Similkameen, Loomis, Palmer, and Wannacut communities through public distribution lines.

The neighborhoods of Pine Creek, Happy Hill, and Cook Mountain are provided electrical power via public distribution lines stemming from the main transmission lines in the Okanogan River valley. A branch of one of the main transmission lines travels from the valley up Conconully Road to the Town of Conconully.

**Fire Protection**

Much of the rural area around Conconully have structural and wildland fire protection provided by Okanogan County Fire Protection District #9, excluding the north end of the Limebelt area and Pine Creek area. Additionally, the Town of Conconully maintains its own Volunteer Fire Department with fire protection responsibility within the community. Okanogan County Fire

Protection District #3 extends part way up State Route 20 and the Chilliwist Road to provide structural and wildland fire protection to residents in those areas.

Okanogan County Fire Protection District #10 provides structural and wildland fire protection to a small service area surrounding the community of Loomis and a narrow strip along the Loomis-Oroville Road to encompass most of the area immediately surrounding Spectacle Lake. Currently, the Fire District #10 does not have a structure to house any of their rolling stock; therefore, it is sitting, unprotected, in an empty field just outside of Loomis. Nearly all other structures in the Similkameen, Loomis, Palmer, and Wannacut Neighborhoods are not currently covered by a rural fire district (there are a few structures in the Loomis Neighborhood that are within Okanogan County Fire Protection District #4).

All of the Okanogan County fire districts have signed a "Memorandum of Understanding" to assist any of the other districts in the County with fire suppression to the utmost of their abilities. State lands are the sole responsibility of the Washington Department of Natural Resources (suppression & reciprocal agreements may apply). Federal lands are the sole responsibility of the Federal management agency (reciprocal agreement may apply). Much of the private lands in Okanogan County are within joint jurisdiction between the County fire protection districts and the WA DNR.

Washington Department of Fish & Wildlife has initiated an active program in fuels reduction & reconfiguration as well as prescribed burning on WDFW lands in the Sinlahekin area. Fuels reduction & reconfiguration has been completed on Scotch Creek Wildlife and Chesaw Wildlife Areas. Plans are in place for fuels reduction and reconfiguration on the Methow Wildlife Area as well as prescribed burning. WDFW has a well-equipped prescribe burn team that conducts prescribed burns when weather and regulations permit. Additionally WDFW currently has MOU's in place with USFS, State Parks, US Fish & Wildlife Service for reciprocal prescribed burning. WDFW is currently pursuing MOU's with the BLM and National Park Service for reciprocal prescribed burning.

The DNR provides wildfire protection during the fire season between April and October with a varying degree of resources available in the early spring and late autumn months. The U.S. Forest Service seasonally responds to all wildland fires on their jurisdiction and may also respond to wildland fires on state and private lands based on a reciprocal agreement with the DNR.

**Potential Mitigation Activities**

The best defense for homeowners in the Similkameen, Loomis, and Conconully communities is the construction of defensible space around homes. Homesites surrounded by fire resistant landscaping have a much better chance of surviving a flame front than those who do not. Several homes in these areas are reached by one-way in, one-way out roads; making it difficult for fire suppression vehicles to safely access the area. Providing pullouts and turnaround areas as well as reducing roadside fuels drastically improves the safety of both residents and firefighters. Additionally, efforts should be made to keep the Loomis-Oroville Road clear of fuels, which could include mowing or herbicide application, due to its being the primary ingress/egress route for all of these neighborhoods.

Education, particularly where there is an increased amount of recreational homes and activity should be a high priority. Awareness of the risk factors, potential ignition sources, and consequences can help avoid losses from wildfire as well as costly suppression. The Okanogan County building permit process should include an information assessment of all proposed

building sites to tell a prospective home builder whether or not they are within an established fire protection district.

In other forested areas such as along State Route 20 and in the Chilliwist Valley, forestland owners can reduce their fire risk by conducting fuels reduction projects. Thinning overstocked stands and removing non-commercial trees and other ladder fuels from the understory can significantly reduce their risk of loss to both their homes and their timber.

In developed recreational facilities, fires should be limited to escape proof fire rings and BBQ pits. Regulations concerning fireworks and fire use should be strictly followed and enforced throughout the County.

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# Chapter 5

## Fire Protection

Fire agency personnel are often the first responders during most emergencies. In addition to structural fire protection, they are called on during wildland fires, floods, landslides, and other events. The following is a summary of the agencies in Okanogan County and their resources and capabilities. A map of the Okanogan County fire districts and department boundaries is presented in Appendix 1.

### Local Fire District Summaries

The firefighting resources and capabilities information provided in this section is a summary of information provided by the fire chiefs or representatives of the wildland firefighting agencies listed. Each organization completed a survey with written responses. Their answers to a variety of questions are summarized here. These synopses indicate their perceptions and information summaries.

Appendix 4 contains contact information and a complete equipment list for each of the following fire service organizations.

#### City of Okanogan Fire Department

**Department Summary:** The City of Okanogan Fire Department covers approximately 3.2 square miles of commercial and residential area. The area is mostly valley floor with steep pitches of grass and sage brush hills to benches with residences. There are fire hydrants that cover 90% of the city at this time. There are 28 volunteers in the fire department with a paid Fire Chief. Volunteers cover both the City and part of Fire District #3. The Department is responsible for mainly structure fire protection but are trained and can respond to wildland fires within the City of Okanogan and Fire District #3 and surrounding areas. The City of Okanogan Fire Department provides lease space to Okanogan County Fire District #3. With residences mixed in with the wildland fuels, steep slopes, erratic winds, and dry summers coupled with elaborate private landscaping schemes can create extreme wildland fire behavior.

**Priority Areas:**

- ***Residential Growth:*** After little or no growth in the past, the City of Okanogan is experiencing a moderate to heavy expansion, with several new annexations and developments. These areas were previously agricultural areas that have been subdivided into varying densities; the upper benches are R-1 designations with the valley floor being of denser R-3 zoning.
- ***Communications:*** Dispatched by Okanogan County Sheriff's Office (OCSO) dispatch on the Pitcher Mountain repeater. Motorola pagers of varying age, Minitor 2 thru 5 pagers, and new Kenwood 2312 portable radios are utilized. The Department currently maintains a back-up dispatch system for emergency's when OCSO dispatch has a system failure. The Department currently has 2 licensed tactical channels in the City of Okanogan for fire department use.

- ***Burn Permit Regulations:*** The City of Okanogan has a burn permit program that was established 1989 by City Ordinance #716. The Outdoor burning code has been changed throughout the years to stay in compliance with the Clean Air Act. Permits cost $11.00 and are issued for one year, there is a period of no burning that starts on June 1 and goes through September 30. Permits are for natural vegetation only, minimal pile size and conditions pertain to each individual permit, violation of any part of OMC 8.36 results in a citation of $550.00.

**District Needs:** The major obstacle that stands before the fire department today is the limited amount of room for expansion of the Okanogan Fire Station; it has reached its capacity. The need for a much larger joint fire station would provide the area needed to increase equipment cache and provide a large classroom for training scenarios and the setup for training aids. In addition, a training burn tower facility for more advanced hands-on-training in operations and tactics.

At some point in the future the need for a 100' *aerial* will become a necessity and the need for a brush engine to cover smaller brush fires within the city limits.

Education grants for materials and staff to meet with the public and educate them on Firewise building methods and landscaping to reduce the catastrophic effects of wild fires.

Increase recruitment and retention of volunteer fire fighters is also a need for the department. Currently the Department has 28 volunteers but in reality need a number closer to 40 to provide response times under the NFPA standard of 8 minutes. The tax base doesn't currently provide the funding for paid staff to cover during periods of limited staffing during the day time.

About 10% of the city is not served by fire hydrants.

A dispatcher is needed that is solely dedicated to fire and EMS dispatch at the OCSO dispatch center.

## City of Omak Fire Department

**District Summary:** The City of Omak Fire Department covers approximately 3.3 square miles of commercial and residential area. The area is mostly valley floor with steep pitches of grass and sage brush hills to benches with residences. With residences mixed in with the wildland fuels, steep slopes, erratic winds, and dry summers coupled with elaborate private landscaping schemes can create extreme wildland fire behavior.

The department is centrally located downtown at 16 North Ash Street. There are 31 volunteers in the fire department with a paid Fire Chief. The department is responsible for mainly structure fire protection but volunteers are trained and respond to wildland fires, vehicle fires, and vehicle accidents, hazardous materials incidents and assist with some EMS incidents. Volunteers cover both the City and part of Fire District #3. The department provides lease space to Okanogan County Fire District #3 to store equipment.

**Priority Areas:**

- ***Residential Growth:*** Currently experiencing light to moderate growth within the City of Omak.
- ***Communications:*** Since switching to narrow band, communications are good for the central valley locations. The City is tied into the County 911 response system.
- ***Burn Permit Regulations:*** There is a burn permit program that works very well inside the City of Omak.

**Issues of Concern:** For many years there has been a high number of wildland related fires caused by careless outdoor burning in rural areas all over the County. The local volunteer fire chiefs do not have the authority to enforce the outdoor burning. The department believes that if a County Fire Marshal were hired it would help to cut down on a lot of the wild fire threat through better public education and enforcement.

**District Needs:** No needs at this time.

## Town of Conconully Fire Department

**District Summary**: The Town of Conconully is a small resort community nestled in a valley about 20 miles northwest of the City of Okanogan. The town has 210 residents, mostly retired. There are 189 housing units in the town, of which, only 54.5% are permanently occupied housing units.

The town borders National Forest, DNR, BLM and private lands. The town is flanked by two separate reservoirs managed by the US Bureau of Reclamation (Conconully and Salmon Lake Dams). The southern town limit is Conconully State Park.

In addition to providing support to the town citizens the Department has an MOU with Fire District #9 to provide structure protection within a 5 mile radius. The Department also provides EMS but do not transport (due to limited capabilities) unless deemed necessary.

The Department is a completely volunteer agency with 12 volunteer firefighters trained in structure and wildfire procedures.

**Priority Areas:**

- ***Residential Growth:*** Conconully has had a very slow growth rate during the last few years.
- ***Communications:*** The Department is dispatched through the OCSO Dispatch. Pagers and portable radios do not work in our area due to the town resting in a hole between several mountains.
- ***Burn Permit Regulations:*** The town does have regulations on burning, but can be hard to enforce.

**Issues of Concern**: The Fire Hall was condemned in 1980 but continues to be used.

**District Needs**: A new fire hall to house all of the Department's fire vehicles. A Class A fire engine is needed to replace some aging equipment. Conconully needs an increase of year round water sources for fire suppression. A repeater near town would solve some communication issues due to the geography surrounding Conconully.

The Department needs help with recruitment, retention, and training of volunteers. This is a problem because most residents are beyond the age of joining the department along with most working age folks cannot afford the high price to drive a 40 mile round trip to work to get to the Omak-Okanogan area so they do not live in Conconully very long.

The Department's fire vehicles are old and in need of some major repairs which the town cannot afford. The Department needs a 4 wheel drive brush truck. The fire department budget for the last several years has been a total of $14,000 which does not go far when maintaining vehicles, fire hall, PPE, training, etc.

## Town of Coulee Dam Fire Department

Chief Robert Jackson

Telephone: 509-422-3830

E-mail: rdjackson99@hotmail.com

Address: 300 Lincoln Ave

Coulee Dam, WA 98116

**District Summary:** The Town of Coulee Dam is located in eastern Washington along the Columbia River with a population of 915 residents in Okanogan County and across the Columbia River there are another 315 residents in Douglas County. The Okanogan County portion of Coulee Dam lies within the Colville Indian Reservation and forms the southern limit of the Okanogan Highlands. The town has a total area of 0.7 square miles.

There are 20 volunteers in the fire department with NO paid staff. The volunteers perform structure protection and wildland firefighting duties.

**Issues of Concern:**

- ***Residential Growth:*** The population has only increased by 5.2% since 2000 with little or no development in the area.

- ***Communications:*** The Department is dispatched through the OC Sheriff's Office Communications Center/Dispatch. Tactical communication is still an issue.

**Cooperative Agreements:** Coulee Dam is part of the Okanogan Mutual Aid Agreement and has a mutual aid agreement with Fire District 3 from Douglas County. The department also has agreements with BIA and Bureau of Reclamation.

**District Needs/Wish List:**

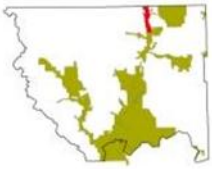
A repeater near town is needed to solve communication issues throughout the Department's jurisdiction. Narrow banding did not solve this problem it has left the area with only one channel to contact dispatch.

A new fire hall is needed as the current hall will not house all of the fire vehicles and equipment and does not provide adequate training areas.

Firefighter recruitment and retention continues to be a problem that the Department faces annually. This is a problem because most residents are beyond the age of joining the department.

The Department needs more training but this is hard to do with every member working their regular 40 hour+ jobs.

## Okanogan County Fire District #1



**District Summary**: Okanogan County Fire District #1 covers approximately 2.2 square miles (2 miles in the district and 0.2 within Oroville city limits) along the Okanogan River valley. The City of Oroville sits on the south end of Lake Osoyoos and at the convergence of the Okanogan and Similkameen Rivers. The city is 4 miles south of the Canadian border.

The District and city has one combined Fire Department which is operated by the City of Oroville and contracts with FD #1 for services. All equipment and operations are housed and conducted from the city fire station in downtown Oroville.

The population of FD #1 and city is 3,641 full time residents. There are 25 volunteer firefighters with no fulltime paid staff. The economy is primarily based on agricultural with an influx of tourist during the summer months. There are numerous orchards within the town's limits and a few grape vineyards.

The fire district responds to structural fire, EMS major medical calls and rescue, wildland fire, vehicle accidents, hazardous material calls non-operational, and water rescues. The District/Department responded to 72 calls in 2011. The District will respond as initial attack to incidents on USFS and DNR lands until the responsible agency takes charge.

**Priority Areas:**

- ***Residential Growth:*** Growth in the area is primarily caused by the proximity to the Canadian market, just 4 miles away in British Columbia, Canada. Three vacation cottage developments have been built on the fringes of the city limits. Over 60% of the property owned on the US side of Lake Osoyoos is owned by Canadians.
- ***Communications:*** Development of a countywide communication plan is needed; the District is tied to Okanogan County 911 dispatch system. Pagers, portable radios, and mobile phones do not work in all areas as the district is in a low lying area surrounded by mountains.
- ***Burn Permit Regulations:*** The District/Department does not have a general burn permit program. However, it does issue recreational burn permits, which follow the requirements of IBC 307, once the County Commissioners declare a burn ban in all areas of the County.

**District Needs**: Localized training available without the need to send each volunteer to training centers outside our local area. A countywide Fire Marshal is needed for enforcement of the fire codes and building inspections.

### Okanogan County Fire District #2

**District Summary:** Fire District #2 includes an area approximately 1 mile wide beginning at the northern edge of the Town of Coulee Dam and proceeds north approximately 6 miles. The District includes the Town of Elmer City and the unincorporated villages of Belvedere to the north, McGinnis Lake to the east, Lone Pine, Koontzville, and Seaton's Grove. Rural residences are scattered along both State Route 155 (Coulee Corridor Scenic Byway) and the Elmer City access road. Bureau of Reclamation land is located on the south and west sides of the district and Colville Tribal trust land is scattered throughout the area.

The district has no paid staff and therefore relies completely on volunteers. Currently 15 volunteers are trained on both structure protection and wildland fire.

Fire hydrants are located in the Town of Elmer City, a local trailer park, and the River View Subdivision.

**Priority Areas:**

- ***Residential Growth:*** Population is the district has remained about the same for the past few years. The town of Elmer City is approximately 240 and the rest of the district is approximately 250.
- ***Communications:*** FD #2 is tied into the Okanogan County 911 response system.
- ***Burn Permit Regulations:*** Follow US BIA (Mt. Tolman Fire Center) restrictions and guidelines. Permits are required and issued at the Elmer City Hall.

**Issues of Concern:** There is a current active effort to annex the villages of Belvedere to the north and McGinnis Lake to the east. This will effectively more than double the size of our district.

**District Needs:** Primary need is a new fire station and training facility. Updated equipment (i.e., a Class A structure truck with all equipment) is also a critical concern. Maintaining a volunteer firefighting work force is very difficult. People don't volunteer anymore or have reached an age that makes it hard for them to be a viable asset.

## Okanogan County Fire District #3

**District Summary:** Okanogan County Fire District #3 is located in center of Okanogan County and currently has 78 volunteers serving a population of approximately 8,000 over 71 square miles. The area is predominately valley floor with steep slopes to benches, residences are located at the edge of these benches with very little regard to the wildland fuel that abuts there residence. Fuel types are natural grasses and sage, some areas have sage as tall as 10' in height. The area was heavy towards agriculture until recent years were the loss of orchard ground has provided large tracts of land that provide avenues for fire to enter the district or leave the district whatever the case maybe.

The area, which comprises FD #3, is fire prone with a high frequency of lighting ignitions in June, July, August and September. Additionally there are frequent human fire starts throughout the region.

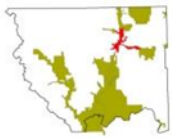
There are 3 stations within the fire district - Station 1 is located in downtown Omak, the fire district rents space from the City of Omak; Station 2 is located in downtown Okanogan this station is located approximately 5 miles from the Omak Station, the fire district rents space from the City of Okanogan; and Station 3 is located in Malott a non-incorporated community 7 miles south of Okanogan. Each station maintains its own roster and handles its own recruitment and training. Departments are responsible for mainly structure fire protection but are trained and respond to wildland fires, vehicle accidents, EMS calls, hazardous material spills, and other types of rescues.

**Priority Areas:**

- ***Residential Growth:*** One challenge FD #3 faces is the large number of houses in the urban/rural fringe compared to twenty years ago. The growing population has expanded further into traditional forest or resource lands and other rural areas. The "interface" between urban and suburban areas and unmanaged forest and rangelands created by this expansion has produced a significant increase in threats to life and property from fires and has pushed existing fire protection systems beyond original or current design or capability. Many property owners in the interface are not aware of the problems and threats they face and owners have done very little to manage or offset fire hazards or risks on their own property. Furthermore, human activities increase the incidence of fire ignition and potential damage.
- ***Communications:*** FD #3 is tied into the County 911 response system.
- ***Burn Permit Regulations:*** No burn permit program at this time other than those issued by the Department of Ecology.

**District Needs**: None at this time.

### Okanogan County Fire District #4



**District Summary:** FD #4 covers 174 square miles and with a population of about 6,000. The District includes the incorporated City of Tonasket and the unincorporated communities of Ellisforde and Crumbacher, as well as a municipal airport. The City of Tonasket is about 20 miles south of the Canadian border. The town is at the intersection of US Highway 97 and State Highway 20, about 28 miles north of Okanogan, the county seat. Apple, pear, peach, apricot, plum, and cherry orchards, wineries, cattle ranches, dude ranches, farms and rugged mountain wilderness with sage-covered foothills make up the fire district.

FD #4 is 100% volunteer and currently has 35 volunteers. The district responds to both structural and wildland fires.

**Priority Areas:**

- ***Residential Growth:*** FD #4 growth is moderate to slow.
- ***Communications:*** FD #4 is tied into the County 911 response system and maintains interoperable with other districts and agencies (DNR & USFS).
- ***Burn Permit Regulations:*** Burn permits are issued by district personnel and DNR.

**District Needs**: A satellite station for Crumbacher, Thermal Iimager, new PPEs (structural and wildland), new SCBAs, replace hoses on fire trucks, and an updated structural engine.

### Okanogan County Fire District #6

**District Summary:** Fire District #6 is the largest Fire District in the County by area covering approximately 350 square miles with a population of approximately 4,000. The District provides contracted support to the Towns of Twisp and Winthrop. The District has four stations in the main communities of Mazama, Winthrop, Twisp and Carlton. The District includes a wide variety of fuel types ranging from grassland to heavy timber and everything in between

It is an all-volunteer department except for a full time Chief and three Division Chiefs. Currently the District's roster consists of 35 volunteer firefighters. The top priority for the District is structure protection but responds to wildfires. The District lands have a dual jurisdiction with the DNR which results in a good working relationship. Also, much of the District borders National Forest and again cooperation with this agency is excellent.

**Priority Areas:**

- ***Residential Growth:*** FD #6 has the highest rate of new construction in Okanogan County. Most of the construction is residential in the urban interface areas. Urban interface area is the biggest concern.
- ***Communications:*** The Department is dispatched through the OC Sheriff's Communications Center/Dispatch. FD #6 has a good communications throughout the District..
- ***Burn Permit Regulations:*** FD #6 does not issue burning permits. When fire danger is high, a complete burn ban is instigated.

**District Needs**: The Winthrop Station is inadequate to handle equipment and training needs. Replacement of the station is the highest priority. Need to replace 2 water tenders and 3 brush trucks. Additional full time paid firefighter staff to provide better service to the area.

## Okanogan County Fire District #7

**District Summary:** The District covers 33 square miles and is made up of orchards and other crops grown both within the valley area and on many of the low benches where irrigation water is available. The surrounding foothills are vegetated primarily by sagebrush and various lower growing grasses. Sparse ponderosa pine can be found in a few of the nearby draws.

The District provides coverage for the Town of Riverside (population 348) and is 100% volunteer with around 18 volunteers. The district responds to both structural and wildland fires.

Individual residents in the Tunk Valley have purchased land they hope will eventually house a small fire department. It should be noted that it is 28 miles of gradual incline from the beginning of Tunk Creek Road near Riverside to its culmination at Crawfish Lake; thus the response time for a neighboring fire department to respond to a fire in the upper extent of Tunk Valley could be significant.

**Priority Areas:**

- ***Residential Growth:*** FD #7's growth is moderate to slow.
- ***Communications:*** FD #7 is tied into the County 911 response system and maintains interoperable with other districts and agencies.
- ***Burn Permit Regulations:*** None at this time.

**District Needs**: New fire station with classroom facility and an urban interface engine.

## Okanogan County Fire District #8

**District Summary:** District encompasses 160,000 acres all on the Colville Indian Reservation. The District is bordered on the south by the Columbia River (Brewster/Bridgeport), east and north by Columbia River Road, and west by Highway 97. Borders by Brewster/Bridgeport near Smith Ranch (Wakefield/Cameron Lake) exit. Population is approximately 350. The terrain is high plateau which breaks down to low elevations on all four compass points with scattered timbers, sagebrush and open grass areas. In addition, wheat field dominate approximately 15,000 acres mostly in central and south central district.

The District has 30 active volunteer members who are nearly all red card trained. All members receive annual refresher training through DNR and have completed their annual first aid training.

District 8 is a wildland fire only unit – no structure capabilities exist. The District has eight Type 6 engines, one 3,000 gallon tender and one command vehicle.

**Priority Areas:**

- **Residential Growth:** WUI with newcomers.
- **Communications:** The District is dispatched out of the County communications center and is adequate except for tone out issues.
- **Burn Permit Regulations:** Burn permits are issued by Mt Tolman, BIA.

**Cooperative Agreements:** Mutual aid agreements with Fire District #3 and Mt Tolman, BIA.

**District Needs/Wish List:**

- Tone out through county is sporadic; district doesn't use pagers due to terrain features – open to suggestions.
- With small budget, ($12,000 annually) vehicle upkeep is a constant concern.

## Okanogan County Fire District #9

**District Summary:** District #9 is about 64 square miles. It is made up of farms, ranches and open range lands. Structures are fairly scattered in most parts. The District does surround the Town of Conconully; however the town has its own fire department. FD #9 only has wildland fire equipment; the residents rely on the Town of Conconully Fire Department for structure protection within 5 miles of the town. For other residents, FD #9 has a mutual aid agreement with FD #3 for structure protection. FD #9 borders FS, BLM, DNR, and Washington Fish and Wildlife.

FD #9 is an entirely volunteer fire district with **no** paid staff and 23 volunteer fire fighters.

**Priority Areas:**

- ***Residential Growth:*** Little to no growth within the last few years.
- ***Communications:*** FD #9 is dispatched by OCS Communication Center/Dispatch.
- ***Burn Permit Regulations:*** Burn permits through Okanogan County and WA Department of Natural Resources.

**District Needs**: A new fire hall is needed because the trucks are currently stored in a barn owned by Fish and Wildlife during the winter months. The barn has only one heated room big enough for our water tender and one brush truck.

The District needs a water tender, two brush trucks, and draftable mobile pumps.

FD #9 needs a repeater to improve the radio communications.

Volunteers need additional training; however, this is tough to do when all our members work 40 or more hours a week either on their own farms or regular jobs.

### Okanogan County Fire District #10

**District Summary:** District #10 is about 24 square miles. It is made up of orchards, farms, ranches, open range lands and timber. Structures are fairly scattered in most parts. The District does surround the unincorporated Town of Loomis. The volunteers are responsible for both wildland fire and structure fire protection. FD #10 borders BLM, DNR, and Washington Fish and Wildlife.

FD #10 is an entirely volunteer fire district with **no** paid staff and 13 volunteer fire fighters.

**Priority Areas:**

- ***Residential Growth:*** Little to no growth within the last few years.
- ***Communications:*** FD #10 is dispatched by OCS Communication Center/Dispatch.
- ***Burn Permit Regulations:*** District 10 follows Washington DNR regulations**.**

**District Needs**: A new fire hall to replace the current fire hall in Loomis, which was built in 1963 and is in need of major repairs or replacement.

Update equipment, (i.e. water tender, newer brush trucks, etc.). Volunteers need additional training; however this is tough to do when all our members work 40 or more hours a week either on their own farms or regular jobs.

### Okanogan County Fire District #11

**District Summary: District Summary:** Fire District #11 is located in North Central Okanogan County and encompasses 71,040 private acres (111 square miles) with approximately 550 citizens and an estimated 350 structures. The area is primarily mountainous with numerous drainages. Northern boundary is 13 miles of east/west international border with the closest Canadian fire station being 20 miles from our Molson satellite station. Western boundary follows Nine Mile road adjoining private ground. Eastern boundary is the Chesaw highway and adjoins private and USFS property. The Southern boundary is intermixed with FS and private property. FD #11 adjoins approximately 300,000 acres of land not protected by any fire protection district.

Historically, the fire regime has been frequent, low-severity wildfires. Successful fire suppression, coupled with the various land management practices have led to overstocking of small trees (dog hair thickets) and an excess of surface debris and brush. This overstocking of vegetation and buildup of surface fuels has led to conditions with higher potential to result in frequent moderate to high-severity wildfires. These fires come with an elevated potential for negative effects to our communities.

The area, which comprises FD #11, is fire prone with a high frequency of lighting ignitions in June, July, August and September. Additionally there are frequent human fire starts throughout the region. The DNR Urban Interface Risk Assessment program has completed assessments on over 260 structures.

Approximately 30,000 acres of FD #11 is privately managed timber in need of fuels reduction caused by numerous developments with poor forest practice planning i.e., extensive ladder fuels from developments, doghair thickets and logging slash. This greatly increases the risk of a severe wildfire event in FD #11 either from a lighting strike or human caused fire.

FD#11 has one centrally located station (Fields Hall) and three 'satellite' stations located in the communities of Molson and Chesaw and at Rawhide Road (located at the junction of Molson and Chesaw Highways).

FD #11 is a completely volunteer fire district with 42 volunteer firefighters who are trained as basic structural and wildland firefighting. The majority of the red carded members are also Firefighter type 1 rated. One officer is certified as Incident Commander Type 4, Single Resource Boss, Dozer Boss and Engine Boss.

**Priority Areas:**

- ***Residential Growth:*** The district continues to see unchecked development with urban interface neighborhoods. The district is made up of 20-acre parcels surrounded by large and small ranches, isolated mountain homes and cabins. Approximately 70% of land in North Central Okanogan County is under the governmental management of the USFS, Washington State Department of Natural Resources, Washington State Department of Fish and Wildlife and the Bureau of Indian Affairs.
- ***Communications:*** FD #11 is tied into the county 911 response system.
- ***Burn Permit Regulations:*** Permits are issued by DNR.

**District Needs**: While only one member is certified in a line rated position for wildland fire, we have many long term members who have skills, knowledge, and abilities as Resource Boss,

Strike Team Leader and other advanced levels. The majority of FD #11 members are red carded and the majority of those are FFT1 rated. The primary obstacle for obtaining more training is the unpaid time commitments for the several weeks of required training at the ISC 230, 231 & 232 plus ISC 290 and leadership courses. At present FD #11 performs a very limited rescue service due to lack of equipment and training. The Kinross Mine operations at Buckhorn Mountain greatly increase the training demands on FD #11. The district is not trained in the use of SCBA equipment due to lack of training, equipment, and facilities. A live fire training facility to facilitate training opportunities for district members would increase the effectiveness of firefighters and other emergency responders.

The district needs to update the fleet. A few newer vehicles have been obtained but this continues to be a problem. The initial response engines will need to be equipped with rescue gear as well as fire gear to handle the increased heavy equipment traffic caused by the mining operation, the increased population supporting the mine and the associated mining support services.

While the primary station in the district (Fields Hall) is located centrally in the district and is a relatively new 4 bay facility (built in 1999) the district still needs the additional development of stations. The stations in Molson, Chesaw and Rawhide are much less than adequate for current needs.

The district is severely lacking in personal equipment. At present no members have certified turnout gear. What turnout gear the district does have is outdated. Over 80% of the members have wildland gear but increased demands on the district will leave us short in the very near future.

## Okanogan County Fire District #12

**District Summary:** Located in Northern Okanogan County with approximately 9,702 private acres (15.76 square miles) in size and a population of 302 citizens. Tax revenue estimate for 2012 is $11,900. Assessed value real property is $19,358,095. The area within the district is mountainous with rock bluffs, valleys, and many steep drainages.

Okanogan Fire District #12 has one fire station located on Swanson Mill Road approximately in the center of the district. The district has one operation division primarily for the purpose of wildland fire suppression. Every firefighter is trained in current First Aid/CPR, but there are no qualified EMS personnel or equipment.

The District currently has 18 volunteer firefighters (no paid staff) and is governed by a three member Board of Commissioners. All of the officers and fire commissioners have many years of involvement with the District. With an average of 18 volunteers in total, all have some level of experience on large and complex wildfires. Most of the firefighters have received training to the woodland Firefighter 1 level. DNR red cards are kept current with annual refresher classes. A current certification in basic First Aid is required of all firefighters. There are two Single Resource Bosses with several others in training. While wildfire ready, the district lacks in training for structure fires. And, although the District responds to vehicle accidents within the district, personnel are not EMS trained or equipped.

All of Okanogan Fire District #12 is under governmental management by DNR, BIA, BLM, and is adjacent to the USFS.

The western boundary is bordered by Fire District #4, Tonasket, and Fire District #1, Oroville, in the Okanogan Valley. The elevation ranges from 1400 ft. at these boundaries to 3800 ft. on the north where DNR, BLM, and USFS properties border. The eastern boundary is a point approximately one-half mile west of Fancher Lake. The southeast roughly parallels the western side of the Antoine Canyon. The southern boundary traverses broken country to the southwest corner two miles west of Ellisford.

A wide variety of fuel models exists within FD #12. The lowest elevations are in the south and west with a total gain of 2400 feet rising in the north and east half of the District. This creates an overall southern and western exposure. The fine low elevation grasses are typically dry enough to ignite easily by July. Sagebrush transitions into scattered ponderosa pine forests. This then becomes a complex mix with fir, tamarack and brush. This combination coupled with summertime upslope, up valley winds has historically created many fast moving large fires, very difficult to control. Roadways create the most significant firebreaks. Some overstocking and doghair thickets exist at various points along Swanson Mill Road. Water sources are limited/seasonal and widely scattered. Many water storage tanks are stationed on private lands throughout the District.

The area within FD #12 is fire prone with a high frequency of lightning ignitions in June, July, August, and September. Additionally there are frequent human fire starts through the area. There are many absentee owners who frequent their property to recreate during the summer and hunting season. The lack of local fire danger knowledge adds to the human caused fires.

**Priority Areas:**

- ***Residential Growth:*** The district is experiencing unchecked development of interface neighborhoods in mountains and valleys. Mountain homes and cabins are served by primitive county road and primitive auxiliary roads and driveways.
- ***Communications:*** The District is dispatch out of the County communications center.
- ***Burn Permit Regulations:*** Permits are issued by DNR.

**District Needs**: An aging fleet of vehicles remains our primary limitation to responses. All but two of our engines are loaned/leased old military surplus. The District owns a 2000 Chevy ¾ ton and a 1995 Ford F-350 purchased through DNR/Military surplus. The District needs to upgrade our overloaded engines with newer vehicles which would be more reliable and would provide the safety margin required by law. In the last year, our water tenders have been upgrade, but they still require some maintenance work to get them fully operational.

The FD #12's fire station is limited by size (two bays) to housing three vehicles year round. This severely limits our response time and capability for approximately 6 months out of the year, when freezing weather becomes a problem. The fire station has no well. The only water on site is a 10,000 gallon tank for seasonal firefighting use. All of the FD #12's water sources are located out of the district. Another fire station better located with a well would provide the district with a water source within the district and storage for additional apparatus. This would also provide room for training and education.

Our district has a 2-watt VHF radio repeater for in-district communications. Due to the steep terrain, our communications has many gaps. While the District now has access to the North County fire repeater which offers better coverage, it is generally reserved for inter-district communications and cannot be used as a tactical frequency. FD #12 would like to apply for a FCC license to increase the power wattage of our 2-watt VHF repeater, in order to improve communications throughout the district.

Some of our truck radios and handheld radios are not capable of all of the required frequencies and should be upgraded to newer, more capable radios. Only some of our radios can communicate on the required National Interoperability channels as recommended by the Department of Homeland Security.

### Okanogan County Fire District #13

**District Summary:** The Okanogan Fire Protection District #13 is authorized and guided by Title 52 of the Revised Code of Washington for Fire Protection Districts. Its primary responsibility is the protection of structural improvements and developments on lands within its district. It also has joint protection responsibilities with the Washington State Department of Natural Resources for protection from wildland fires.

The fire district boundary generally coincides with that of the Republic School District #309, with the addition of an annexed portion extending westward from Ferry County into Okanogan County along the state highway route 20 corridor. The district area is approximately 140 square miles with a population of approximately 3300.

Fire district staffing consists of:

- 35 – Firefighters (volunteer)
- 3 - Fire Commissioners (volunteer)
- 1 - District Secretary (part-time paid)
- 1 – Maintenance Worker (part-time paid)

The fire district is generally situated within the wooded valleys of the San Poil River and the Curlew Lake valley, including their tributaries. The valley bottoms are typically open and grassy where agriculture and development has cleared the forests. Uplands are generally wooded. Natural vegetation throughout the district creates a widespread Wildland/urban interface fire threat potential.

Approximately 1/3 of fire district values lie within the city limits of Republic, Washington with remaining values existing in the rural areas of the district.

The local area has an active fire history. Large wildfires have been documented throughout Okanogan County. When large fires occur, citizens are reminded of the threat to their homes, and awareness of hazard fuels peaks for a time. However, the mental vividness of evacuations, warning bulletins, and firefighters and equipment pouring into the community to render assistance dulls with time. It is important for residents to understand the vulnerability of living within dense vegetation where dry summers create the potential for catastrophic fire events.

**Priority Areas:**

- ***Residential Growth:*** Fire prone developments in subdivisions surrounding Curlew Lake and up tributary creek drainages, and north of the City of Republic on Klondike Mountain.
- ***Communications:*** Establish another repeater for fire/ems to cover the dead spots around the boundary area between Curlew Lake and Malo.
- ***Fire Fighting Vehicles:*** The district will need an additional structural engine for the planned satellite station on the west side of Curlew Lake. The district will need to upgrade the old tender stationed at the East Lake Hall. The tank leaks and the pump is too small for efficient use of the vehicle. Some of the older vehicles in the fleet are higher maintenance than the newer vehicles, and also do not provide as many efficiencies and safety features for firefighters as newer models that are up to the latest standards.

Replacement or refurbishment of older apparatus must be an ongoing program as funding opportunities develop.

- ***Burn Permit Regulations:*** The fire district does not administer a burn permit system. The fire district has relied upon a system established by the Washington State Department of Natural Resources (DNR) that allows outdoor burning under certain times of the year according to particular rules.

During times of the year when DNR burning rules are relaxed, usually early spring and late fall, the fire district is frequently called out to suppress escaped fires started by homeowners burning grass and debris. Escape fire incidents have a negative impact upon the time and patience of volunteer firefighters. The volunteers are willing to help those in genuine need when fire threatens the community due to accidental reasons, but their enthusiasm wanes when their personal lives are interrupted by fires that have escaped due to poor planning or carelessness. Because of escaped burning incidents, there is a need to develop further cooperation and education between local law enforcement and Fire Chiefs to cooperatively enforce current laws regarding reckless and negligent fire use.

**Issues of Concern**: The trend of dwindling industrial activity in the fire district will degrade the tax revenues over time. Poor economics will continue to be a limiting factor in providing adequate fire protection unless business and industry can be attracted to the area.

**District Needs:** Fire district leaders have developed a list of general issues and considerations that pertain to multiple neighborhoods or the district in general, which have been incorporated into the Chapter 5 of this document.

### Okanogan County Fire District #14

**District Summary:** Located in Northern Okanogan County with approximately 79,953 private acres (124 square miles) in size and a population of 1,700 citizens. The area within the district is mountainous with three major valleys and many steep drainages.

Okanogan Fire District #14 has one primary fire station located in Curlew and three satellite stations in the communities of Danville, Malo, and Toroda. The district has two operations divisions (fire and medical). Every firefighter is trained in current First Aid/CPR, but there are no qualified EMS personnel or equipment.

The District currently has 30 volunteer firefighters and 23 volunteer EMS providers (no paid staff) and is governed by a three member Board of Commissioners. All of the officers and fire commissioners have many years of involvement with the District. With an average of 30 volunteers in total, all have some level of experience on large and complex wildfires. Most of the firefighters have received training to the woodland Firefighter 1 level. DNR red cards are kept current with annual refresher classes. A current certification in basic First Aid is required of all firefighters. One commander is certified at Incident Command Type 3 and Division Group Supervisor.

**Priority Areas:**

- ***Residential Growth:*** There continues to be unchecked development of interface neighborhoods in narrow, mountainous valleys. Small ranches and farms make up the majority of development in the larger valley bottoms and some upland areas. Isolated homes and cabins exist in the mountainous areas of the District.
- ***Communications:*** The valley is difficult place for effective communications. The topography makes radio communication spotty, and the District does not have cell phone coverage to fall back on. Firefighters in the field frequently need contact with people or organizations that are only reachable by phone. The District's own dispatch attempts to make that connection but because the District relies on volunteers, someone to fill that role is not always available. Topography enters into the communications problem again because reported fires are often not easy to spot, due to limited vantage points, and a lot of time can be wasted in getting eyes on them and then trying to calculate a way into that area.
- ***Burn Permit Regulations:*** The fire district does not administer a burn permit system. The fire district has relied upon a system established by the Washington State Department of Natural Resources (DNR) that allows outdoor burning under certain times of the year according to particular rules.

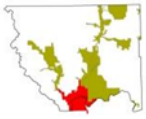
**District Needs:** The primary obstacle for obtaining wildland fire training is unpaid time commitments for the several weeks of required training at the ISC 230, 231, & 232 plus ISC 290 and leadership courses.

An aging fleet of apparatus is our primary limitation. The newest vehicle of our fleet is a 1999 F-450 Ford which came to the District surplus from the USFS Colville National Forest in 2005. Much of our heavy rolling stock is late 1960 vintage and up for replacement.

Additionally, the District currently has no water tenders on inventory. This is a gaping hole in our water transport and portable hydrant ability. We have recently acquired one surplus Kenworth tractor truck for building a tender but have not yet amassed the funding to do so.

While the primary station of the District is a new (2004/05) five bay facility located in the town of Curlew, the District is still in need of additional development of stations. The two bay, three apparatus station in Toroda (1998) is adequate for current needs. The single bay, single apparatus stations in Malo and Danville are much less than adequate for current needs. Stations similar to the Toroda station need to be built in both the Danville and Malo locations.

### Okanogan County Fire District #15



**District Summary:** Fire District #15 covers 230 square miles in two counties (Okanogan and Douglas). Within those two counties FD #15 covers a population of over 4,000. The area is mostly agricultural in nature with apple, pears, cherries and wheat. Also FD #15 has a vast diversity of low income minority agricultural workers, mostly Hispanic. During the peak harvest months, August through November, the population of the district could double in numbers. The District also covers a wide range of topography, from grass/sagebrush to dense timber.

The district operates four stations: Brewster, Pateros, Methow and Rocky Butte on the Bridgeport Bar. The District provides coverage for the Cities of Brewster, Pateros, and Bridgeport. The district responds to over 120 calls a year covering brush fires, structure fires, vehicle fires and vehicle accidents. The district also owns and operates an ambulance service that employees 4 EMT-I's and an EMS Supervisor, who is also an EMT-l.

FD #15 has a paid District Fire Chief and over 60 volunteers. All our firefighters are red card qualified. Along with that the District has several who are Crew Boss and Engine Boss qualified.

**Priority Areas:**

- ***Residential Growth:*** The Alta Lake, Methow, and French Creek areas have had a big growth of new homes over the past two to three years. The District needs to improve fire service to those areas as well as Brewster, Pateros and Bridgeport Bar areas. The Alta Lake area has a State Park as well as a popular golf course with a motel, both of which has increased our call volume to those areas. The closest station to the Alta Lake area is 3-4 miles away in Pateros. The Alta Lake area should be covered more efficiently with a station and equipment assigned to the area.
- ***Communications:*** The District needs to improve our communications in the Methow area as well as the areas of our district surrounding Bridgeport. The topography in these areas makes it difficult to get good signal from the current repeater sites. Dispatched by OC Sheriff's Office Communications Center/Dispatch (911) for both counties.
- ***Burn Permit Regulations:*** The City of Brewster has a burn permit requirement and the cost is $30.00 and is good from Oct 1 – Apr 30. The district has no permit process in place at this time**..**

**District Needs**: A training facility, either within the district or somewhere within in the County, is necessary for volunteers to get good quality training without having the burden and costs of traveling out of the area, especially now with the proposed new LIVE fire training requirements.

A fire station and equipment (Class A Engine) in the Alta Lake and Methow areas to improve the current overcrowding conditions. Improve communications with repeaters in dead areas. Retention and recruitment of volunteers is a major problem. The District is always in need of volunteer firefighters and EMS.

Update contracts with neighboring agencies. Developing contingency plans for the urban interface areas of the district. The District needs to continue to improve relationships with the cities (Brewster, Pateros, and Bridgeport).

## Okanogan County Fire District #16

**District Summary:** The Aeneas Valley is located in NE Okanogan County approximately 18 miles SE of Tonasket. The rough district boundaries are: all private land, on both sides the valley, from Peony Creek road to just past the Aeneas Valley Road general store. FD #16 encompasses approximately 51.5 square miles or 33,000 acres.

The general Aeneas Valley is a broad drainage running NW to SE with numerous smaller drainages dropping into the main valley from the surrounding mountains. The main valley floor at 2,200 - 2,600 feet is bordered to the east and west with mountains reaching up to 6,000. While the lower reaches of Aeneas Valley can be broad and open the topography is typically steeper and rugged approaching the higher elevations.

This topographic arrangement has multiple effects on fuels, demographics, infrastructure, landownership, and wildland fires (see topics below).

The valley floor is much denser in both structures and population with smaller parcels of land with easier access for fire equipment. The valley presents challenges with regards to both weather as well as an adequate water supply, especially in the higher elevations. There are also many isolated homes and cabins with difficult, often single road access and/or closely surrounded with heavy fuels. Most side roads are not maintained so access is, at best, difficult, and in the winter months it can be impossible. The district borders approximately 9 miles of the Okanogan National Forest. In the valley floor the vegetation ranges from grassland to smaller, isolated stands of Ponderosa pine. This trend continues as you move up in elevation, changing to a higher density of trees with 3,500' and up. The Northeast portion of the district borders the Okanogan National Forest with a very high density of ponderosa pines.

Aeneas Valley floor fuel composition is given to a mixture of timber plots, grazing pastures and irrigated agricultural lands. These are also a limited area of scrub brush and indigenous grasses. Stringers of timber extend into the valley floor from intersecting drainages. Both the lower valley area and the upper reaches of the surrounding mountains are dry site, fire prone landscapes.

Adjacent forests of ponderosa pine are intermixed with Douglas-fir and occasional western larch. These timber stands are often thick with heavy ground and ladder fuels. There is also a lack of management of these forests tracks leading to overstocking, unhealthy stands and fire prone conditions. At all levels grass and shrub fuels and needle cast are the primary fire carriers.

The Aeneas Valley is prone to lightning strikes throughout the dry-season summer months. With the rapid increase of population and structures the additional risk of human fire starts is increasing. The Washington DNR Interface Risk Assessment program lists the Aeneas Valley as a high-risk area.

**Priority Areas:**

- ***Residential Growth:*** One of the fastest growing areas in Okanogan County is the Aeneas Valley, which is a textbook example of the Wildland/Urban Interface (WUI). The population base is moving more towards retired couples building their retirement home. There are a few small, home-based businesses as well as those who commute to either Tonasket, Okanogan, or as far away as the West side of the state. The growth in the Aeneas Valley is well documented both by value through the Assessor's Office as well as

building permits issued through the Okanogan County Building Department. In the past 3 years, District 16 has experienced growth of 138%.

- ***Communications:*** The valley is difficult place for effective communications. The topography makes radio communication spotty, and the District does not have cell phone coverage to fall back on. Firefighters in the field frequently need contact with people or organizations that are only reachable by phone. The District's own dispatch attempts to make that connection but because the District relies on volunteers, someone to fill that role is not always available. Topography enters into the communications problem again because reported fires are often not easy to spot, due to limited vantage points, and a lot of time can be wasted in getting eyes on them and then trying to calculate a way into that area.
- ***Burn Permit Regulations:*** Enforcement of fire regulations will remain the responsibility of the Department of Natural Resources and the Okanogan County Sheriff's office.
- ***Manpower:*** Being an all-volunteer organization the manpower available at any given time for an incident can be rather slim with a lot of the same people being repeatedly called upon to respond. In fact during the hot dry summer we tend to have the least amount of people available. Our goal is to have approximately 30 training firefighters but we can't seem to get much above 20 at any given time. Because as is typical in volunteer organization, about 80% of the work is done by about 20% of the people. The loss of one or two key individuals can severely impact the ability of the fire district to adequately perform its duties.
- ***Other:*** Unless you're district has a very large tax base not only can't you hire full time employees, but you also cannot provide them with the necessary professional training needed. Seldom mentioned is the fact this problem extends onto the administrative side as well. For the commissioners on down, there are a multitude of RCW's and WAC's which seem to be written for large districts that have to be implemented and followed. Very little training, especially affordable training, is available to cover this area. This exposes the district, as well as the tax payers to potentially costly risk and litigation. People are stepping into roles for which they have no training and very little chance of getting it and being expected to perform flawlessly.

**District Needs**:

Currently District #16 has 19 red-carded firefighters. The goal is to have all firefighters trained to NWCG level of FF2. Other goals include trained qualified Engine Boss/Incident Commander Type 4 or higher. The District's biggest challenge is recruiting volunteers from the resident population. Training is limited to available open classes provided by DNR and FS. Our current high training priority is getting our physically able firefighters trained to fight structural fires, complete with SCBA (which is a big financial challenge.)

District #16 is at its desired number of fire department vehicles but most are 1990's vintage or older and are higher maintenance vehicles requiring more labor hours and therefore not as reliable. The District's goal is to upgrade vehicles and capacities as opportunities permit.

At this time there is not a district supplied place to park fire apparatus out of the weather therefore, an indoor heated training and maintenance facility would increase cold weather fire protection as well as reduce the use of district members' homes and property.

Other needs: A big concern is the availably of an adequate water supply in the district and surrounding area. Therefore, the district needs multiple water tenders. Qualified drivers for water tenders is the most critical skill shortage the district has.

### Bureau of Land Management

**Spokane District Mission Statement:** The mission of the Spokane District is to share their unique capability and interest in sustaining the full diversity of natural and cultural landscapes across Washington State and invite their discovery and use. This includes protecting the natural resources, such as water for fish and wildlife; preserving environmental and cultural values on the lands they manage; providing for multiple uses, that include some commercial activities; and enhancing opportunities for safe and enjoyable outdoor recreation. The Spokane District also assesses energy and mineral resources and works to ensure that their development is in the best interest of the public. Another major responsibility is to ensure consideration of Tribal interests and administration the Department of Interior's trust responsibilities for American Indian Reservation communities.

**Spokane District Summary:** Up through the 1970's, BLM's policy was to divest ownership of all federal public (BLM) lands in the state of Washington. But in 1980, at the height of the Sage Brush Rebellion (a social movement to give control over federal lands to the states and local authorities), Washington voted to have the public lands remain under federal ownership and management. In the 1980 general election, the state put a measure on the ballot asking voters if the state constitution should "be amended to provide that the state no longer disclaim all rights to unappropriated federal public lands." Approximately 60% of the people and the majority in every county voted no, signaling to BLM that there was strong support for continued federal management of the public lands in the state.

The Spokane District Fire Management Program currently consists of 2 type six wildland engines (300 gallons) with two full time Engine Captains, four engine crew members, one Fuels Specialist, Seasonal Dispatcher, and a Fire Management Officer (FMO). One engine is stationed in Spokane at the District office and the other in Wenatchee at the field office. There are approximately 16 other specialist (staff) from across the district that assist the Fire Management Program in wildland and/or prescribed fire efforts. With the District's scattered ownership pattern, the engines are usually on scene after initial attack forces have arrived. Our engines and personnel are available for off District and out of state fire assignments that aide in support, training, and experience. The Spokane District BLM has cooperative agreements with the Colville National Forest, DNR, Spokane County FD #10 & #3, Grant County FD #5, Douglas County FD #4, Chelan County FD #1, Benton County FD #1, and Kennewick City FD.

### USDA Forest Service

**District Summary:** The Okanogan-Wenatchee National Forests (OWF) cover nearly 4 million acres of forested lands on the eastern slopes of the Cascade Mountains. National forest lands span from the Canadian border south to the Yakima Indian Reservation and from the Cascade crest east to the Columbia River on the Wenatchee National Forest and to the Okanogan County line on the Okanogan National Forest. The OWF has 7 Ranger Districts, two of which are in Okanogan County. There are approximately 900 red carded Forest Service employees that participate directly in fire suppression or support fire suppression activities.

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### Washington Department of Natural Resources

**District Summary:** Washington State Department of Natural Resources is the state's largest on-call fire department with employees who fight fire on about 12.7 million acres of non-federal (private, state and tribal) forest land. The DNR has the primary protection responsibilities on private and state forest land throughout Northeast Region in the State of Washington. The DNR may also respond to fires outside of DNR jurisdiction that threaten DNR protection. The DNR provides wildland fire prevention and regulation on private and state forestland. The DNR works cooperatively during suppression operations with the private sector, local protection entities, and other State and Federal agencies. The DNR does not provide formal EMT services. Most DNR employees have first-aid training and some, individually may have had EMT and/or first-responder training.

South Okanogan and Highlands Districts cooperate and share equipment, personnel and resources when initial attack resources are minimal.

The Northeast Region Interagency Communications Center (NEWICC) maintains lists of "call when needed" Faller Agreements and Dozer Agreements. Operators are equipped and trained for fire suppression throughout the local districts. Dozer sizes can range from D-4 to D-8.

DNR helicopter(s) are staged at the Omak Airport initially, and later at Colville throughout fire season for initial attack. The helicopter staged at the Omak Airport is usually a Bell 205 with helitack crew.

The Fire Boss (SEAT on pontoons) water scooper is generally staged at Deer Park.

The BIA SEAT has been available to DNR at the Omak Airport for initial attack during recent fire seasons.

Canadian air tankers and lead plane are requested for initial attack when needed.

The DNR South Okanogan District is located in the southwest quadrant of the Northeast Region of the State of Washington. The South Okanogan District spans more than 1,000,000 acres and is located geographically within the south half of Okanogan County. The district is comprised of private, county, state, federal and tribal property ownerships with numerous jurisdictions. Within the district there are approximately 250,000 acres of state land (including both WA DNR and WDFW managed lands), and approximately 300,000 acres of private land (including private lands within the Colville Reservation).

The Northeast Region Office is located in Colville, Washington. The South Okanogan District has 1 work center located at the Omak Airport. South Okanogan District Fire Control staff number 24 employees during the peak of fire season. Of which, 3 are permanent full time employees. The remaining 21 employees are comprised of 7 Natural Resource Worker 2 (NRW2), engine drivers and 14 firefighters. Employment duration for the 7 NRW2 positions is usually between mid-April and mid-October and employment duration for the firefighters is usually three months. South Okanogan District State Lands staff number 4 permanent employees who participate in the fire program as needed. DNR resources are neither trained nor equipped for structure suppression.

The South Okanogan District seasonally staffs 7 (4 - Type 6 and 3 - Type 5) 4X4 engines. The engines are usually staffed with a 3 person firefighting crew 5 days per week and are on offset schedules to provide 7 day a week coverage. Staffing levels vary as fire season begins and draws

to an end. A strike team of engines are requested to assist the district with initial attack when "Red Flag" warnings are predicted.

The DNR Highlands District is located in the northwest quadrant of the Northeast Region of the State of Washington; and spans a 1,330,000 acre mosaic of ownerships and jurisdictions. Highlands District is located in the northern portions of both Okanogan and Ferry Counties; and is bordered on the north by Canada, on the south by the boundaries of the Colville Confederated Tribes, on the west by the foothills of the Cascade Range, and on the East by the Kettle Range. The district is comprised of private, county, state, federal and tribal ownerships with numerous jurisdictions and interests. Within Highlands district in Okanogan County there are about 178,711 acres of WA DNR managed land, about 25,811 acres of WDFD managed land and about 601,193 acres of private land. Highlands district also has about 26,785 acres of WA DNR managed land located in Ferry county. Topographic variations range from 900' to 8,000'. Uplands are a mixture of very rugged, often rocky slopes giving way to either rolling highlands or partially timbered rounded mountains.

The Highlands district fire program has one work center at Highlands Fire Camp (HFC), two miles south of Loomis. There is a memo of understanding with two Fire Protection Dictricts (Tonasket and Curlew) for minimal office use. Highlands state lands staff use a work center in downtown Loomis. The Highlands District Fire Control staff totals 43 individuals at the peak of fire season of which includes 3 permanent employees, 7 career-seasonal employees who work from about April to October, and 33 seasonal fire fighter employees on staff from roughly June to September. The Highlands 20 Person Hand Crew resides and trains at Highlands Fire Camp, until they are needed for fire response anywhere in the District, or across the state. HFC also has a permanent Heli-spot and Fire Base Camp location. When needed, additional fire resources, such as Incident Management Teams and Strike Teams are brought in for peak workloads. Highlands State Lands staff has 8 additional staff that participate in the fire program when needed.

The Highlands District seasonally staffs six (five – Type 5 and one – Type 6) 4X4 Engines, with a three-person firefighting crew in each engine. Engine staffing is on a varied schedule that provides seven day per week coverage June through September. The DNR utilizes a "home guard" approach in that the seasonal engine drivers park their assigned engines at their residence within their assigned geographic area of the district. Supervisors also drive a type 7 4X4 Engine.

Inside the DNR Highlands District are portions of Ferry and Okanogan counties with two E-911 Dispatching Centers and Emergency Service Operations. Three incorporated cities; Oroville, Tonasket and Republic, all have WUI neighborhoods developing outside their city boundaries. Additionally six towns and numerous communities provide a multiplex of rural/urban interface neighborhoods developing in mountainous drainages within perennial fire ecology with a history of complex, costly wildfires.

## Fire Protection Issues

The following sections provide a brief overview of the many difficult issues currently challenging Okanogan County in providing wildland fire protection to citizens. These issues were discussed at length both during the committee process and at several of the public meetings. In most cases, the committee has developed action items (see Chapter 6) that are intended to begin the process of effectively mitigating these issues.

### Residential Growth

One challenge Okanogan County faces is the large number of houses in the urban/rural fringe compared to twenty years ago. Since the 1970s, a segment of Washington's growing population has expanded further into traditional forest or resource lands and other rural areas. The "interface" between urban and suburban areas and unmanaged forest and rangelands created by this expansion has produced a significant increase in threats to life and property from fires and has pushed existing fire protection systems beyond original or current design or capability. Many property owners in the interface are not aware of the problems and threats they face and owners have done very little to manage or offset fire hazards or risks on their own property. Furthermore, human activities increase the incidence of fire ignition and potential damage.

*It is one of the goals of this document to help educate the public on the ramifications of living in the wildland-urban interface, including their responsibilities as landowners to reduce the fire risk on their property and to provide safe access to their property for all emergency personnel and equipment. Homeowners building in a high fire risk area must understand how to make their properties more fire resistant using proven firesafe construction and landscaping techniques and they must have a realistic understanding of the capability of local fire service organizations to defend their property.*

### Rural Fire Protection

People moving from urban to more rural areas frequently have high expectations for structural fire protection services. Often, new residents do not realize they that the services provided are not the same as in an urban area. The diversity and amount of equipment and the number of personnel can be substantially limited in rural areas. Fire protection may rely more on the landowner's personal initiative to take measures to protect his or her property. Furthermore, subdivisions on steep slopes and the greater number of homes exceeding 3,000 square feet are also factors challenging fire service organizations. In the future, public education and awareness may play a greater role in rural or interface areas. Great improvements in fire protection techniques are being made to adapt to large, rapidly spreading fires that threaten large numbers of homes in interface, rural, and remote developments.

In most western states, state and federal agencies that have wildland fire protection responsibilities have launched a campaign to reiterate to the public that they do not provide structural fire protection. Much of the increasing costs of wildland fires can be directly related to the increasing number of structures in the wildland urban interface. State and federal agencies are trying to make it clear to the public that land and homeowners are responsible for reducing the fire risk on their property and that the agencies are not responsible for or required to provide structural protection.

*The CWPP planning committee has made several recommendations targeting increased wildland fire awareness and education for residents living in or moving into the wildland urban interface of Okanogan County.*

### Pre-planning in High Risk Areas

Although conducting home, community, and road defensible space projects is a very effective way to reduce the fire risk to communities in Okanogan County, recommended projects cannot all occur immediately and many will take several years to complete. Thus, developing pre-planning guidelines specifying which and how local fire agencies and departments will respond to specific areas is very beneficial. These response plans should include assessments of the structures, topography, fuels, available evacuation routes, available resources, response times, communications, water resource availability, and any other factors specific to an area. All of these plans should be available to the local fire departments as well as dispatch personnel.

*One of the main goals of this CWPP is to identify areas with a high risk of experiencing wildland fires and take direct actions to mitigate those risks. However, in areas where mitigation may be difficult or will take a long period of time to implement, pre-disaster and emergency planning measures have been recommended.*

### Fireworks

Due to Okanogan County's close proximity to the Colville Reservations, fireworks are increasingly available to the public in Okanogan County. Even with the existing fireworks ban during periods of high wildland fire risk, the use of fireworks, particularly in recreational areas, is high. Both the CWPP planning committee and local residents have noted fireworks as a high risk factor for wildfire ignitions. So far, they have not resulted in large fires; however, there are several documented ignitions due to fireworks within Okanogan County.

*The CWPP planning committee has identified fireworks as a serious threat to Okanogan County, and thus, has made recommendations for strict regulations and active enforcement of all fireworks-related restrictions.*

### Accessibility

Fire chiefs throughout the County have identified home accessibility issues as a primary concern in some parts of Okanogan County. Many existing housing developments and private driveways have been constructed without regard to access requirements of large emergency vehicles. Additionally, many of these roads are several miles long and dead end with no warning or plans for future connections to other access roads. The lack of road connectivity and general accessibility in some areas restricts engagement by fire suppression resources. Continued enforcement of Okanogan County's current standards regarding road and driveway construction regulations for fire apparatus would prevent accessibility issues in new developments. Wildfire risk can be lessened and firefighter safety can be improved by keeping vegetation including tall grass, brush, and trees a safe distance from the road right-of-way. This will not only improve accessibility, but will also allow the road to serve as a control point for suppression activities.

Additionally, the fire districts have identified several unimproved and unmaintained county roads that could serve as strategic access points for fire suppression activities if they were maintained periodically for this purpose. In some cases, these roads are partially maintained, but are limited by inadequate or nonexistent bridge crossings.

*The planning committee involved in the development of this CWPP found accessibility to be one of the primary difficulties with safe emergency ingress and egress. It is a clear goal of this planning process to continue the enforcement and maintenance of the current road standards countywide. As part of this process, the committee has recommended an action item for improvement of existing substandard roads, driveways, and bridges, where necessary, to improve firefighter safety and suppression effectiveness.*

### Wildfire Suppression and Mobility

An important factor in fire suppression is mobility. The ability to transport personnel and equipment to and from the incident is essential for firefighting safety and efficiency. Portions of the topography of Okanogan County limit access. Some areas are difficult to reach and wildfires will develop before suppression resources arrive. Occasionally, suppression efforts employing defensible roads and topographic breaks as an in-direct strategy are necessary. Making the most of existing road systems is a prudent planning strategy and the effectiveness of those road systems can be maximized if fuel reduction thinning can occur where necessary.

### Fire-Resistant Construction Materials

Due to the multitude of highly publicized wildland-urban interface fires occurring in the western states, there has been an increased level of research, development, and marketing of more fire-resistant construction materials. Information on high risk materials as well as fire-resistant alternatives can be readily found online or through local fire departments.

*The planning committee has recommended that additional education regarding wildfire awareness issues and fire-resistant construction materials be provided to those engaged in new construction projects.*

### Road Signage and Rural Addressing

The ability to quickly locate a physical address is critical in providing services in any type of emergency response. Accurate road signage and rural addressing is fundamental to assure the safety and security Okanogan County residents. Currently, there are numerous areas throughout the County lacking road signs, rural addresses, or both. Signing and addressing throughout the County needs to be brought up to NFPA code in order to assure visibility and quick location.

### Volunteer Firefighter Recruitment

The rural fire departments in Okanogan County are predominantly dependent on volunteer firefighters. Each district spends a considerable amount of time and resources training and equipping each volunteer, with the hope that they will continue to volunteer their services to the department for at least several years. One problem that all volunteer-based departments encounter is the diminishing number of new recruits. As populations continue to rise and more

and more people build homes in high fire risk areas, the number of capable volunteers has gone down. In particular, many departments have difficulty maintaining volunteers available during regular work day hours (8am to 5pm).

*One of the goals of this CWPP is to assist local fire departments and districts with the recruitment of new volunteers and retention of trained firefighters. This is a very difficult task, particularly in small, rural communities that have a limited pool; however, providing departments with funding for training, safety equipment, advertising, and possibly incentive programs will help draw more local citizens into the fire organizations.*

### Public Wildfire Awareness

As more and more people move into the wildland urban interface of Okanogan County, the need for a coordinated wildfire education program becomes paramount. Many new residents in high wildland fire risk areas are not aware of the potential threat nor do they recognize the lack of defensibility and/or accessibility of their homes. It is important that the local fire districts and departments in Okanogan County have the funding and materials they need to develop educational programs for citizens in their response areas. General awareness of the risk, home defensible space, evacuation procedures, sheltering, and adequate access to structures are just a few of the potential topics that could be covered. A concerted effort to provide basic materials to all fire districts and other cooperating organizations should be considered by Okanogan County. This would reduce the overall and individual cost to the districts as well as improve the quality of education and materials to be presented.

*Developing a mechanism to increase public awareness regarding wildfire risks and promoting "do it yourself" mitigation actions is a primary goal of the CWPP planning committee as well as many of the individual organizations participating on the committee.*

### Communication

There are several communication issues being addressed in Okanogan County. Many of the emergency responders have identified areas of poor reception for both radios and cell phones. The lack of communication between responders as well as with central dispatch significantly impairs responders' ability to effectively and efficiently do their job as well as lessens their safety. The conversion to a narrow band communication system is likely to exacerbate these issues unless numerous additional repeaters are installed.

On a smaller scale, many subdivisions or unincorporated population centers have identified the need to improve emergency communication between residents. In an emergency situation, there is no existing way of notifying each resident in an area of the potential danger, the need for evacuation, etc. Many groups of homeowners have begun to establish phone trees and contact lists in order to communicate information at the individual scale; however, this is not being done in all of the high wildfire risk areas within the County.

Another communication issue that was identified during the public meetings is the ability of wildfire suppression teams to tap the local knowledge of many of the area residents, particularly the larger landowners. There are a handful of local landowners that could be an excellent

resource advisor regarding the condition of county and private roads, access points, fuel conditions, etc.

*Communication is a central issue for the planning committee; thus, numerous recommendations targeting the improvement of communications infrastructure, equipment, and pre-planning have been made.*

### Water Resources

Nearly every fire district involved in this planning process indicated the need to develop additional water resources in several rural areas. Developing water supply resources such as cisterns, dry hydrants, drafting sites, and/or dipping locations ahead of an incident is considered a force multiplier and can be critical for successful suppression of fires. Pre-developed water resources can be strategically located to cut refilling turnaround times in half or more, which saves valuable time for both structural and wildland fire suppression efforts.

## Current Wildfire Mitigation Activities

### Public Education Programs

Many of the county's fire departments and agencies are actively working on public education and homeowner responsibility by visiting neighborhoods and schools to explain fire hazards to citizens. Often, they hand deliver informative brochures and encourage homeowners to have their driveways clearly marked with their addresses to ensure more rapid and accurate response to calls and better access.

### Mutual Aid Agreements

Currently the cities, towns, fire protection districts, and wildland fire agencies within Okanogan County have extensive mutual aid agreements that serve to increase the protection and effectiveness of all Okanogan County fire response jurisdictions. Municipal and county fire departments provide mutual aid for each other to the fullest extent possible. These agreements significantly improve the capabilities and effectiveness of any and all individual fire departments as well as provide assistance to the state and federal wildland fire teams. Not only does this improve the safety of Okanogan County residents, structures, infrastructure, and lands, but it also facilitates good interdepartmental working relationships.

# Chapter 6

## Mitigation Recommendations

Critical to implementation of this CWPP are the identification and implementation of an integrated schedule of action items targeted at achieving a reduction in the number of human caused fires and the impact of wildland fires in Okanogan County. This section of the plan identifies and prioritizes potential mitigation actions, including treatments that can be implemented in the county to pursue that goal. As there are many land management agencies and hundreds of private landowners in Okanogan County, it is reasonable to expect that differing schedules of adoption will be made and varying degrees of compliance will be observed across various ownerships.

The land management agencies in Okanogan County, including the Washington Department of Natural Resources, Washington Department of Fish and Wildlife, USFS, and the BLM, are participants in the planning process and have contributed to this plan's development. Where available, their schedule of land treatments has been considered in the planning process to improve the correlation between their identified planning efforts and the efforts of Okanogan County.

Okanogan County encourages the building of disaster resistance in normal day-to-day operations. By implementing plan activities through existing programs and resources, the cost of mitigation is often a small portion of the overall cost of a project's design or program.

All risk assessments were made based on the conditions existing during 2013. Therefore, the recommendations in this section have been made in light of those conditions. However, the components of risk and the preparedness of the county's resources are not static. It will be necessary to fine-tune this plan's recommendations regularly to adjust for changes in the components of risk, population density changes, infrastructure modifications, and other factors.

### Maintenance and Monitoring

As part of the policy of Okanogan County, the Community Wildfire Protection Plan will be reviewed at least bi-annually at special meetings of the planning committee, open to the public and involving all municipalities/jurisdictions, where action items, priorities, budgets, and modifications can be made or confirmed. The Okanogan County Commissioners or their designee is responsible for scheduling, publicizing, and leading the review meetings. During these meetings, participating jurisdictions will report on their respective projects and identify needed changes and updates to the existing plan. Complete re-evaluation of the plan will be made every five years. The five year review will include updates to the GIS data and mapping, re-evaluation of other Okanogan County planning documents, re-evaluation of wildfire extent and ignition profiles, and revision of community assessments.

### Prioritization of Mitigation Activities

The action items recommended in this chapter were prioritized through a group discussion and voting process. The action items in Tables 6.1 – 6.4 are ranked as "High", "Moderate", or "Low" priorities. The CWPP committee does not want to restrict funding to only those projects

that are high priority because what may be a high priority for a specific community may not be a high priority at the county level. Regardless, the project may be just what the community needs to mitigate disaster. The flexibility to fund a variety of diverse projects based on varying criteria is a necessity for a functional mitigation program at the county and community level.

The proposed treatment areas listed in Table 6.5 were sorted by fire district or responsible agency and ranked on a 1, 2, 3 . . . hierarchical scale by the committee. This method results in a set of highest priority project recommendations for each jurisdiction.

## Wildfire Mitigation Recommendations

As part of the implementation of wildfire mitigation activities in Okanogan County, a variety of management tools may be used. Management tools include but are not limited to the following:

- Homeowner and landowner education
- Policy changes for structures and infrastructure in the wildland-urban interface
- Home site defensible zone through fuels modification
- Community defensible zone through fuels alteration
- Access improvements
- Emergency response enhancements (training, equipment, locating new fire stations, new fire districts, pre-planning)
- Regional land management recommendations for private, state, and federal landowners

Sound risk management is a foundation for all fire management activities. Risks and uncertainties relating to fire management activities must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity. Net gains to the public benefit will be an important component of all mitigation decisions. Maintaining private property rights will also be a guiding principle in mitigation decision-making.

### Policy and Planning Efforts

Wildfire mitigation efforts must be supported by a set of policies and regulations at the county level that maintain a solid foundation for safety and consistency. The recommendations enumerated here serve that purpose. Because these items are regulatory in nature, they will not necessarily be accompanied by cost estimates. These recommendations are policy related and therefore are recommendations to the appropriate elected officials; debate and formulation of alternatives will serve to make these recommendations suitable and appropriate.

**Table 6.1. Action Items in Safety and Policy.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.1.a: Develop County policy concerning building materials used in high-risk WUI areas on existing structures and new construction.** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead:** County Commissioner's Office<br>**Support:** Okanogan County Fire Districts, and all city and town fire departments | N/A | Deleted Action Item Due to Insufficient Funding |
| **6.1.b: Distribute wildfire and emergency services awareness info with building permit requests.** | **CWPP Goal #1,2,3**<br>Priority: Medium | **Lead:** County Building Department<br>**Support:** County Commissioners and incorporated cities of Oroville, Tonasket, Riverside, Omak, Okanogan, Conconully, Nespelem, Elmer City, Coulee Dam, Brewster, Pateros, Twisp, and Winthrop. | On-going | Original Action Item |
| **6.1.c: Rural signage (road signs & house numbers) improvements across the County.** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead:** County Planning Department<br>**Support:** County Commissioners and Sheriff's Office | On-going | Original Action Item |
| **6.1.d: Develop policy on requiring new home and business construction to install underground power lines.** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead:** County Planning Department<br>**Support:** County Commissioner's Office, Okanogan County Public Utilities District, and utilities companies. | N/A | Deleted Action Item Due to Insufficient Funding/Manpower |
| **6.1.e: Develop a burn ordinance to enforce burning permits and fire restrictions throughout the County.** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead:** DNR<br>**Support:** City and County Planning Departments, Okanogan County Sheriff's Department | N/A | Completed pending approval of County Comprehensive Plan |
| **6.1.f: Develop policy on adoption of WUI Code.** | **CWPP Goal #1,2,4, 5,6**<br>Priority: High | **Lead:** County Commissioner's Office<br>**Support:** County Planning Department, Okanogan County Fire Districts | N/A | Deleted Action Item Due to Insufficient Funding/Manpower |

**Table 6.1. Action Items in Safety and Policy.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.1.g: Continue development, support of the North Central Washington Prescribed Fire Council and Washington State Prescribed Fire Council.** | **CWPP Goal #1,2,3, 4,5,6**<br>Priority: High | **Lead:** North Central Washington Prescribed Fire Council and Washington State Prescribed Fire Council<br>**Support:** County Commissioner's Office, Okanogan County Fire Districts, WDFW, USFS, DNR, & BLM | On-going | Original Action Item |
| **6.1.h: : Incorporate this Community Wildfire Protection Plan into the Public Utility District's Emergency Preparedness and Contingency Plan.** | **CWPP Goal #1,2,7**<br>Priority: High | **Lead:** Okanogan County Public Utility District<br>**Support:** Okanogan County Department of Emergency Management | N/A | Deleted Action Item Due to Insufficient Funding/Manpower |
| **6.1.i: Incorporate the Okanogan County Community Wildfire Protection Plan into the Okanogan County Comprehensive Plan, where applicable.** | **CWPP Goal #1,2,7**<br>Priority: High | **Lead:** Okanogan County Commissioners<br>**Support:** Okanogan County Planning Department | N/A | Completed- Pending Approval of County Comprehensive Plan |
| **6.1.j: Adopt stringent regulations to insure fire-safe development of rural subdivisions (see FIREWISE or similar programs for specific recommendations).** | **CWPP Goal #1,2,3, 6**<br>Priority: High | **Lead:** Okanogan County Planning Department<br>**Support:** County Commissioner's Office, County Building Department, Okanogan County Fire Districts | N/A | Completed- Pending Approval of County Comprehensive Plan |
| **6.1.k: Maintain aboveground vegetation management on powerlines**. | **CWPP Goal #1,2,4, 5,6**<br>Priority: Moderate | **Lead:** Public Utility District<br>**Support:** Okanogan County Electric Cooperative | Ongoing | New Action Item |

### Fire Prevention, Education, and Mitigation Projects

The protection of people and structures will be tied together closely because the loss of life in the event of a wildland fire is generally linked to a person who could not, or did not, flee a structure threatened by a wildfire or to a firefighter combating that fire. Many of the recommendations in this section will define a set of criteria for implementation while others will be rather specific in extent and application.

Many of the recommendations in this section involve education and increasing wildfire awareness among Okanogan County residents. These recommendations stem from a variety of factors including items that became obvious during the analysis of discussions during public meetings and observations about choices made by residents living in the wildland-urban interface.

Residents and policy makers of Okanogan County should recognize certain factors that exist today, the absence of which would lead to increased risk of wildland fires in Okanogan County. The items listed below should be acknowledged and recognized for their contributions to the reduction of wildland fire risks:

**Forest Management** has a significant impact on the fuel composition and structure in Okanogan County. The forest management programs of the Washington DNR, Washington DFW, USFS, BIA, BLM and other landowners in the region have led to some reduction of wildland fuels where they are closest to homes and infrastructure; however, there is significant room for growth in these fuels reduction programs. Furthermore, forests are dynamic systems that will never be completely free from risk. Treated stands will need repeated treatments to reduce the risk to acceptable levels in the long term.

**Agriculture** is a significant component of Okanogan County's economy. Much of the interface area is made up of a mosaic of agricultural crops. The original conversion of these lands to agriculture from forest and rangelands was targeted at the most productive soils and juxtaposition to water. Many of these ecosystems were consequently at some of the highest risk to wildland fires because biomass accumulations increased in these productive landscapes. The result today is that much of the landscape historically prone to frequent fires has been converted to agriculture, which is at a much lower risk than prior to its conversion. The preservation of a viable agricultural economy in Okanogan County is integral to the continued management of wildfire risk in this region.

**Prescribed fire** can be used as a tool in forest and rangeland management programs to accomplish several goals. Prescribed fire, when done correctly and in appropriate areas, can help reduce hazardous fuel loads. Prescribed fire has also been used to prepare sites for seeding or planting, improve wildlife habitat, manage competing vegetation, control insects and disease, improve forage for grazing, enhance appearance, and improve access.

**Table 6.2. Action Items for Fire Prevention, Education, and Mitigation.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.2.a: Implementation of Wildfire Educational Programs** | **CWPP Goal #1,2,3**<br>Priority**:** High | **Lead:** County Emergency Manager, Okanogan County Fire Districts<br>**Support:** USFS, BIA, BLM, WA DNR, school districts | On-going | Original Action Item |
| **6.2.b: Wildfire risk assessments of homes in identified neighborhoods** | **CWPP Goal #1,2,3,4, 5,6**<br>Priority**:** High | **Lead**: County Emergency Manager and Washington DNR<br>**Support**: County Commissioner's, BIA, USFS, County LCG, local community organizations, Okanogan County Fire Districts | On-going About 50% Of County Complete | Original Action Item |
| **6.2.c: Home site defensible space treatments** | **CWPP Goal #1,2,4,5, 6**<br>Priority**:** Medium | **Lead**: County Emergency Manager and Washington DNR<br>**Support**: County Commissioner's, BIA, USFS, County LCG, local community organizations, Okanogan County Fire Districts | On-going | Original Action Item |
| **6.2.d: Initiate an incentive based promotional program for community defensible zone treatments in rural subdivisions or housing clusters** | **CWPP Goal #1,2,4,5, 6**<br>Priority: Medium | **Lead**: County Emergency Manager and Washington DNR<br>**Support**: County Commissioner's, BIA, USFS, County LCG, local community organizations, Okanogan County Fire Districts | N/A | Pending Approval of County Comprehensive Plan |
| **6.2.e: Maintenance of home site defensible space treatments** | **CWPP Goal #1,2,4,5, 6**<br>Priority: Medium | **Lead**: County Emergency Manager and Washington DNR<br>**Support**: County Commissioner's, BIA, USFS, County LCG, local community organizations, Okanogan County Fire Districts | N/A | Deleted Action Item Due to Insufficient Funding |

**Table 6.2. Action Items for Fire Prevention, Education, and Mitigation.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.2.f: Re-entry of home site defensible space treatments** | **CWPP Goal #1,2,4,5, 6**<br>Priority: Medium | **Lead**: County Emergency Manager and Washington DNR<br>**Support**: County Commissioner's, BIA, USFS, County LCG, local community organizations, Okanogan County Fire Districts | N/A | Deleted Action Item Due to Insufficient Funding |
| **6.2.g: Development of community evacuation plans and alternate safety zones.** | **CWPP Goal #1,2,3,4, 5,6**<br>Priority: Medium | **Lead**: County Emergency Manager<br>**Support**: Okanogan County Fire Districts, local non-governmental community organizations, USFS, DNR, BIA, and BLM | N/A | Deleted Action Item Due to Insufficient Funding |
| **6.2.h: Coordinated burn restriction system to allow residents to quickly find related information.** | **CWPP Goal #1,2,3**<br>Priority: Medium | **Lead**: DNR<br>**Support**: County Commissioners, Fire Districts | On-going | New Action Item |
| **6.2.i: Provide education to communities on becoming Firewise.** | **CWPP Goal #1,2,3**<br>Priority: Medium | **Lead**: DNR, Conservation District<br>**Support**: Fire Districts, USFS, BLM | On-going | New Action Item |

## Infrastructure Enhancements

Critical infrastructure refers to the communications, transportation (road and rail networks), energy transport supply systems (gas and power lines), and water supply that service a region or a surrounding area. All of these components are important to northeast Washington and to Okanogan County specifically. These networks are, by definition, a part of the wildland-urban interface in the protection of people, structures, **infrastructure**, and unique ecosystems. Without supporting infrastructure, a community's structures may be protected, but the economy and way of life lost. As such, a variety of components will be considered here in terms of management philosophy, potential policy recommendations, and mitigation recommendations.

**Table 6.3. Action Items for Infrastructure Enhancements.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.3.a: Post "Emergency Evacuation Route" signs along the identified primary and secondary access routes.** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead**: County Emergency Manager<br>**Support**: County Public Works, County Commissioner's Office, Okanogan County Fire Districts | N/A | Deleted Action Item Due to Insufficient Funding |
| **6.3.b: Thin vegetation and widen PUD and Okanogan Electric Co-op transmission lines in high risk areas** | **CWPP Goal #1,2,4,5,6**<br>Priority: High | Lead: Okanogan County Public Utilities District and Okanogan County Electric Co-op<br>Support: adjacent landowners | On-going | Original Action Item |
| **6.3.c: Create and maintain defensible space around critical infrastructure.** | **CWPP Goal #1,2,4,5,6**<br>Priority: High | **Lead**: County Emergency Manager<br>**Support**: County Commissioners, incorporated cities, Okanogan County Public Utilities District | N/A | Deleted Action Item Due to Insufficient Funding |

| | | | | |
|---|---|---|---|---|
| **6.3.d: Connect dead end roads, where feasible, in one-way in, one-way out drainages to provide an additional escape route.** | **CWPP Goal #1,2**<br><br>Priority: Medium | **Lead**: County Emergency Manager<br><br>**Support**: County Public Works, County Planning Department, USFS, BLM, DNR, BIA | N/A | Deleted Action Item Due to Insufficient Funding |
| **6.3.e: Access improvements of bridges, cattle guards, culverts, and limiting road surfaces.** | **CWPP Goal #1,2**<br><br>Priority: High | **Lead**: County Public Works<br><br>**Support:** County Commissioners, State of Washington (Lands and Transportation), USFS, DNR, BIA | N/A | Deleted Action Item Due to Insufficient Funding |
| **6.3.f: Fuels mitigation along the primary and secondary access routes in the County to insure these routes can be maintained in the case of an emergency** | **CWPP Goal #1,2,4,5,6**<br><br>Priority: High | **Lead**: County Public Works and Washington Department of Transportation<br><br>**Support**: County Commissioner's Office, USFS, DNR, BIA | N/A | Deleted Action Item Due to Insufficient Funding |
| **6.3.g: Install a municipal water system in the Town of Conconully** | **CWPP Goal #1,2,4,6**<br><br>Priority: Medium | **Lead**: Town of Conconully<br><br>**Support**: County Emergency Manager and County Commissioners | 2018 | Original Action Item |

## Resource and Capability Enhancements

There are a number of resource and capability enhancements identified by the rural and wildland firefighting districts in Okanogan County. All of the needs identified by the districts are in line with increasing the ability to respond to emergencies and are fully supported by the Community Wildfire Protection Plan committee. The implementation of each item will rely on either the isolated efforts of the rural fire districts or a concerted effort by the County to achieve equitable enhancements across all of the districts.

**Table 6.4. Action Items for Resource and Capability Enhancements.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.4.a: Enhance radio availability in each district, link into existing dispatch, improve range within the region, and conversion to consistent standard of radio types** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: Communications Center** | On-going | Installed a repeater in the northern portion of the county – allows fire departments to use fire tactical response frequencies and not mobile-to-mobile.<br><br>Enhanced delivery of information to the first responders – delivers detailed description of the event to cell phone or email. |

**Table 6.4. Action Items for Resource and Capability Enhancements.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.4.a: Continued** | | | | Preparing and installing pre-identified response plans into the dispatch communications system –allows dispatchers to dispatch specific sets of responders to specific incidents or locations – 2nd half 2013.<br><br>Completed narrow-banding for the entire county. |
| **6.4.b: Retention of volunteer firefighters** | **CWPP Goal #1,2,3**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | On-going | Original Action Item |
| **6.4.c: Map onsite water sources such as hydrants or underground storage tanks and drafting or dipping sites** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead:** Fire Districts<br>**Support: County GIS** | N/A | Deleted Action Item Due to Insufficient Funding/Manpower |
| **6.4.d: Increase training and capabilities of firefighters** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | On-going | Original Action Item |
| **6.4.e: Facility, land, and basic equipment for a joint City of Okanogan/Fire District #3 fire station** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | Pending Funding | Original Action Item |

**Table 6.4. Action Items for Resource and Capability Enhancements.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.4.f: Centralized Okanogan County fire training center to include large, modern classroom and training burn tower for more advanced, hands on training in operations and tactics** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | Pending funding | Original Action Item |
| **6.4.g: Obtain a 100 foot ladder truck for City of Okanogan Fire Department** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.h: Facility, land, and basic equipment for a larger Okanogan County Fire District #2 fire station** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.i: Facility, land, and basic equipment for a three small one-engine stations on outskirts of Okanogan County Fire District #3** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.j: Facility, land, and basic equipment for a new station in the Alta Lake area on Okanogan County Fire District #15** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.k: Obtain an urban interface apparatus for the Methow station, a rescue apparatus for the Pateros station, and update aging brush trucks on Okanogan County Fire District #15** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | N/A | Completed |
| **6.4.l: Additional funding to provide paid daytime staff at primary stations in Okanogan County Fire District #3, City of Okanogan Fire Department, and Town of Winthrop Volunteer Fire Department** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | On-going | Town of Winthrop is now contracting with Fire District #6 – FD #6 is still looking at adding additional staff. |

**Table 6.4. Action Items for Resource and Capability Enhancements.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.4.m: Facility, land, and basic equipment for a new Winthrop fire station in Okanogan County Fire District #6** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.n: Facility, land, and basic equipment for a satellite station near Crumbacher in Okanogan County Fire District #4** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.o: Obtain newer structural engine and thermal imager for Okanogan County Fire District #4** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | N/A | Completed |
| **6.4.p: Obtain three Type 4 engines for Okanogan County Fire District #3** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.q: Facility, business plan, MOUs, and basic equipment for a new Okanogan County Fire District in Tunk Valley** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | On-going | Developed Informal Fire Brigade & Water System |
| **6.4.r: Increase station capacity to house equipment at all three Okanogan County Fire District #3 stations** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.s: Hire a County Fire Marshal** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: County Commissioners**<br>**Support: Fire Districts** | Pending Funding | Original Action Item |
| **6.4.t: Improve safety equipment and personal protective equipment for all Fire Districts in Okanogan County** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | On-going | Original Action Item |
| **6.4.u: Facility, business plan, and basic equipment for an Okanogan County Fire District #11 satellite station in the Havillah area** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |

**Table 6.4. Action Items for Resource and Capability Enhancements.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.4.v: Obtain structural equipment, air packs, and necessary training for Okanogan County Fire District #11** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.w: Obtain a 4x4 brush truck and funding for repairs to existing equipment for the Town of Conconully Fire Department** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.x: Facility, land, and basic equipment for a fire station in Okanogan County Fire District #9** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.y: Obtain a water tender, two brush trucks, and draftable mobile pumps for Okanogan County Fire District #9** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item (edited) |
| **6.4.z: Facility, land, and basic equipment for a new and larger fire hall for the Town of Conconully Fire Department** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.aa: Obtain a newer pumper truck and extrication vehicle and equipment for the Town of Winthrop Volunteer Fire Department** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | N/A | Completed |
| **6.4.ab: Begin locating sites for future development of at least three all weather water storage facilities in the Tunk Valley** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | N/A | Completed |
| **6.4.ac: Facility, land, and basic equipment for a new fire hall for the Town of Winthrop Volunteer Fire Department** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | N/A | Completed |
| **6.4.ad: Facility, land, and basic equipment for a new fire hall for Okanogan County Fire District #7** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |

**Table 6.4. Action Items for Resource and Capability Enhancements.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.4.ae: Obtain updated rolling stock (including a water tender), washer & dryer, a hose washer & dryer, and basic life support equipment for Okanogan County Fire District #7** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.af: Support the maintenance and/or enhancement of State and Federal firefighting programs and resources in Okanogan County** | **CWPP Goal #1,2,4**<br>Priority: High | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.ag: Facility (including recruitment and training program) for the new Okanogan County Fire District #16** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.ah: Obtain updated rolling stock for Okanogan County Fire District #12** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2016 | Original Action Item |
| **6.4.ai: Obtain funding for land and a new station at a better location in Okanogan County Fire District #12** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Original Action Item |
| **6.4.aj: Obtain two Type 6 4x4 wildland trucks, one Type 4 4x4 wildland truck, two 2,500+ gallon tenders, one short wheel-base 4x4 structure truck for Okanogan County Fire District #16, and funding for advanced training.** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | On-going | Original Action Item |
| **6.4.ak: Obtain updated rolling stock equipped with both fire and rescue gear for Okanogan County Fire District #11, and funding for advanced training.** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead:**<br>**Support:** | On-going | Original Action Item |

**Table 6.4. Action Items for Resource and Capability Enhancements.**

| Action Item | Goals Addressed (see page 4) | Responsible Organization | Timeline | 2013 Status |
|---|---|---|---|---|
| **6.4.al: Expand storage and bay capacity of both the Molson and Chesaw Fire Stations in Okanogan County Fire District #11** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | 2018 | Partially Completed (built station in Fields Hall) |
| **6.4.am: Updated turnouts and wildland firefighting personal gear for Okanogan County Fire District #11** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | On-going | Original Action Item |
| **6.4.an: Continue to update and verify GIS information is accurate throughout the County.** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead: Fire Districts**<br>**Support: County Commissioners** | On-going | New Action Item |
| **6.4.ao: Continue to expand the Fire Districts to encompass more communities.** | **CWPP Goal #1,2,4**<br>Priority: Medium | **Lead:** County Commissioners<br>**Support:** Fire Districts | 2017 | New Action Item |

### Proposed Treatment Project Areas

The following project areas were identified by the CWPP planning committee as having multiple factors contributing to the potential wildfire risk to residents, homes, infrastructure, and the ecosystem. Treatments within the project areas will be site specific, but will likely include homeowner education, creation of a wildfire defensible space around structures, fuels reduction, and access corridor improvements. Specific site conditions may call for other types of fuels reduction and fire mitigation techniques as well. Defensible space projects may include, but are not limited to commercial or precommercial thinning, pruning, brush removal, chipping, prescribed burning, installation of greenbelts or shaded fuel breaks, and general forest health improvements.

Every projects' priority ranking was decided by the CWPP planning group for each fire district or agency responsible for implementation of the project. The planning group also gave every project a risk rating of "high", "medium", or "low". Projects with a "high" risk rating show that the area being treated has a high probability of wildfire occurrence and a wildfire in the project area will have a high impact on the community. A "low" risk rating reflects that there is a low probability of a wildfire occurring in the project area and that a fire in the project area would not have a great impact on the community. A "moderate" risk rating shows that either the project area has a moderate probability of wildfire occurrence and a moderate potential impact on the community or one of these factors was rated as "low".

| Okanogan County Fire District | Project Id Number | Project Name | Project Type | # of Acres | # of Structures | Miles of Road | Priority Ranking |
|---|---|---|---|---|---|---|---|
| 1, 11 | 1 | Nine Mile | Defensible Space | 14,397 | 92 | 54 | High |
| 11 | 2 | Pontiac Ridge | Defensible Space, Forest Mgmt, Roadside Fuels | 18,407 | 138 | 61 | High |
| 14 | 3 | Toroda Creek | Defensible Space, Forest Mgmt, Roadside Fuels | 31,042 | 128 | 62 | High |
| NA | 4 | Lost Lake | Defensible Space, Forest Mgmt, Roadside Fuels | 3,709 | 23 | 10 | High |
| NA | 5 | Bonaparte Lake | Defensible Space, Forest Mgmt, Roadside Fuels | 1,985 | 28 | 7 | High |
| 11, 12 | 6 | Havillah | Defensible Space, Forest Mgmt, Roadside Fuels | 29,004 | 137 | 63 | High |
| 1, 4, 12 | 7 | Mount Hull | Defensible Space, Forest Mgmt | 14,290 | 293 | 64 | High |
| NA | 8 | Wannacut | Defensible Space | 8,681 | 94 | 49 | High |
| 10 | 9 | Loomis | Defensible Space, Forest Mgmt, Roadside Fuels | 5,938 | 115 | 12 | High |
| 4 | 10 | Aeneas Valley | Defensible Space, Forest Mgmt, Roadside Fuels, Ed. | 46,721 | 556 | 180 | High |

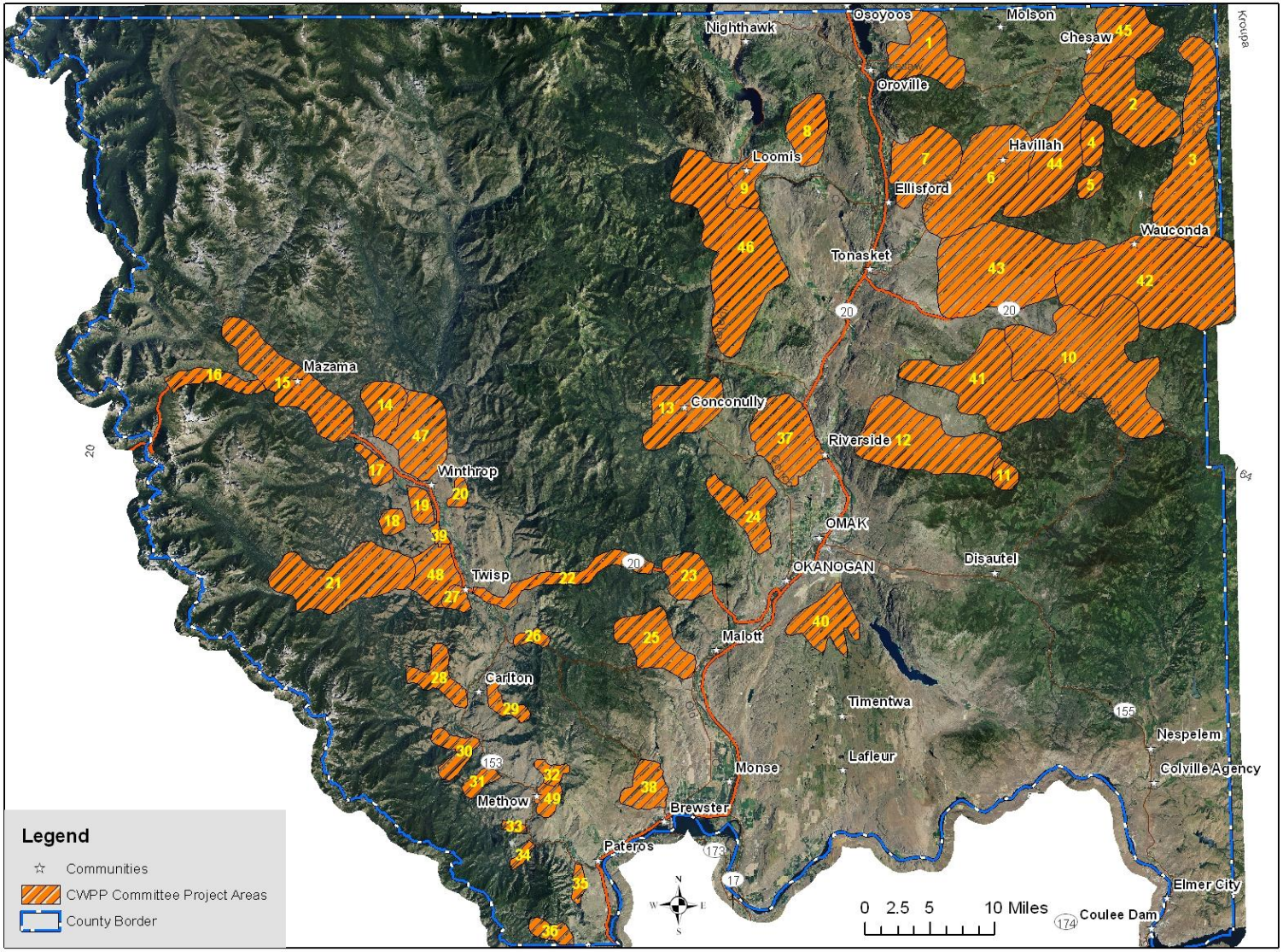
| Okanogan County Fire District | Project Id Number | Project Name | Project Type | # of Acres | # of Structures | Miles of Road | Priority Ranking |
|---|---|---|---|---|---|---|---|
| NA | 11 | Crawfish Lake | Defensible Space, Forest Mgmt, Access, Ed. | 2,449 | 45 | 5 | High |
| NA | 12 | Twin Creeks Development | Access, Education, Water Issues | 27,561 | 156 | 67 | High |
| 9 | 13 | Conconully | Defensible Space, Forest Mgmt, Roadside Fuels, Ed. | 14,448 | 317 | 25 | High |
| 6 | 14 | Rendezvous | Defensible Space | 6,964 | 41 | 23 | High |
| 6 | 15 | Mazama | Defensible Space, Forest Mgmt, Roadside Fuels | 21,959 | 728 | 71 | High |
| 6 | 16 | Cascade Highway | Defensible Space, Forest Mgmt, Roadside Fuels | 5,459 | 0 | 8 | High |
| 6 | 17 | Wolf Creek | Defensible Space, Roadside Fuels | 2,935 | 117 | 17 | High |
| 6 | 18 | Pine Forest | Defensible Space, Forest Mgmt, Roadside Fuels | 2,169 | 89 | 11 | High |
| 6 | 19 | Twin Lakes | Education | 2,877 | 331 | 22 | High |
| 6 | 20 | Bear Creek | Defensible Space | 1,709 | 30 | 8 | High |
| 6 | 21 | Twisp River | Defensible Space, Forest Mgmt, Road Fuels/Widen | 24,220 | 210 | 46 | High |
| 6 | 22 | Hwy 20 Corridor | Defensible Space, Roadside Fuels | 9,312 | 162 | 29 | High |
| 3 | 23 | Buzzard Lake | Defensible Space, Roadside Fuels | 7,086 | 48 | 25 | High |
| 3, 7, 9 | 24 | Salmon Creek | Defensible Space | 9,923 | 63 | 16 | High |
| 3, 15 | 25 | Chiliwist | Defensible Space, Roadside Fuels, Rural Addressing | 12,375 | 83 | 22 | High |
| 6 | 26 | Benson Creek | Defensible Space | 1,691 | 18 | 5 | High |
| 6 | 27 | Alder Creek | Defensible Space | 2,182 | 35 | 9 | High |
| 6 | 28 | Libby Creek | Defensible Space | 6,218 | 44 | 13 | High |
| 6 | 29 | Texas Creek | Defensible Space | 3,239 | 20 | 8 | High |
| 6 | 30 | Gold Creek | Defensible Space, Forest Mgmt, Roadside Fuels | 4,739 | 47 | 11 | High |
| 15 | 31 | McFarland Creek | Defensible Space, Forest Mgmt, Roadside Fuels | 2,377 | 14 | 4 | High |

| Okanogan County Fire District | Project Id Number | Project Name | Project Type | # of Acres | # of Structures | Miles of Road | Priority Ranking |
|---|---|---|---|---|---|---|---|
| 15 | 32 | French Creek | Defensible Space, Forest Mgmt | 2,068 | 33 | 8 | High |
| 15 | 33 | Squaw Creek | Defensible Space, Forest Mgmt, Roadside Fuels | 905 | 7 | 2 | High |
| 15 | 34 | Black Canyon | Defensible Space, Forest Mgmt, Roadside Fuels | 1,154 | 3 | 3 | High |
| 15 | 35 | Alta Lake | Defensible Space, Education | 1,561 | 124 | 8 | High |
| NA | 36 | Antoine Creek | Defensible Space | 2,961 | 29 | 7 | High |
| 7, 9 | 37 | Limebelt | Defensible Space, Forest Mgmt, Roadside Fuels | 16,945 | 154 | 45 | High |
| 15 | 38 | Harmony Heights | Defensible Space, Access | 6,382 | 46 | 26 | High |
| 6 | 39 | Hoot N Holler | Defensible Space | 970 | 36 | 7 | High |
| 8 | 40 | Camron Lake | Defensible Space, Forest Mgmt, Roadside Fuels | 10,666 | 24 | 17 | High |
| NA | 41 | Bannon Mountain | Defensible Space, Forest Mgmt, Roadside Fuels | 29,250 | 55 | 48 | High |
| 13 | 42 | Wauconda | Defensible Space, Forest Mgmt, Roadside Fuels | 48,405 | 113 | 56 | High |
| 4 | 43 | Cayuse | Defensible Space, Forest Mgmt, Roadside Fuels | 38,688 | 180 | 85 | High |
| 11 | 44 | North Fork Bonapart | Defensible Space, Forest Mgmt, Roadside Fuels | 18,057 | 26 | 16 | High |
| 11 | 45 | Buckhorn | Defensible Space, Forest Mgmt, Roadside Fuels | 12,629 | 98 | 19 | High |
| NA | 46 | Loomis2 | Defensible Space, Forest Mgmt, Roadside Fuels | 41,620 | 48 | 57 | High |
| 6 | 47 | Rendezvous2 | Defensible Space, Forest Mgmt, Roadside Fuels | 14,823 | 402 | 62 | High |
| 6 | 48 | Twisp River2 | Defensible Space, Forest Mgmt, Roadside Fuels | 8,028 | 181 | 21 | High |
| 15 | 49 | French Creek2 | Defensible Space, Forest Mgmt, Roadside Fuels | 2,704 | 45 | 19 | High |

*The number of structures is based on address points; thus, the number of actual buildings may be higher.

The Washington DNR, Washington Department of Fish and Wildlife, Bureau of Land Management, National Park Service, individual fire protection districts, or individual landowners may take the lead on implementation of many of these projects; however, project boundaries were purposely drawn without regard to land ownership in order to capture the full breadth of the potential wildland fire risk. Coordination and participation by numerous landowners will be required for the successful implementation of the identified projects.

**Figure 6.1. Map of Proposed Projects**



### Regional Land Management Recommendations

Wildfires will continue to ignite and burn depending on the weather conditions and other factors enumerated earlier. However, active land management that modifies fuels, promotes healthy forestland conditions, and promotes the use of natural resources (consumptive and non-consumptive) will ensure that these lands have value to society and the local region. The Washington DNR, Washington DFW, USFS, BIA, BLM, private forest landowners, and all agricultural landowners in the region should be encouraged to actively manage their wildland-urban interface lands in a manner consistent with reducing fuels and wildfire risks.

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# Chapter 7

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## Signature Pages

This Okanogan County Community Wildfire Protection Plan has been developed in cooperation and collaboration with representatives of the following organizations and agencies.

### Okanogan County Board of Commissioners

| | |
|---|---|
| **Jim DeTro**, Chair<br>Okanogan County Commissioner District #3 | 10/15/13<br>Date |
| **Ray Campbell**<br>Okanogan County Commissioner District #2 | 10/15/13<br>Date |
| **Sheilah Kennedy**<br>Okanogan County Commissioner District #1 | 10/15/13<br>Date |

## Signatures of Participation by Okanogan County Fire Districts and Departments

This Community Wildfire Protection Plan and all of its components identified herein were developed in close cooperation with the participating entities listed.

| | |
|---|---|
| Gordon A. Henry | 9-25-2013 |
| City of Okanogan Fire Department | Date |
| | 9-25-13 |
| City of Omak Fire Department | Date |
| Robert Jackson | 9-27-13 |
| Town of Coulee Dam Fire Department | Date |
| | |
| Town of Conconully Fire Department | Date |
| Rodney J Noel | |
| Okanogan County Fire District #1 | Date |
| David L Finch | |
| Okanogan County Fire District #2 | Date |
| | 9-25-13 |
| Okanogan County Fire District #3 | Date |
| | |
| Okanogan County Fire District #4 | Date |
| Don Waller | 9-25-13 |
| Okanogan County Fire District #6 | Date |
| Brad Armstrong | Oct. 11, 2013 |
| Okanogan County Fire District #7 | Date |

| | |
|---|---|
| Okanogan County Fire District #8 | 10-10-13<br>Date |
| Okanogan County Fire District #9 | 9-26-13<br>Date |
| Okanogan County Fire District #10 | 10-31-13<br>Date |
| Okanogan County Fire District #11 | 9 26 13<br>Date |
| Okanogan County Fire District #12 | Date |
| Okanogan/Ferry County Fire District #13 | Date |
| Okanogan/Ferry County Fire District #14 | Date |
| Douglas/Okanogan County Fire District #15 | 10-10-2013<br>Date |
| Okanogan County Fire District #16 | Oct. 24, 2013<br>Date |

## Signatures of Participation by other Okanogan County Entities

This Community Wildfire Protection Plan and all of its components identified herein were developed in close cooperation with the participating entities listed.

Frank F. Rogers — 10-26-13

**Sheriff Frank Rogers,** Director,
Okanogan County Department of Emergency Management — Date

Linda Coates-Markle — 12.4.13

**Linda Coates-Markle**, Wenatchee Field Manager
Spokane District Bureau of Land Management — Date

12/13/13

**Aaron Everett**, Deputy Supervisor,
Forest Practices and Federal Relations, State Forester, Washington State Department of Natural Resources — Date

**Michael Balboni**, Forest Supervisor,
Okanogan-Wenatchee National Forest — Date

10/21/2013

**Brad Tucker**, Project Manager
Northwest Management, Inc. — Date

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This plan was developed by Northwest Management, Inc. under contract with Okanogan County and the Washington Department of Natural Resources. Funding for the project was provided by the Okanogan County Department of Emergency Management.

**Citation of this work:**

Bloch, Vaiden, T. R. King, and B. Tucker. *Lead Authors.* 2013. Okanogan County, Washington, Community Wildfire Protection Plan. Northwest Management, Inc., Moscow, Idaho. Pp 123.

Bloch, Vaiden, T. R. King, and B. Tucker. *Lead Authors.* 2013. Okanogan County, Washington, Community Wildfire Protection Plan Appendices. Northwest Management, Inc., Moscow, Idaho. Pp 39.

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**Northwest Management, Inc.**
233 East Palouse River Drive
PO Box 9748
Moscow ID 83843

208-883-4488 Telephone
208-883-1098 Fax
NWManage@consulting-foresters.com
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Navigation

# Largest Fire in State History

by **Gary DeVon** on August 26, 2015 in **News**

Tonasket EMS Director Michael Greene and family were among the lucky ones as their North Pine Creek Rd. residence was sapred by fire, although most of the land around the home looked like scorched earth. Katie Teachout/Staff Photo

## Okanogan Complex burns 285,399 acres

> **I'd rather have people alive to gripe than dead because we didn't evacuate." Patrick Plumb, Tonasket Mayor**

OKANOGAN COUNTY – The Okanogan Complex Fire has grown to be the largest wildfire in Washington State History, even surpassing last year's devastating record breaking fires in the Methow and Pateros areas known as the Carlton Complex.

The Okanogan Complex which includes fires in the Lime Belt, Blue Lake, Tunk Block, Beaver Lake and Nine Mile areas in Okanogan County, encompasses some 258,399 acres, more than 400 square miles, and is being said to be only 10 percent contained, according to the Northeast Washington Fire Update. Fire officials say more than 1200 people are battling the fire which has threatened as many as 5000 homes. Among the crews battling the fire are US Forest and DNR firefighters, 200 Washington State National Guardsmen, local fire departments, fire departments from all over the state and citizen volunteers. Sixteen of the firefighters from Australia who came to battle the fires raging across the Western United States have joined the fight against the Okanogan Complex Fires as well. Unfortunately, the fires could burn for several more months, according to Fire spokesman Rick Isaacson.

Okanogan County Emergency Management ordered State Highway 20 closed and a Level 3 immediate evacuation of Tonasket on Thursday, Aug. 20. The highway reopened the next day, but firefighting was still intense as fires burned in many areas of the county. The Level 3 has been lifted for Tonasket, but other areas remain in immediate danger from the fires. Gary DeVon/staff photo

Since the first of the fires, Nine Mile, started on Thursday, Aug. 13, there have been several evacuations declared, including of the towns of Tonasket, Conconully, Twisp and in the Aeneas Valley, Pine Creek and Tunk areas. Currently the Level 3 evacuation, which was declared on Thursday, Aug. 20 in Tonasket, has dropped to a Level 1, according to Tonasket Mayor Patrick Plumb, who has been keeping his town updated through the Facebook page, Tonasket, Washington, Stuff You Should Know.

"There's been some grumbling about the Level 3 evacuation of town, but I've talked to the DNR and many of them said the fire outside of Tonasket was acting in a way they'd never seen before," said Mayor Plumb. "When you get firefighters with this kind of experience and the reports they were getting, you understand why the call was made.

"The EOC was prudent… I'd rather have people alive to gripe than dead because we didn't evacuate. We lost no homes in Tonasket, but the numbers lost elsewhere, if you heard them they'd make you cry. I believe this is going to be much worse than the Carlton in terms of homes lost."

Plumb added, "I think the Tonasket firefighters and heavy equipment operators who did the back burn a couple of days ago eliminated the danger to our town."

The mayor went on to applaud the efforts of the firefighters, both on hand lines and local citizen volunteers, as well as all those that have been helping with those that had to evacuate from the areas around Tonasket, as well as local businesses in Tonasket, Loomis and Oroville who have opened their doors to help the community. He wasn't so charitable with the traditional national aid organizations.

"Our local people, some of them put their health on the line driving through smoke to lend a hand to people who lost homes. The national organizations have done little to help, but the locals have really come through," Plumb said.

As of Tuesday, Stage 3 evacuations are still in effect for all of Aeneas Valley.The area northeast of Nespelem is still under Level 3 evacuations with the addition of South Nanamkin Creek north to the…

A Level 1 evacuation order is an alert to people about the potential danger and evacuations are voluntarry, Level 2 means to get ready and evacuate to friends or a shelter outside the fire danger area; those choosing to stay should be ready to leave at a moments notice and Level 3 means to leave immediately.

Suppression efforts in the Okanogan Complex made good progress Monday even though heavy smoke impaired visibility and air support was unable to operate. While the high level inversion kept fire activity somewhat subdued there were many areas of high fire activity.

Tunk Block Fire: The fire was active on the north end where work was done on an indirect line along the northwest side. On the northeast side efforts were successful in keeping the fire out of the Aeneas Valley. A spot fire along the Omak Lookout Road was successfully lined; crews patrolled the road throughout the day. Direct line construction around the south end tied lines together and crews started to strengthen them and patrol. Highway 155 is open, we ask the public to be cautious when driving as fire crews are still operating in the area.

The Lime Belt, Blue Lake, and Beaver Lake Fires: There continues to be active fire, particularly in the northeast corner and the Wright Mountain area where the fires continue to merge. Crews worked to construct indirect line between the two fingers west of Wright Mountain; other crews looked for ways to go direct and minimize fire growth. Direct line was constructed in the Conconully area as structure protection continued.

Twisp River Fire: Lines on the north, east, and south, continue to hold. Crews and dozers tied the line together on the west side and began burnout operations to solidify the line.

Nine Mile Fire: The fire is 95 percent contained and remains in monitor status.

Night Shift: The fire is expected to have pockets of active burning. Priorities for the night shift are focused on structure protection at numerous locations around the fire. Particular attention will be paid to structures along Highways 20 and 155, the B&O and Columbia River Roads, Tonasket, and along Salmon Creek.

Weather: The Red Flag warning is still in effect; and active fire may occur where valleys are aligned with the winds. Smoke will continue to be heavy throughout the night as the high level inversion persists. Winds will be variable. Firefighters and the public are cautioned to be aware if they experience difficult breathing and take steps to minimize exposure and seek medical help.

Evacuations and Closures The public is encouraged to contact the Okanogan Emergency Operations Center to learn how to register for automated phone messages in the event of evacuation notices being issued for particular neighborhoods. Contact emergency staff at 509-422-7348 or the Colville Tribal Emergency Management Center at 507-634-2105.

North Star Fire on Colville Reservation

The nearby North Star Fire, located 12 miles north of Nespelem on the Colville Reservation is listed as three percent contained and 150,000 acres.

The fire showed little growth Monday as it expanded to 150,000 acres. Fire behavior was variable throughout the day, generally backing, flanking and occasional torching within the perimeter. Helicopters continued providing water drops for crews around Nespelem to strengthen fire perimeter lines. An anchor point has been established on the southeast edge of the fire, near Owhi Flats, using direct line tactics to protect communities to the south. Fire managers assessed road systems and conducted burnout operations where feasible. Crews continued protection of critical communications sites and reinforced firelines to enhance community protection. Structure assessment continued in the surrounding areas.

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**About Gary DeVon**

Gary DeVon is the managing editor of the Okanogan Valley Gazette-Tribune and celebrated his 25th year at the newspaper in August 2012. He graduated from Gonzaga University with a degree in Communications - Print Journalism, with an emphasis in photojournalism. He is a proud alumnus of Oroville High School. His family first settled in Okanogan County in the late 1800s. His parents are Judy DeVon and the late Larry DeVon and he has two younger brothers - Dante and Michael. Many family members still call Oroville home. He has a grown daughter, Segornae Douglas and a young granddaughter, Erin.

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- ○ Build a new Justice Complex to replace existing juvenile security facility with the needed space and private meeting areas.
- ○ House juveniles at Martin Hall, a maximum security facility at Medical Lake (about 3 hours away)

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# After A Bad Fire Season, Okanogan County Looks The Other Way On Land Use

By ROWAN MOORE GERETY (/PEOPLE/ROWAN-MOORE-GERETY) • DEC 10, 2015

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*A makeshift memorial honors three young firefighters that died when their truck veered off Twisp River road.*

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Drive through this vast landscape of sagebrush and pine forests with Lorah Waters, and she'll point out the scars of wildfire all around you: scorched hillsides and razed homes from this summer's Okanogan Complex fires, and gradual re-growth from burns in 2012 and 2014. "Last year, everything to the South, North, and East was on fire--this was a little bit of a donut hole in the Carlton Complex," Waters says, pointing out the window.

Waters has lived in Okanogan County for fifteen years, and she works with local groups on planning and land use in the county. She says it's hard to change the basic equation of wildfire here, because "The whole county is high-risk. And so, simply saying that you shouldn't build near the forest isn't adequate. We want to live here. There are gonna be people in the hills."

What you can do, she says, is try to control how people build, by pushing for fire-resistant building materials and access roads that are safe for firefighters. To see just what impact this can have, we drive up a steep, winding dirt road where three firefighters died this summer when they veered off the road fleeing a blaze above them. "I guess you could just put yourself in a firefighter's shoes trying to go up this road, or you think about two trucks trying to pass each other on a road like this," Waters says, as her station wagon squeezes past a van making its way down.

A wooden cross and a firefighter's hardhat form a makeshift memorial in a gully beside the road. It's impossible say whether a wider road could have averted this tragedy. But Waters says the county is full of roads and housing developments that were not built with fires or firefighters in mind. "Developers came in and bought up these ranches, sold off these one and 2.5 acre parcels, and created this mess of access," Waters says. "They're just little mazes--a number of them have no exit, and so firefighters are scared about going in there."

In the aftermath of the Carlton Complex fire in 2014, Okanogan County was re-writing its planning and zoning documents. But not much changed where wildfire's concerned: in much of the county, you can build five houses to the acre without a well that supplies enough water to put a fire out; and you can build houses in the middle of the woods without clearing the brush and dead trees around them.

County Commissioner Jim Detro says that is as it should be: "I'm not gonna tell you you should put a metal roof on your house, but it would make sense if you did. There are people that want their own little piece of property and they don't want anyone to touch it or tell them how to do anything with it."

That fiercely independent streak runs deep in politics here, along with the view that regulation is bad for economic growth. But economist Ray Rasker says that's the wrong way to think of managing wildfire risk. "In the short term, it seems like that's restricting development, but in the long term, what you actually see are homes that are safer, lower insurance costs," Rasker says. "And in the end, you don't see the county's tax base going up in flames, because the ultimate goal is to build a subdivision that can withstand a wildfire."

As it stands, Rasker says the incentives for development in areas prone to wildfire are out of whack. "When you read in the news that the federal agencies are spending up to $3 billion a year fighting fires, what they're really spending money on is defending private property from fires. Another way to say that is that the federal taxpayer pays for the land use decisions of local government."

As more and more people continue to flock to rural parts of the West, firefighting costs are projected to grow even more. "So you could look at it as a problem, or you could see it as an opportunity," Rasker says: more than 80% of the land in the Wildland Urban interface—where private property meets public forest land—is still undeveloped.

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CHARLENE MATTICS
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IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON
IN AND FOR THE COUNTY OF OKANOGAN

| | |
|---|---|
| METHOW VALLEY CITIZENS' COUNCIL and FUTUREWISE,<br><br>Petitioners/Plaintiffs,<br><br>vs.<br><br>OKANOGAN COUNTY,<br><br>Respondent/Defendant | NO. 15-2-00005-7<br><br>ORDER DENYING CROSS MOTIONS FOR SUMMARY JUDGMENT AND/OR DISMISSAL |

THIS MATTER came before the Court on December 17, 2015 on the cross motions of both parties for summary judgment and/or dismissal. Mr. Tim Trohimovich, Attorney at Law, represented Methow Valley Citizen's Council and Futurewise and Mr. Alexander Mackie and Mr. Albert Lin, Attorneys at Law, represented Okanogan County. At the conclusion of the hearing, the Court asked both parties to prepare what they deemed appropriate proposed orders and file them by January 15, 2016. Having now reviewed the submissions of both the petitioners and respondent and the record herein, the Court declines to adopt either party's order and instead denies the cross motions.

For purposes of CR 56(h), the record before the Court consisted of the following:



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| Document | Party | Date |
|---|---|---|
| Complaint and Petition for Judicial Review Under RCW 36.70C; Petition for Declaratory Judgment Under RCW 7.24; Petition for Declaratory Judgment Under Article IV, Section 6 of the Washington State Constitution; Petition for Writ of Certiorari Under RCW 7.16; Petition for Writ of Certiorari Under Washington Constitution, Article IV, Section 6 | MVCC/ Futurewise | January 9, 2015 |
| Answer and Affirmative Defenses of Okanogan County | Okanogan County | January 22, 2015 |
| Two volume record of proceedings - Tabs 1-65 | | April 10, 2015 |
| Stipulation Supplementing the Record | MVCC/ Futurewise | May 18, 2015 |
| Methow Valley Citizens' Council's and Futurewise's Petitioners'/Plaintiffs' Opening Brief | MVCC/ Futurewise | June 1, 2015 |
| Okanogan County's Motion to Dismiss All Non SEPA-Related Claims | Okanogan County | July 2, 2015 |
| Memorandum in Support of Okanogan County's Motion to Dismiss All Non SEPA-Related Claims | Okanogan County | July 2, 2015 |
| Okanogan County's Response Brief Re SEPA Issues Pursuant to RCW 7.16.030 et. seq,; Writ of Review | Okanogan County | July 2, 2015 |
| Methow Valley Citizens' Council's and Futurewise's Petitioners'/Plaintiffs' Reply Brief and Answer to Motion to Dismiss | MVCC/ Futurewise | July 15, 2015 |
| Methow Valley Citizens' Council's and Futurewise's Petitioners'/Plaintiffs' Amended Opening Brief | MVCC/ Futurewise | September 15, 2015 |
| State of Washington, Department of Ecology Motion for Leave to File Amicus Curiae Brief | Washington State Dept. of Ecology | September 24, 2015 |
| State of Washington, Department of Ecology Amicus Curiae Brief | Washington State Dept. of Ecology | September 24, 2015 |

| Document | Party | Date |
|---|---|---|
| Stipulation of Respondent Okanogan County for State of Washington Department of Ecology's Motion for Amicus Curiae | Okanogan County | October 2, 2015 |
| Agreed Order | Judge Rawson | October 2, 2015 |
| Okanogan County's Reply Brief to Department of Ecology's Amicus Brief | Okanogan County | October 30, 2015 |
| Declaration of Perry Huston in Support of Okanogan County's Reply Brief to Department of Ecology's Amicus Brief | Okanogan County | October 30, 2015 |
| Okanogan County's Motion to Supplement Record, and materials attached | Okanogan County | November 16, 2015 |
| Declaration of Perry Huston in Support of Okanogan County's Motion to Supplement Record | Okanogan County | November 16, 2015 |
| Second Stipulation Supplementing the Record, and materials attached | MVCC/ Futurewise | November 18, 2015 |
| Stipulation to Supplement Record, and materials attached | Okanogan County | December 29, 2015 |

## DECISION

It would be overly simplistic to say that because there are cross motions before the Court there must automatically be issues of fact and thus summary judgment is inappropriate. That is not the case. After considering the extensive record and the arguments of counsel, in truth there are factual issues that warrant denial of both parties' motions. And while it is not necessary for purposes of summary judgment, a brief explanation of the Court's decision is appropriate.

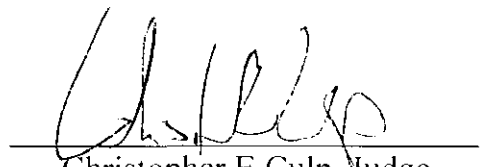
The record establishes that Okanogan County in 2014 began the process of updating its comprehensive plan with adoption of a new plan and interim zoning ordinance. Pending development and adoption of a permanent zoning ordinance, the interim ordinance essentially maintains the plan previously in place and adopted by the board of county commissioners in 1964. The final regulatory program to implement the new plan is now a work in progress and will be set forth in a last zoning ordinance.

Summary judgment for plaintiffs is not appropriate because, as they state in their proposed findings at page 2, a "Comprehensive Plan" is only a "beginning step" in planning for the physical development of the county. RCW 36.70.020(6). Until the final product is known there are necessarily questions involving genuine issues of material fact about what provisions it will contain and whether those comply with state law. Any ruling now would preclude consideration of the final zoning ordinance.

Likewise, the county is not entitled to dismissal as three property owners present genuine issues of material fact regarding potential adverse effects of the comprehensive plan on water wells they have. Among other things, the trier of fact will have to determine whether the final zoning ordinance protects their rights by including provisions adequate to protect the quality and quantity of ground water.

The cross motions for summary judgment are denied.

DATED this 11th day of March, 2016.



Christopher E Culp, Judge

# Septic Tank Density and Ground-Water Contamination

by Marylynn V. Yates[a]

## ABSTRACT

As more and more cases of ground-water contamination are reported, the public has become increasingly aware of the importance of preserving the quality of this limited resource, especially in areas totally dependent on ground-water sources. Although most of the attention is focused on pollution by organic chemicals, these compounds are responsible for a relatively small percentage of ground-water-related disease outbreaks. The majority of waterborne disease outbreaks are caused by bacteria and viruses present in domestic sewage. Septic tanks contribute the largest volume of waste water, 800 billion gallons per year to the subsurface, and are the most frequently reported cause of ground-water contamination associated with disease outbreaks. The U.S. Environmental Protection Agency has designated areas with septic tank densities of greater than 40 systems per $mi^2$ (1 system per 16 acres) as regions of potential ground-water contamination. Numerous cases of ground-water contamination have been reported in areas of high septic tank density; lot sizes in these areas range from less than one-quarter acre to three acres. The single most important means of limiting ground-water contamination by septic tanks is to restrict the density of these systems in an area.

## INTRODUCTION

Ground-water supplies over 100 million Americans with their drinking water. In rural areas, there is an even greater dependence on ground water, as 90 to 95% of the drinking water used is ground water (Bitton and Gerba, 1984). The increasing dependence on ground water as a source of potable water has spurred efforts to protect the quality of this limited resource.

Septic tank leachate is the most frequently reported cause of ground-water contamination. In 1970, 29% of the United States' population disposed of their domestic waste through individual onsite disposal systems (U.S. Environmental Protection Agency, 1977). This represents approximately 19.5 million single units, almost 17 million of which are septic tanks or cesspools. While the relative percentage of new homes using septic tanks has decreased over the past several years, the total number of septic tanks is increasing at a rate of about one-half million per year (Scalf, Dunlap, and Kreissl, 1977).

It has been estimated that the total volume of waste disposed of via septic tanks is approximately 800 billion gallons per year, virtually all of which is disposed in the subsurface (U.S. Environmental Protection Agency, 1977). This makes septic tanks the leading contributor to the total volume of waste water discharged directly to ground water.

The consumption of untreated or inadequately treated ground water was responsible for over one-half of all the waterborne outbreaks and 45% of all cases of waterborne disease in the United States from 1971 to 1979 (Craun, 1984). Over one-half of the outbreaks occurred in noncommunity systems, 96% of which use ground water, although more cases of illness resulted from outbreaks in community systems (systems that serve at least 15 service connections used by year-round

[a]R. S. Kerr Environmental Research Laboratory, P.O. Box 1198, Ada, Oklahoma 74820.

Received January 1985, revised March 1985, accepted April 1985.

Discussion open until March 1, 1986.

**Table 1. Etiology of Waterborne Disease in the United States, 1971-1979 (Craun, 1984)**

| *Disease* | *Outbreaks (%)* |
|---|---|
| Acute gastrointestinal illness | 55 |
| Chemical poisoning | 11 |
| Giardiasis | 11 |
| Shigellosis | 8 |
| Hepatitis A | 6 |
| Salmonellosis | 3 |
| Viral gastroenteritis | 2 |
| Typhoid | 2 |
| Toxigenic *E. coli* gastroenteritis | <1 |
| *Campylobacter* gastroenteritis | <1 |

residents or that regularly serve at least 25 year-round residents). Outbreaks in individual systems, which depend primarily on ground-water sources, accounted for only 1% of the cases of illness. This may not accurately reflect the actual number which occur, as outbreaks in individual systems are usually not recognized or reported.

Etiologic agents were determined in 45% of the outbreaks (Table 1). Only 11% were caused by toxic chemicals; the vast majority were caused by pathogenic (disease-causing) microorganisms. The remainder were classified as acute gastrointestinal illness of unknown etiology. It is believed that many of these were caused by viruses such as the Norwalk virus or rotaviruses (Gerba, 1983), for which detection methods have only recently become available.

Overflow or seepage of sewage from septic tanks or cesspools was responsible for 43% of the outbreaks and 63% of the cases of illness caused by the use of untreated, contaminated ground water. Thus, septic tanks represent a significant threat not only to preserving the potability of ground water, but also to human health.

## SEPTIC TANKS AND WATERBORNE DISEASE

There have been several waterborne disease outbreaks attributable to the contamination of ground water with septic tank effluent. Approximately 1,200 people in a town of 6,500 developed acute gastroenteritis, probably due to *Shigella sonnei,* in a two-month period (Craun, 1981). An epidemiological study showed that illness was associated with the consumption of tap water. Further investigation revealed that one of the community's two wells had high levels of fecal coliform bacteria (indicators of fecal pollution by warm-blooded animals). The source of contamination was found, using a dye tracer, to be a church septic tank located approximately 150 ft from the well. A breakdown in the city's chlorinator had resulted in the distribution of 1 million gallons of contaminated water to the community, causing the large outbreak.

An outbreak of 98 cases of hepatitis A (infectious hepatitis) in Arkansas was traced to the use of commercial pellet ice (Craun, 1979). The water used to make the ice, as well as the ice itself, was found to be heavily contaminated with fecal coliform bacteria. A dye study traced the contamination to a septic tank leach field serving a home occupied by persons who had recently had infectious hepatitis.

Another outbreak of hepatitis A resulted from the contamination of an 11- to 180-ft deep limestone formation overlain by 3 ft of glacial till (Vogt, 1961). Well depths ranged from 30 to 100 feet, and most wells were cased through the glacial till and a short distance into the rock. The drinking water well of the first reported case was located 6 ft from the septic tank. Two other wells were located 10 ft away. Four weeks later, 16 individuals from the three households served by these wells became ill within a three-day period. The outbreak was preceded by a period of snowmelt and heavy rainfall, suggesting that virus-contaminated effluent was carried to the drinking water aquifer.

In 1972, five cases of typhoid occurred in a residential area in Washington (Craun, 1979). An epidemiological investigation revealed that a typhoid carrier lived in the area. When a dye was flushed through the septic system of his home, it was detected 36 hours later in several wells in the area, including the ill family's well, which was located 210 ft away. *Salmonella typhi,* the causative agent of typhoid, was isolated from this well water.

A Norwalk-like agent was responsible for over 400 cases of gastroenteritis at a resort camp in Colorado (Craun, 1984). Over one-half of the persons visiting the camp developed diarrhea at the camp or within one week of leaving it. It was found (using dye tracers) that the camp tap water was contaminated with effluent from a septic tank located 50 ft above the spring supplying the camp.

An echovirus was isolated from a 40-ft deep well during an outbreak of gastrointestinal illness in Florida (Wellings *et al.,* 1977). The well was located 100 ft from a solid waste field in the middle of an area bordered by septic tanks. The virus was isolated from sewage, well water, and stools of individuals living in the camp. In addition,

six weeks later, an outbreak of 15 cases of hepatitis A occurred in the same camp.

## SEPTIC TANK DENSITY

As stated earlier, septic tanks are the largest contributors of waste water to the subsurface. Several features of septic tank systems can contribute to their potential to contaminate ground water. These include: improper construction, siting, installation, and maintenance of the septic tank; depth to water; climate; and geology of the site. However, the most important factor influencing ground-water contamination from onsite waste disposal systems is the density of systems in an area (U.S. Environmental Protection Agency, 1977). Using data obtained from the 1970 Census of Housing, the density of onsite waste disposal systems was mapped on a county-by-county basis. Three density ranges were identified: low (less than $10/mi^2$), intermediate (10 to $40/mi^2$), and high (greater than $40/mi^2$). The U.S. Environmental Protection Agency (1977) has designated areas with a septic tank density of greater than $40/mi^2$ (1 per 16 acres) as regions of potential contamination problems.

Controlling the density of septic tanks is generally done at the local government level, although State governments are becoming more involved in the regulation of septic tank siting. Most States regulate septic tank placement by imposing setbacks, minimum percolation rates, and absorption field sizing restrictions. These may be adequate to protect the ground-water quality in areas with low densities of septic tanks; however, when the density increases, the soil's capacity to purify the septage may be overcome, increasing the potential for ground-water contamination.

There are a few States which have laws regulating septic tank density by prescribing a minimum lot size necessary in order for a septic tank installation permit to be issued. These States are listed in Table 2.

## SEPTIC TANK DENSITY AND GROUND-WATER CONTAMINATION

In the past, the generally recognized minimum lot size for septic tank placement in areas not served by municipal sewerage has been about 0.47 acres (Reneau, 1979). This standard has been based on engineering considerations rather than on concern for preserving the quality of the environment (Perkins, 1984). Although data on septic tank density in areas of waterborne disease outbreaks are practically nonexistent, many cases of ground-water contamination have been found in areas of high septic tank density. Following are a few examples.

### Colorado

The water quality of three mountain communities in Jefferson County, Colorado which utilize individual onsite waste disposal systems was studied (Hall, 1978). Homes were located on 1.5- to 3-acre lots underlain by fractured crystalline

**Table 2. Minimum Lot Size Requirements for Septic Tanks**

| *State* | *Lot size (acres)* | *Comments* |
|---|---|---|
| Alabama (Pate, 1977) | 0.34 | |
| Maine (Toppan, 1977) | 0.46 | |
| Minnesota (Lee, 1980) | 0.46 - 1.84 | Only on lakefront property. |
| Mississippi (State statute 41-67-7) | 0.40<br>0.46 | If public water supply.<br>If private water supply. Well must be at least 50 ft from the tank and 100 ft from the disposal field. |
| Montana (Commission, 1974) | 0.23<br>0.46 | No well on property.<br>Well on property. |
| Nevada (State statute 444.650) | 0.25<br>1.00 | If public water supply.<br>If private water supply. |
| Washington (Plews, 1977) | 0.29 | Subdivisions or multiple housing units. |

rock aquifers. Water samples were collected from 30 wells and analyzed for several pollution indicators. Elevated nitrate levels were found, as were total and fecal coliforms. Ford *et al.* (1980) found that increased nitrate concentrations (over 45 mg/l) in the ground water were associated with increased housing density (more than one residence per acre) in unsewered areas of this same county.

### Delaware

Two areas were chosen to study the problem of ground-water contamination by septic tanks (Miller, 1972). The first area was one mile square, with homes on one-quarter to one-half-acre lots. Each home had a septic tank and a shallow well (13 to 35 ft deep). The area was selected because of the high water table, poorly-drained soils, and reports of overflowing septic tanks during rainy periods. The second area was chosen as a result of reports of high (greater than 45 mg/l) nitrate levels in the drinking water. This area was 0.75 $mi^2$, had deeper wells (35 to 70 ft), and well-drained soils. Houses were on one-quarter to one-half-acre lots.

The results of the study in the first area showed that nitrate levels averaged 6.9 to 11 mg/l, and coliforms were detected in the wells. Nitrate levels in the second area ranged from 22 to 136 mg/l, with many of the wells exceeding the drinking water standard of 45 mg/l. Low-nitrate levels in the water in the first area could have been due to the fact that anaerobic conditions existed which would inhibit nitrogenous compounds such as ammonia and urea from being oxidized to nitrate.

One conclusion reached by Miller was that percolation tests are not necessarily the best means of determining the suitability of a site for a septic tank system, especially if performed during the dry season. Another recommendation was that, to decrease the potential for ground-water contamination, the regulation allowing two 4-bedroom homes to occupy a one-acre lot be changed to allow one 4-bedroom home per two-acre lot.

### Massachusetts

The U.S. Geological Survey conducted a study of ground-water quality in 17 small (less than 1 $mi^2$) drainage basins of the Ipswich and Shawsheen Rivers in a suburban area north of Boston (Morrill and Toler, 1973). The areas were all served by public water supplies, but none had municipal sewers. Housing density ranged from 0 to 900 units per $mi^2$. Chloride and specific conductance were used as indicators of contamination by domestic sewage. The concentration of chloride in the septic tank effluent was 50 ppm higher than in the public water supply. The investigators showed a correlation between the relationship of housing density to residual conductance, and the accretion of dissolved solids in the baseflow of streams.

### New Mexico

Extensive pollution of drinking water wells has resulted from septic tank effluent in the middle Rio Grande Basin (Wright, 1975). It was estimated that there are over 16,000 septic tanks in a 30-mile stretch of the river. Due to the sandy and gravelly nature of the soil, the effluent is not adequately purified before it reaches the relatively shallow aquifer, thereby contaminating the drinking water.

### New York

Ground-water contamination has been demonstrated in Nassau County, Long Island, which has over 100,000 septic tank systems (Miller, Deluca, and Tessier, 1974). Nitrates, mainly from septic tanks and fertilizers, have penetrated hundreds of feet into an artesian aquifer. Several public water supply wells were found to have nitrate levels exceeding the drinking water standard of 45 mg/l. A survey of the streams in the area revealed that ground-water-fed streams averaged 11 mg/l nitrate in sewered areas and 25 mg/l in unsewered areas, suggesting that septic tanks are a significant contributor to the problem of nitrate contamination of the ground water.

### North Carolina

Elevated nitrate and chloride concentrations were found in the well water of several subdivisions using septic tank systems in Raleigh, North Carolina (Miller, Hackenberry, and DeLuca, 1977). Most of the homes were on lots ranging from one-quarter to over one-half acre in size. The wells were 100 to 200 ft deep, and drilled into fractured granites, schists, and gneisses. Although nitrate levels were not above standards, the increase in concentration above background was confirmed to be caused by septic tank contamination.

## DEVELOPING REGULATIONS TO CONTROL SEPTIC TANK DENSITY

As the importance of safeguarding the quality of the nation's water supply has become widely recognized, standards regarding septic tank placement are being changed. According to the Farmer's Home Administration, many counties and States

are increasingly providing rural zoning ordinances or laws that limit the use of septic tanks to 2- to 10-acre lots (Rose, 1978).

Several approaches can be taken in developing regulations regarding septic tank density with the goal of preserving ground-water quality. One of these is to impose minimum lot size requirements larger than those which have been found to be associated with ground-water contamination. Another is to evaluate each potential site individually, taking into consideration the geologic characteristics of the site and methods of waste disposal being practiced in the surrounding area. A third approach would be to calculate the amount of dilution of the effluent that is required before it reached the ground water to minimize the pollution potential. For example, based on measured nitrate concentrations of the septic tank effluent in an area of eastern Connecticut, it was calculated that the effluent would have to be diluted at least one to one before reaching the water table to reduce nitrate concentrations to the drinking water standard of 45 mg/l in permeable soils with deep water tables (Holzer, 1975). It was calculated that the density would have to be limited to one residence per acre on well-drained sites in areas covered by till to achieve the desired dilution.

Several mathematical models have been developed which can be used to predict the extent of ground-water contamination; these have been reviewed by Perkins (1984). These models allow input of specific local characteristics such as the hydraulic conductivity of the aquifer, rainfall, and evaporation. Using the drinking water standard for the desired contaminant, the lot size required to meet that standard is then computed.

While these models can provide useful information, it must be kept in mind that in any mathematical model, assumptions are made which may not be valid for every individual case. In addition, most models of contaminant movement are valid only for chemical substances such as nitrate and chloride.

Very few models exist on the movement of bacteria and viruses in the subsurface, although they are the major causes of waterborne disease in the United States. There have been a few studies which have actually followed the movement of bacteria and viruses from septic tanks to ground water. From the results of these studies, summarized in Table 3, it is apparent that pathogenic microorganisms in domestic waste water can survive in septic tanks, migrate through the leach field, and reach ground water.

**Table 3. Virus Movement from Septic Tanks**

| *Site* | *Virus detection* |
|---|---|
| New Mexico | 11 ft from source in 15 ft-deep well (Hain and O'Brien, 1979). |
| New York | 213 ft from source in sandy soil (Vaughn *et al.*, 1983). |
| Texas | 82 ft from source in well (Wang *et al.*, 1981). |
| Wisconsin | 175 ft from source 12 days after introduction into septic tank (Stramer, 1984). |
| Wisconsin | In wells up to 131 days after introduction into septic tank (Stramer, 1984). |

Recently, information regarding the factors which control the length of time viruses can survive in ground water has been obtained (Yates, 1984). These data, along with hydrogeologic information such as hydraulic conductivity, porosity, and hydraulic gradient, will be used in a model to predict virus movement in the subsurface. The model can then be used to predict safe distances between drinking water wells and sources of contamination such as septic tanks.

## CONCLUSIONS

1. Septic tanks are the major contributors of waste water to the subsurface.
2. Over one-half of the waterborne disease outbreaks in the United States are due to the consumption of contaminated ground water; septic tanks are the most frequently reported cause of contamination.
3. The most important factor influencing ground-water contamination by septic tanks is the density of systems in an area.
4. Several cases of ground-water contamination have been reported in areas of high septic tank densities; lot sizes in these areas range from less than one-quarter to three acres.

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*Marylynn V. Yates received her Ph.D. in Microbiology from the University of Arizona. She also has an M.S. in Chemistry from New Mexico Institute of Mining and Technology, and a B.S. in nursing from the University of Wisconsin-Madison. Currently, she is a postdoctoral research associate in the Departments of Microbiology and Immunology and Chemistry at the University of Arizona, Tucson, Arizona.*

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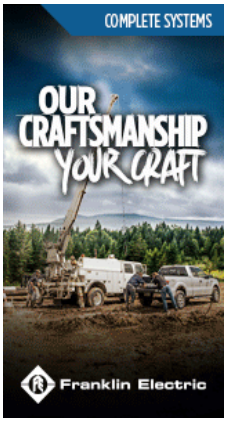


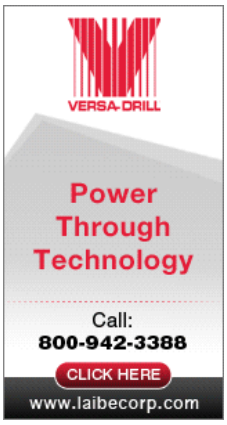

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# Septic System Density and Infectious Diarrhea in a Defined Population of Children

*Mark A. Borchardt,[1] Po-Huang Chyou,[1] Edna O. DeVries,[2] and Edward A. Belongia[1]*

[1]Marshfield Medical Research Foundation and [2]Department of Pediatrics, Marshfield Clinic, Marshfield, Wisconsin, USA

**One-quarter of U.S. households use a septic system for wastewater disposal. In this study we investigated whether septic system density was associated with endemic diarrheal illness in children. Cases—children 1 to < 19 years old seeking medical care for acute diarrhea—and controls resided in the Marshfield Epidemiologic Study Area, a population-based cohort in central Wisconsin. Enrollment was from February 1997 through September 1998. Study participants completed a structured interview, and septic system density was determined from county sanitary permits. Household wells were sampled for bacterial pathogens and indicators of water sanitary quality. Risk factors were assessed for cases grouped by diarrhea etiology. In multivariate analyses, viral diarrhea was associated with the number of holding tank septic systems in the 640-acre section surrounding the case residence [adjusted odds ratio (AOR), 1.08; 95% confidence interval (CI), 1.02–1.15; $p$ = 0.008], and bacterial diarrhea was associated with the number of holding tanks per 40-acre quarter-quarter section (AOR, 1.22; 95% CI, 1.02–1.46; $p$ = 0.026). Diarrhea of unknown etiology was independently associated with drinking from a household well contaminated with fecal enterococci (AOR, 6.18; 95% CI, 1.22–31.46; $p$ = 0.028). Septic system densities were associated with endemic diarrheal illness in central Wisconsin. The association should be investigated in other regions, and standards for septic systems should be evaluated to ensure that the public health is protected.** ***Key words:*** **communicable diseases, diarrhea, drinking water, sanitation, water microbiology.** ***Environ Health Perspect*** **111:742–748 (2003). doi:10.1289/ehp.5914 available via *http://dx.doi.org/* [Online 17 January 2003]**

Acute infectious diarrhea remains a common illness in the United States, particularly among young children, the age group most susceptible to gastrointestinal infections. Children < 5 years old experience 1.3–2.3 mild diarrhea episodes per year, and approximately 220,000 children < 6 years old are hospitalized annually with severe diarrhea (Glass et al. 1991). Diarrheal illness accounts for 10% of all hospitalizations in this age group (Glass et al. 1991).

One major reservoir of human enteropathogens in the environment is private onsite wastewater treatment systems (i.e., septic systems). Septic systems process wastewater from approximately 25 million rural and suburban households, or one-quarter of all households in the nation (U.S. Bureau of the Census 1993). More than a trillion gallons of wastewater pass through these systems each year, according to the U.S. Environmental Protection Agency (U.S. EPA 1977). Effluent is released directly into the land subsurface, where enteric microorganisms are removed by soil filtration and adsorption. However, depending on environmental conditions, the effectiveness of this process may be limited. Laboratory and field studies have documented that bacteria and especially viruses can be transported rapidly through the soil profile and contaminate groundwater, where they can move horizontally hundreds of meters and survive up to several months (Bitton and Harvey 1992; Gerba and Bitton 1984; Hagedorn 1984; Jansons et al. 1989; Scandura and Sobsey 1997; Vaughn et al. 1983; Woessner et al. 2001; Yates and Yates 1988). Enteropathogens can also be released unintentionally on top of the land surface when a septic system malfunctions because of age or neglect.

Septic systems remain a common method of wastewater disposal as the U.S. population continues to expand into rural and suburban areas not served by municipal sewers. Septic systems have been implicated in disease outbreaks (Beller et al. 1997; Craun 1979, 1981, 1984; McGinnis and DeWalle 1983; Vogt 1961; Yates 1985), but their role as a transmission source of endemic diarrhea is unknown. People living in rural central Wisconsin are potentially exposed to enteropathogens from a type of septic system called a holding tank. Holding tanks are used where the soil is unsuitable for disposing effluent from a septic drain field. Unlike a conventional septic system, a holding tank is a sealed concrete vault that prevents the release of wastewater and stores it until it is removed by a licensed waste hauler. However, in central Wisconsin, improper discharge of wastewater from holding tanks by homeowners has been reported to be common (Popelka 1994). To assess the role of septic systems, particularly holding tanks, as risk factors for acute infectious diarrhea, we conducted a case–control study of children living in a defined population of central Wisconsin. Because groundwater may be one transmission route for septic system pathogens, we also investigated case and control household wells for pathogen occurrence and assessed indicators of water sanitary quality as diarrhea risk factors.

## Methods

***Study population.*** The study population included children living in the Marshfield Epidemiologic Study Area (MESA), a dynamic cohort of all persons living in 14 contiguous zip codes around Marshfield, Wisconsin (Figure 1) (DeStefano et al. 1996). Nearly all MESA residents receive their medical care from Marshfield Clinic and its regional network, and their medical records are computerized and linked to the MESA residency database. The MESA population denominator is continuously updated. As of 1 February 1997, the MESA population was 58,466, including 15,681 children 1–18 years old. Approximately half the residents lived in a municipality, and the remainder lived in the surrounding rural area without municipal sewer or water. Approximately half of MESA residents were enrolled in a health maintenance organization at the time of the study.

The research protocol was reviewed and approved by the Institutional Review Board of Marshfield Clinic, and informed consent was obtained from the parents of all participants. The specific hypothesis concerning septic systems was not disclosed to participants or their parents.

***Case ascertainment and enrollment.*** The enrollment period extended from February 1997 through September 1998. Children with acute diarrhea were identified by health care providers when a child sought medical treatment, and by research coordinators daily reviewing appointment records and diagnosis codes [based on *International Classification of Diseases*, 9th revision (ICD-9 1995)]. Parents of potentially eligible children were contacted during their clinic visit or as soon as possible thereafter.

Address correspondence to M. Borchardt, Marshfield Medical Research Foundation, 1000 North Oak Ave., Marshfield, WI 54449 USA. Telephone: (715) 389-3758. Fax: (715) 389-3808. E-mail: borchardt.mark@mmrf.mfldclin.edu

We thank the staff of Planning and Zoning offices of Clark, Marathon, and Wood counties, Wisconsin.

This project was supported by the Wisconsin Department of Commerce and Marshfield Clinic. The study team included D. Kempf, J. Treutel, K. Konitzer, L. Wittman, N. Herr, L. Ziegelbauer, R. Vierkant, P. Bertz, S. Spencer, A. Witte, and A. Stargardt.

The authors declare they have no conflict of interest.

Received 26 July 2002; accepted 16 January 2003.

Children living in MESA were eligible to participate if they were between 1 and < 19 years old on the date of enrollment and they had three or more loose, watery stools in a 24-hr period. Children with < 24 hr of diarrhea or diarrhea lasting more than 21 days at the time of enrollment were not eligible. We excluded children with immunosuppressive conditions, chronic or recurrent diarrhea (based on parent report), or antibiotic use during the 48 hr before onset. Only the first case in each household was enrolled.

***Determination of etiologic agents.*** Stool specimens from case children were collected within a few days after enrollment (median elapsed time, 1 day; 95% of specimens collected within 5 days) and hand-delivered to Marshfield Clinic. Cultures were performed to identify *Salmonella*, *Shigella*, *Escherichia coli* O157:H7, *Campylobacter* species, and *Yersinia enterocolitica* using standard media and biochemical screens (Murray et al. 1995). *Cryptosporidium* oocysts and *Giardia* cysts were identified using the Merifluor direct immunofluorescence assay (Meridian Diagnostics, Cincinnati, OH). Rotavirus and adenovirus 40/41 antigens in stool were detected by enzyme immunoassays (Premier Rotaclone and Premier Adenoclone, type 40/41; Meridian Diagnostics). Tests for caliciviruses were unavailable.

***Selection of controls.*** Controls were randomly selected every 2 weeks from the MESA population to maintain a 1:2 ratio of cases to controls. They were frequency matched to cases enrolled in the preceding 2-week period based on sex and age group (1–4 years, 5–11 years, and 12–18 years). Frequency matching was employed to ensure that the age and sex distributions of cases and controls were similar, but the analysis of risk factors was performed without individual matching. Cases and controls were enrolled and frequency matched in 2-week time blocks to ensure the same seasonal distribution of enrollment. Selected controls were contacted by letter and then telephoned to confirm eligibility and request their participation. Controls were excluded if they had diarrhea (same definition as cases) within 30 days before their interview.

***Septic system risk factors.*** The septic system density surrounding each case and control residence was determined for three geographic scales corresponding to conventional land survey units: section (640 acres, 259 hectares), quarter section (160 acres, 64.75 hectares), and quarter-quarter section (40 acres, 16.19 hectares). These land survey units are square and defined by fixed lines established under the federal Public Land Survey System (U.S. Bureau of Land Management 1973). The choice of these three land survey units as the denominators for septic system density was made *a priori* before statistical analysis. Septic system data were obtained from public records of property taxes and sanitary permits. Case and control addresses were merged with property tax records to find the corresponding parcel identification number (PIN). The PIN specified actual property location by section, quarter section, and quarter-quarter section. Case and control PINs were merged with property tax records to identify all property in the same land survey units. Property listings with improved valuation < $10,000 were excluded because these were unlikely to include houses or other buildings with septic systems. PINs were linked with sanitary permits, which have been required for installation or renovation of septic systems since approximately 1980. Permits were excluded if the system was closed or an inspection had not been performed (i.e., system had not been used). If there were multiple permits for renovations at the same property, only the most recent permit was included.

Septic systems were classified as holding tanks, nonholding tanks ≤ 20 years old, and nonholding tanks > 20 years old. Nonholding tanks included conventional septic drain fields, Wisconsin mound systems, privies, and a few experimental sand filters. Twenty years is the approximate functional life span of a septic drain field. Properties without a sanitary permit (i.e., septic systems installed before the permit requirement implemented in 1980) were categorized as nonholding tank septic systems > 20 years old, because holding tanks were uncommon before 1980. Systems installed after the date of enrollment for each participant were excluded. Case and control subjects who resided in a village or city with municipal sewer were assigned a septic system density of zero at all three geographic scales.

***Household water quality.*** Household water quality was determined for all case and control households with private wells, usually within 1 week after enrollment. Four-liter samples were aseptically collected by a study technician and filtered, and cultures were performed to identify *Salmonella*, *Shigella*, *E. coli* O157:H7 (Greenberg et al. 1992), and *Y. enterocolitica* (Schiemann 1982). A separate 1-L sample was analyzed for *Campylobacter* (Korhonen and Martikainen 1990). Water samples were also analyzed for standard indicator organisms of sanitary quality. Total coliforms were measured by two chromogenic substrate assays performed in parallel, Colilert (IDEXX, Portland, ME) and Colisure (Millipore Corp., Bedford, MA). Both assays also detect *E. coli*, and a sample was classified as positive for total coliform or *E. coli* if either assay was positive. Fecal enterococci were detected by a separate chromogenic substrate assay, Enterolert (IDEXX).

***Telephone interview.*** Parents of case and control children completed a structured telephone interview with questions pertaining to demographic information and disease symptoms and 68 questions covering potential risk factors or confounders for acute diarrhea (Appendix). Environmental and dietary exposures were ascertained for the 5-day period before onset of symptoms (case children) or the 5 days before the interview (control children). Source of drinking water (municipal, private well, or bottled water) and method of wastewater disposal (municipal sewer or septic system) were also determined in the interview. The median elapsed time between the clinical encounter and telephone interview was 2 days; controls were interviewed at the time of the initial phone call seeking their participation.

***Statistical analysis.*** The Wilcoxon rank sum test was used to test for median differences in continuous variables between cases and controls. Univariate odd ratios and *p*-values were calculated using unconditional logistic regression (Breslow and Day 1980). Independent variables with a *p*-value < 0.15 were eligible to be selected in a stepwise (both forward selection and backward elimination) multiple logistic regression model. Regression models were created using all cases and controls and for specific subgroups based on the results of stool tests: bacterial, viral, and *Cryptosporidium* infections and diarrhea of unknown etiology. Each subgroup of cases was compared with the entire group of control children to identify significant associations. Because the study protocol used frequency matching, these analyses were performed without individual matching of cases and controls. Variables with a *p*-value < 0.05 were retained in the final multivariate logistic regression models. Interaction effects were evaluated for the retained risk factors. All regression models were assessed for goodness of fit. Adjusted population attributable risks (PARs) were estimated for risk factors that were significantly associated with each pathogen subgroup based on stepwise regression modeling, and 95% confidence intervals (CI) for covariate-adjusted PARs were obtained by bootstrapping (Bruzzi et al. 1985; Efron and Tibshirani 1993;

**Figure 1.** Location of MESA (shaded region), where the study was conducted.

Kahn and Sempos 1989). All statistical analyses were performed using SAS version 6.12 (SAS Institute, Cary, NC) (SAS 1990).

## Results

A total of 188 eligible case children were identified during the study period, and 160 (85%) agreed to participate. Seven (4%) case children were excluded because they failed to complete the questionnaire ($n$ = 2), were taking immunosuppressive medications ($n$ = 2), or lived in households where a sibling had been previously enrolled ($n$ = 3). Four hundred eight control households were contacted, and 316 (78%) agreed to participate. Of these, 42 children (13%) were excluded because they were immunosuppressed ($n$ = 2), had diarrhea during the past 30 days ($n$ = 33), or were enrolled as a case child or lived in the same household with a case child ($n$ = 7).

Case ascertainment was evaluated by reviewing an age-stratified sample of 196 medical encounters for children living in MESA who had any of 39 ICD-9 diagnosis codes corresponding to acute diarrhea or gastroenteritis during the enrollment period. Of the 196 encounters, 89 (45%) appeared to meet the eligibility criteria based on the clinical note, and 31 (35%; 95% CI, 25–46) of these were enrolled in the study. The distributions of age, sex, and zip code (Marshfield vs. other) were similar for enrolled and nonenrolled children.

***Demographic and clinical characteristics.*** The median age of the 153 case children was 2.2 years, compared with the median age of 3.7 years among 274 controls ($p$ = 0.03). Eighty-six case children (56%) and 153 controls (56%) were male. Similar proportions of case and control subjects lived in rural households with private wells and septic systems (Table 1). The median duration of diarrhea was 7 days (range, 1–16 days), and the median maximum number of loose stools was 6 per 24 hr (range, 3–30 per 24 hr). Fever and vomiting were common during the acute illness. Of 153 case children, 130 (85%) submitted a stool specimen. The most commonly identified pathogens were *Cryptosporidium*, *Campylobacter* species, and rotavirus. No pathogen was identified in more than half the specimens (Table 1). None of the specimens was positive for *Shigella*, *Yersinia*, or *Giardia*.

***Household water quality.*** Tap water was analyzed for 191 (90%) of 212 case and control households with private wells. Forty-four wells (23%) were positive for total coliform, seven (4%) were positive for fecal enterococci, two (1%) were positive for *E. coli*, and one well had a putatively pathogenic bacterium, *Yersinia intermedia*. None of the wells sampled was positive for *Campylobacter*, *Salmonella*, *Shigella*, or *E. coli* O157:H7.

***Risk factor analysis.*** For all cases analyzed as a single group, diarrheal illness was not associated with septic system density, source of drinking water, or sanitary quality of the household well. Because transmission factors may vary for different pathogens, subanalyses were conducted for different etiologic groups. Cases of *E. coli* O157:H7, *Salmonella*, and *Campylobacter* infection were grouped together as bacterial infections ($n$ = 20); rotavirus and adenovirus 40/41 cases were classified as viral ($n$ = 18), and *Cryptosporidium* cases were analyzed as a separate subgroup ($n$ = 16). Cases with no identified pathogen were classified as diarrhea of unknown etiology ($n$ = 76). Cases within each etiologic subgroup were enrolled throughout the study period without any evidence of significant seasonal clustering.

In univariate analyses, diarrheal illnesses of viral and bacterial etiologies were associated with septic system densities of several classifications based on type, age, and geographic scale (Table 2). The *Cryptosporidium* and unknown etiologic groups were not associated with septic system densities. Diarrheal illnesses of viral, bacterial, and unknown etiologies were marginally associated with drinking water source, and the unknown etiologic group was also associated with drinking from a private well positive for fecal enterococci (Table 3). *Cryptosporidium* infections were not associated with any risk factors related to drinking water. Viral, bacterial, and unknown etiology groups were also associated with a number of behavioral, dietary, and lifestyle variables ($p$ < 0.15) in the univariate analysis (data not shown). These variables were considered potential independent risk factors for diarrheal illness or potential confounders with the septic system risk factors and, as such, were included in the stepwise multiple logistic regression modeling to identify independent significant predictors for each etiologic group.

In multivariate analysis, viral diarrhea was independently associated with the number of holding tanks in the same section (640-acre block) as the residence (Table 4). The median holding tank density for controls and viral diarrhea cases residing in rural areas without municipal sewer was 3.0 and 7.0 holding tanks per section, respectively (range, 0–50 holding tanks per section for each group). Viral diarrhea was also independently associated with younger age and living in a household where another person had diarrhea during the previous 4 weeks (Table 4).

Bacterial diarrhea was independently associated with the number of holding tanks in the quarter-quarter section (40-acre block) of the residence (Table 4). The median holding tank density in areas without municipal sewer was 1 (range, 0–15) per quarter-quarter section for case children with bacterial diarrhea, and 0 (range, 0–15) per quarter-quarter section for controls. Bacterial diarrhea was also independently associated with a child entering a calf hutch or pen. No interactions between holding tank density and other risk factors were detected for either bacterial or viral etiologic groups.

**Table 1.** Characteristics of the study population.

| Characteristics | Cases ($n$ = 153) No. | Cases ($n$ = 153) Percent[a] | Controls ($n$ = 274) No. | Controls ($n$ = 274) Percent |
|---|---|---|---|---|
| Male | 86 | 56 | 153 | 56 |
| Age group | | | | |
| 12–23 months | 67 | 44 | 58 | 21 |
| 24–59 months | 51 | 33 | 143 | 52 |
| 5–11 years | 17 | 11 | 37 | 14 |
| 12–18 years | 18 | 12 | 36 | 13 |
| Attended group child care | 66/122 | 54 | 97/203 | 48 |
| Drinking water source | | | | |
| Municipal water | 75 | 49 | 135 | 49 |
| Private well | 71 | 46 | 134 | 49 |
| Bottled water | 7 | 5 | 5 | 2 |
| Household wastewater system | | | | |
| Septic system | 68 | 44 | 121 | 44 |
| Municipal sewer | 85 | 56 | 153 | 56 |
| Symptoms | | | | |
| Fever | 80/148 | 54 | | |
| Vomiting | 77/152 | 51 | | |
| Abdominal pain | 84/126 | 67 | | |
| Bloody stool | 19/148 | 13 | | |
| Diarrhea etiology[b] | | | | |
| *Cryptosporodium parvum* | 16 | 12 | | |
| *Campylobacter* | 11 | 8 | | |
| Rotavirus | 11 | 8 | | |
| *Salmonella* spp. | 7 | 5 | | |
| Adenovirus 40/41 | 7 | 5 | | |
| *E. coli* O157:H7 | 2 | 2 | | |
| No pathogen identified | 76 | 58 | | |

[a]Percentages were calculated with $n$ as denominator unless noted. [b]Etiology was reported for 130 case children who submitted stool samples.

To avoid potential confounding due to differences between city and noncity populations, we conducted an additional analysis of risk factors for viral and bacterial diarrhea after excluding cases and controls with municipal sewer. In the original multivariate models these participants were assigned a septic system density of zero. In the new analysis, viral diarrhea was marginally associated with holding tank density per section [7 cases, 111 controls; adjusted odds ratio (AOR), 1.32; 95% CI, 0.99–1.75; $p = 0.06$] and inversely associated with age (AOR, 0.019; 95% CI, 0.0006–0.644; $p = 0.03$), but it was no longer associated with recent diarrhea in a household member (AOR, 10.64; 95% CI, 0.31–367.77; $p = 0.19$). Bacterial diarrhea was marginally associated with the number of holding tanks per quarter-quarter section (13 cases, 111 controls; AOR, 1.12; 95% CI, 0.99–1.46; $p = 0.07$) but remained associated with entering a calf hutch or pen (AOR, 10.6; 95% CI, 2.75–40.81; $p < 0.001$).

Multivariate analysis demonstrated that drinking water source was not independently associated with diarrhea of unknown etiology (data not shown). The analysis was then restricted to the subset of case and control households with a private well (30 cases, 121 controls) to assess whether drinking from a private well positive for fecal enterococci was independently associated with this etiologic group. The subanalysis showed that among households with a private well, two risk factors were independently associated with diarrhea of unknown etiology: Household member had diarrhea during the previous 4 weeks and private well was positive for fecal enterococci (Table 4).

The fecal enterococci test was the only microbial indicator of water sanitary quality that was significantly associated with diarrheal illness. A positive total coliform test, the most frequently used indicator of water sanitary quality, was not associated with diarrheal disease as a single group, nor was it associated with any of the etiologic subgroups in univariate analyses. Only two wells were positive for *E. coli*, too few to determine associations of this indicator with disease outcome.

***PAR estimates.*** The adjusted PAR was estimated for the variables that were significantly positively associated with each etiologic subgroup, assuming that there was a causal relationship between the risk factor and diarrhea event (Table 5). To calculate PAR, it was necessary to categorize holding tank density as a dichotomous exposure variable. For viral diarrhea, the exposure threshold was ≥ 6 holding tanks per section (≥ 90th percentile of the holding tank density distribution of the controls), resulting in an AOR of 3.76 ($p = 0.029$). For bacterial diarrhea, the threshold was ≥ 1 holding tank per quarter-quarter section (≥ 75th percentile of the density distribution of the controls), resulting in an AOR of 2.17 ($p = 0.145$). On the basis of these thresholds and after adjusting for other risk factors, it was estimated that 20% of viral diarrhea and 19% of bacterial diarrhea were attributable to a holding tank density. Among the subset of children who drank from a private well, it was estimated that 11% of diarrhea of unknown etiology was attributable to wells positive for fecal enterococci.

## Discussion

This observational study identified septic system density as a risk factor for sporadic cases of viral and bacterial diarrhea in central Wisconsin children. The risk of viral diarrhea illness increased by 8% for every additional holding tank per section (640 acres), and the risk of developing bacterial diarrhea increased by 22% for every additional holding tank per quarter-quarter section (40 acres). Density is a continuous variable; therefore, the AORs are expressed per unit change in density. Holding tank density was highly correlated with the density of other septic system types, and the relative contribution of other septic systems versus holding tanks could not be assessed. Thus, the observed associations may be due in part to the parallel effect of other septic systems. The associations identified in the univariate analyses between viral or bacterial diarrhea and other types of septic systems suggest that this parallel effect is possible. Septic systems are a recognized source of enteropathogens, but we believe this is the first study to assess residential proximity to septic systems as a risk factor for enteric infections.

Because this was a case–control study, the observed disease associations do not necessarily represent causal relationships. Septic system density may be a surrogate for rural residential density, and unmeasured confounders unique to the rural environment may explain the observed associations between diarrheal illness and holding tanks. For example, residents of higher-density neighborhoods (e.g., subdivisions) in rural areas may have higher levels of education and/or income, and this may increase the likelihood of seeking medical care for diarrheal illness. Socioeconomic data were not collected in the present study, so these factors were not assessed for potential confounding. Population density was unlikely to be a confounder in this study because case and control households in municipalities, where

**Table 2.** Univariate associations between septic system densities and viral or bacterial diarrhea in children.

| Septic system type and density scale[a] | Bacterial diarrhea ($n = 20$)[b] | | | Viral diarrhea ($n = 18$)[b] | | |
|---|---|---|---|---|---|---|
| | OR[c] | 95% CI | *p*-Value | OR[c] | 95% CI | *p*-Value |
| All systems | | | | | | |
| Section | 1.022 | 0.984–1.062 | 0.258 | 1.033* | 0.998–1.069* | 0.067* |
| Quarter section | 1.062* | 0.986–1.144* | 0.113* | 1.078* | 1.007–1.154* | 0.030* |
| Quarter-quarter section | 1.153* | 0.992–1.341* | 0.064* | 1.177* | 1.015–1.365* | 0.031* |
| Holding tanks | | | | | | |
| Section | 1.030 | 0.979–1.084 | 0.253 | 1.049* | 1.003–1.098* | 0.038* |
| Quarter section | 1.062 | 0.967–1.166 | 0.211 | 1.076* | 0.983–1.177* | 0.113* |
| Quarter-quarter section | 1.148* | 0.968–1.362* | 0.112* | 1.146* | 0.963–1.365* | 0.126* |
| All nonholding tanks[d] | | | | | | |
| Section | 1.033 | 0.947–1.128 | 0.464 | 1.036 | 0.951–1.128 | 0.422 |
| Quarter section | 1.222* | 0.959–1.558* | 0.101* | 1.218* | 1.013–1.464* | 0.036* |
| Quarter-quarter section | 1.272 | 0.827–1.957 | 0.274 | 1.390* | 0.960–2.013* | 0.081* |
| Nonholding tanks ≤ 20 years old | | | | | | |
| Section | 0.691 | 0.253–1.886 | 0.471 | 1.502* | 0.998–2.262* | 0.051* |
| Quarter section | 0.854 | 0.151–4.819 | 0.859 | 2.528* | 1.125–5.684* | 0.025* |
| Quarter-quarter section | 0[e] | —[e] | 0.980 | 4.292* | 1.426–12.911* | 0.009* |
| Nonholding tanks > 20 years old | | | | | | |
| Section | 1.043 | 0.952–1.142 | 0.370 | 1.025 | 0.933–1.127 | 0.605 |
| Quarter section | 1.249* | 0.972–1.606* | 0.082* | 1.199* | 0.991–1.451* | 0.061* |
| Quarter-quarter section | 1.328 | 0.869–2.031 | 0.190 | 1.259 | 0.812–1.950 | 0.304 |

OR, odds ratio.
[a]The land survey units of section, quarter section, and quarter-quarter section correspond to 640, 160, and 40 acres, respectively. [b]274 controls. [c]Septic system density was analyzed as a continuous variable. OR was calculated per additional septic system per land survey unit. [d]Nonholding tanks include conventional septic drain fields, Wisconsin mound systems, privies, and experimental sand filter systems. [e]Unable to perform complete maximum likelihood iteration. *Variable met statistical significance criterion for inclusion in multivariate model.

**Table 3.** Univariate associations between diarrhea etiology and drinking water–related factors found eligible for stepwise multiple regression modeling (i.e., factors with $p < 0.15$).

| Etiology | Factor | OR | 95% CI | *p*-Value |
|---|---|---|---|---|
| Viral[a] ($n = 18$) | Household uses Marshfield municipal water | 2.08 | 0.80–5.42 | 0.134 |
| Bacterial[a] ($n = 20$) | Household uses private well | 2.44 | 0.91–6.67 | 0.076 |
| Unknown[a] ($n = 76$) | Household uses Marshfield municipal water | 1.60 | 0.95–2.68 | 0.078 |
| | Private well positive for fecal enterococci[b] | 6.05 | 1.28–28.68 | 0.023 |

OR, odds ratio.
[a]274 controls. [b]Analysis restricted to cases ($n = 30$) and controls ($n = 121$) living in a household with a private well.

population density is greatest, had a septic system density of zero. When municipal households were excluded from the analysis, holding tank density remained a predictor of viral and bacterial diarrhea, although statistical significance was reduced, probably because of smaller sample size.

The associations between viral or bacterial diarrhea and septic system density are biologically plausible. Holding tanks constitute approximately one-third of all private septic systems in the study area. Properly managed holding tanks do not release effluent to the environment, but county sanitarians in central Wisconsin estimate that as many as 40% of all holding tanks have some illegal surface discharge (Popelka 1994). When water use was estimated for all households with holding tanks in Wood County, Wisconsin, and compared with the volume of wastewater reportedly pumped in the year 2000, 40 million gallons of wastewater were unaccounted for and presumably released untreated to the environment (G. Popelka. Personal communication). The region used in this study overlaps approximately one-half of Wood County.

Conventional septic systems could also be a transmission source of enteric pathogens. Properly functioning septic drain fields may allow viruses to reach groundwater (Alhajjar et al. 1988; DeBorde et al. 1998), and when a drain field fails, it discharges to the land surface, allowing people to be potentially exposed to untreated fecal wastes. There are more than 700,000 septic systems in Wisconsin, and 133,000 (19%) are conventional drain fields that were constructed before 1970 and are likely failing because of age and design limitations (WDC 1998).

Enteric bacteria and viruses in groundwater can be transported long distances and survive for months (Bitton and Harvey 1992; Gerba and Bitton 1984; Hagedorn 1984; Jansons et al. 1989; Scandura and Sobsey 1997; Vaughn et al. 1983; Woessner et al. 2001; Yates and Yates 1988). Bacteria are significantly larger and tend to move shorter distances than do viruses. This is consistent with the finding that bacterial diarrhea was associated with holding tank density expressed at the smallest scale investigated (40 acres), whereas viral diarrhea was associated at the largest scale (640 acres). Diarrhea of unknown etiology was not associated with septic system density, which is difficult to explain if this etiologic subgroup contained mostly viruses. However, different virus types can vary widely in their abilities to survive and be transported in the environment, depending on their size, isoelectric point, and other physical characteristics (Bitton and Harvey 1992; Dowd et al. 1998; Gerba and Bitton 1984; Yates and Yates 1988), so there is no reason necessarily to expect the viral and unknown etiologic subgroups to be similarly associated with septic system density.

Consumption of well water was not a likely transmission route of bacterial infection from nearby septic systems in this study, because bacterial pathogens were not isolated from the wells of case households, although contamination may have been sporadic. We did not test well water for the presence of viral pathogens, so the potential role of groundwater consumption as a source of viral diarrhea is unknown. Another potential transmission route was via direct or indirect exposure to septic system effluent released to the land surface in the vicinity of case households. We have observed houses in central Wisconsin where untreated holding tank effluent is piped to a nearby open ditch. Children could have possibly contacted effluent indirectly through toys, pets, or vectors, especially given the low infectious dose of many enteric pathogens. Further research is needed to assess these potential sources of transmission.

The total coliform test is the standard indicator for gauging the risk of disease transmission from drinking water. This indicator has limitations because coliform bacteria may originate from nonfecal sources, and the test does not correlate with all waterborne diseases (Craun et al. 1997; Payment et al. 1993). In this study, children who drank from private wells that were coliform positive were not at increased risk for diarrheal disease. However, children who drank from private wells that were positive for fecal enterococci had 6-fold greater odds of becoming ill with diarrhea of unknown etiology. The etiologic agents in this subgroup likely included human caliciviruses, because these viruses have been responsible for several groundwater-related outbreaks (Beller et al. 1997; Lawson et al. 1991; McAnulty et al. 1993; Taylor et al. 1981), and most nonbacterial gastroenteritis outbreaks in the United States are due to caliciviruses (Fankhauser et al. 1998). Other studies have also shown that fecal enterococci in drinking water or recreational water is associated with gastrointestinal illnesses (Dufour 1984; Fleisher et al. 1993; Moe et al. 1991).

The PAR estimates suggest that eliminating the holding tank risk factor would prevent some sporadic diarrhea in central Wisconsin. This risk factor may account for up to one-fifth of viral and one-fifth of bacterial diarrheal illnesses. Drinking from a well positive for fecal enterococci may account for 11% of diarrhea of unknown etiology. Although the PAR for drinking contaminated groundwater estimated in this study was based on a small number of cases, it does provide an initial estimate of the potential burden of endemic diarrheal disease attributable to private wells. More than 15 million households in the United States use a private well for drinking water (U.S. Bureau of the Census 1993), and approximately half the drinking water disease outbreaks in the United States each year are due to contaminated groundwater (Barwick et al. 2000; Craun 1992; Herwaldt et al. 1991; Kramer et al. 1996; Levy et al. 1998; Moore et al. 1993). However, the fraction of endemic diarrhea attributable to groundwater is unknown. In the only other estimate of attributable risk for drinking water, Payment et al. (1991) found that 35% of gastrointestinal illnesses among

**Table 4.** Multivariate independent risk factors for diarrhea based on etiology.[a]

| Etiology | Risk factor | AOR | 95% CI | *p*-Value |
|---|---|---|---|---|
| Viral ($n = 18$)[b] | Number of holding tanks in same 640-acre section (per additional tank) | 1.08 | 1.02–1.15 | 0.008 |
| | Household member had diarrhea in past 4 weeks | 5.04 | 1.70–14.95 | 0.004 |
| | Age (per year) | 0.66 | 0.47–0.92 | 0.015 |
| Bacterial ($n = 20$)[b] | Number of holding tanks in same 40-acre quarter-quarter section (per additional tank) | 1.22 | 1.02–1.46 | 0.026 |
| | Entered calf hutch or pen | 12.74 | 4.67–34.72 | < 0.001 |
| Unknown ($n = 30$)[c] | Private well positive for fecal enterococci | 6.18 | 1.22–31.46 | 0.028 |
| | Household member had diarrhea in past 4 weeks | 4.06 | 1.66–9.94 | 0.002 |

[a]AORs were determined using stepwise multiple logistic regression models. Variables with a univariate $p$-value < 0.15 were eligible for inclusion in each model, and variables with a $p$-value < 0.05 were retained in the final model. [b]274 controls. [c]121 controls; analysis restricted to cases and controls living in a household with a private well.

**Table 5.** Adjusted PAR for risk factors independently associated with diarrhea etiologic subgroups.

| Etiology | Risk factor | Percent cases exposed | Adjusted PAR (%) | 95% CI |
|---|---|---|---|---|
| Viral ($n = 18$)[a] | Number of holding tanks in same 640-acre section (≥ 6 vs. 0–5) | 28 | 20 | 2–42 |
| | Household member had diarrhea in past 4 weeks | 39 | 31 | 10–53 |
| Bacterial ($n = 20$)[a] | Number of holding tanks in same 40-acre quarter-quarter section (≥ 1 vs. 0) | 35 | 19 | 0–39 |
| | Entered calf hutch or pen | 55 | 50 | 28–72 |
| Unknown ($n = 30$)[b] | Private well positive for fecal enterococci | 13 | 11 | 2–23 |
| | Household member had diarrhea in past 4 weeks | 43 | 33 | 14–50 |

[a]274 controls. [b]121 controls; analysis restricted to cases and controls living in a household with a private well.

residents of a suburb of Montreal, Canada, were attributable to municipal treated water derived from a river.

Several methodologic limitations should be considered when interpreting the results of this study. The study was conducted in a rural area where holding tanks comprise a large proportion of septic systems. The results may not be generalizable to areas with different proportions of septic system types. A large number of variables were examined in this study, increasing the potential for spurious associations. Because of the nature of the geographic data, all residences within the same land survey unit were classified as having the same septic system density, although for those households located near the outer perimeter of a land survey unit the actual density may have differed. Selection bias may have occurred by enrolling only those children with diarrhea who were seeking medical treatment. Finally, the subgroup analyses were based on relatively few cases, suggesting that the reported AORs and PARs could be overestimated.

Many regions of the United States have higher septic system densities than does central Wisconsin. In this study, the highest septic system density was 56 per square mile. Of 472 census tracts in 16 counties surrounding Atlanta, Georgia, 98 tracts have septic system densities > 100 per square mile, and in Suffolk County, New York, 6 census tracts exceed 2,000 septic systems per square mile (U.S. Bureau of the Census 1993). The U.S. EPA has suggested that densities of conventional septic drain fields > 40 per square mile (i.e., section) may result in groundwater contamination (U.S. EPA 1977). As of 1999, 31 states were reviewing the adequacy of their septic system codes (NSFC 1999). In addition, the U.S. EPA is preparing to promulgate the Groundwater Rule, a set of measures intended to reduce disease transmission from the more than 158,000 public groundwater systems in the nation (U.S. EPA 2000). The results of the present study support the public health importance of these activities and demonstrate a need for further research regarding septic systems and groundwater as sources of endemic diarrhea in rural and suburban populations.

**Appendix.** Categories of behavioral, dietary, and lifestyle factors investigated as potential independent risk factors for acute diarrhea or confounders with septic system density.

- Person-to-person transmission
  - Daycare attendance
  - Recent diarrhea in daycare children
  - Recent diarrhea in family members
- Travel
  - Travel outside the United States
  - Destination
- Dietary history
  - Raw milk
  - Other dairy products and eggs
  - Meat and poultry
  - Salad items and fruits
  - Home garden produce
  - Undercooked foods
  - Meal locations
- Pets
  - Contact with dogs, cats, or reptiles
  - Recent diarrhea in pets
- Farm activities
  - Farm resident or farm visitor
  - Type of farm
  - Kinds of livestock and poultry
  - Number of animals
  - Contact with young animals
  - Direct or indirect manure exposures
  - Recent diarrhea in livestock
- Recreational water activities
  - Swim in lake, pond, or river
  - Swallow untreated water
- Drinking water and sewage disposal
  - Drinking water source
  - Bottled water consumption
  - Quantity of water consumed
  - Sewage system type

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# SCIENCE-BASED LAND-USE PLANNING TOOLS TO HELP PROTECT GROUND-WATER QUALITY, CEDAR VALLEY, IRON COUNTY, UTAH

by Mike Lowe, Janae Wallace, and Walid Sabbah, Utah Geological Survey
and Jason L. Kneedy, Chesapeake Energy

SPECIAL STUDY 134
UTAH GEOLOGICAL SURVEY
*a division of*
UTAH DEPARTMENT OF NATURAL RESOURCES
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***Cover photo:*** *View of Cedar City from Right Hand Canyon Road above the "C" on Lone Tree Mountain looking northwest.*

ISBN 978-1-55791-836-9

**SPECIAL STUDY 134**
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**2010**

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# SCIENCE-BASED LAND-USE PLANNING TOOLS TO HELP PROTECT GROUND-WATER QUALITY, CEDAR VALLEY, IRON COUNTY, UTAH


## ABSTRACT

Cedar Valley, Iron County, is a semi-rural area in southwestern Utah that is experiencing an increase in residential development. Whereas much of the development is on community sewer systems, many subdivisions use septic tank soil-absorption systems for wastewater disposal. Many of these septic-tank systems are on basin-fill deposits that are the principal aquifer for the area. The purpose of our study is to provide tools for water-resource management and land-use planning. In this study we (1) map ground-water recharge and discharge areas for the basin-fill aquifer to indicate where ground-water resources are most vulnerable to surface sources of pollution, (2) classify the ground water quality in the basin-fill aquifer to formally identify and document the beneficial use of ground water resources, and (3) apply a ground-water flow model using a mass balance approach to determine the potential impact of projected increased numbers of septic tank systems on water quality in the basin-fill aquifer and thereby recommend appropriate septic-system density requirements to limit water-quality degradation.

The Cedar Valley basin-fill aquifer consists primarily of Tertiary to Quaternary alluvial sediments composed of discontinuous, lenticular, commonly elongated, poorly to well-sorted bodies of sand, clay, gravel, and boulders, interbedded with lava flows and some lacustrine, eolian, and volcaniclastic deposits. The basin fill may be as much as 3900 feet (1190 m) thick in the eastern part of Cedar Valley. Ground water in the Cedar Valley basin-fill aquifer occurs under confined, unconfined, and perched conditions.

Ground-water recharge areas include the fractured bedrock surrounding the valley, and basin fill along the valley margins, which typically consists of coarse, granular, permeable sediments deposited primarily in alluvial fans, where ground water is generally under unconfined conditions. The basin-fill aquifer is generally under leaky confined conditions in the central, lower elevation areas of the valley where water-yielding coarser grained deposits are overlain by or contain intervening beds of low-permeability silt and clay. Upward ground-water gradients in the central, lower elevation areas of Cedar Valley were once sufficient to supply flowing wells that covered an approximate area of 50 square miles (130 $km^2$) in central Cedar Valley in 1939, but due to ground-water pumpage, no flowing wells have existed in Cedar Valley since 1975. This central part of the valley, which contains fine-grained confining layers greater than 20 feet (6 m) thick and where ground water now generally has a downward vertical head gradient, is mapped as a secondary recharge area. Although some wells in the confined part of the basin-fill aquifer have an upward vertical head gradient, they are sporadically distributed and are not mapped as a discrete ground-water discharge area.

Utah's ground-water quality classes are based mostly on total-dissolved-solids (TDS) concentrations as follows: Class IA (Pristine), less than 500 mg/L; Class II (Drinking Water Quality), 500 to less than 3000 mg/L; Class III (Limited Use), 3000 to less than 10,000 mg/L; and Class IV (Saline), 10,000 mg/L and greater. Cedar Valley ground water is Class IA (80% of basin; primarily in central and western parts of valley), Class II (19%; primarily in eastern part of valley), and Class III (1%; an area of persistent nitrate contamination northwest of Cedar City) based on chemical analyses of water from 119 wells sampled during 1974–2000. Total-dissolved-solids concentrations range from 184 to 2190 mg/L. Nitrate-as-nitrogen concentrations in the basin-fill aquifer range from 0.06 to 57.4 mg/L, and average 7.59 mg/L.

Nitrogen in the form of nitrate is one of the principal indicators of pollution from septic tank soil absorption systems. To provide recommended septic-system densities, we used a mass-balance approach in which the nitrogen mass from projected additional septic tanks is added to the current nitrogen mass and then diluted with ground water flow available for mixing plus the water added by the septic tank systems themselves. Ground water available for mixing was calculated using a regional, three-dimensional, steady-state, ground-water flow model. Our ground-water flow indicates that two categories of recommended maximum septic-system densities are appropriate for development using septic tank soil-absorption systems for wastewater disposal: 5 and 15 acres per system (2 and 6 $hm^2$/system). These recommended maximum septic-system densities are based on hydrogeologic parameters incorporated in the ground-water flow simulation and the modeled area was divided into three ground-water flow domains based on flow-volume similarities; a

fourth domain was assigned to northern Cedar Valley due to insufficient data.

# INTRODUCTION

Cedar Valley (figure 1), Iron County, is a semi-rural area in southwestern Utah that is experiencing an increase in residential development. Whereas much of the development is on community sewer systems, many subdivisions use septic tank soil-absorption systems for wastewater disposal. Many of these septic-tank systems are on basin-fill deposits that are the principal aquifer for the area. Preservation of ground-water quality and the potential for ground-water quality degradation are critical issues that should be considered in determining the extent and nature of future development in Cedar Valley. Local government officials in Cedar Valley have expressed concern about the potential impact that development may have on ground-water quality, particularly development that uses septic tank soil-absorption systems for wastewater disposal. Local government officials would like to formally identify ground-water recharge areas and current ground-water quality to provide a basis for defendable land-use regulations to protect ground-water quality; they would also like a scientific basis for determining recommended densities for septic-tank systems as a land-use planning tool.

## Purpose and Scope

The purpose of our study is to provide land-use planners with science-based tools for approving new development in a manner that will protect ground-water quality. To accomplish this purpose we (1) delineate ground-water recharge areas for the basin-fill aquifer to determine where the aquifer is most vulnerable to surface sources of pollution, (2) classify the ground water quality of the basin-fill aquifer to formally identify and document the beneficial use of ground water resources, and (3) apply a ground-water flow model using a mass balance approach to determine the potential impact of projected increased numbers of septic tank systems on water quality in the basin-fill aquifer, and thereby recommend appropriate septic-system density requirements to limit water-quality degradation.

### Ground-Water Recharge Area Delineation

The purpose of recharge-area mapping is to delineate the relative vulnerability of the basin-fill aquifer to potential surface sources of contamination based on the presence or absence of confining layers and vertical head gradient. In this study, we used the methods of Anderson and others (1994; see also Anderson and Susong, 1995) as modified by Lowe and Snyder (1996) and Snyder and Lowe (1998) for identifying confining layers, and delineating recharge and discharge areas for basin-fill aquifers; much of the text in this section is from Snyder and Lowe (1998). To delineate recharge and discharge areas, we evaluated both the principal aquifer (figure 2) and local overlying shallow unconfined aquifers. The principal aquifer is the most important source of ground water, and may be confined or unconfined. The principal aquifer begins at the mountain front along the valley margins where coarse-grained alluvial-fan sediments predominate and ground water is generally unconfined. Away from bedrock exposures, fine-grained silt and clay may form confining layers above and within the principal aquifer. Water in sediments above the upper confining layer is in a shallow unconfined aquifer. Shallow unconfined aquifers are generally not an important source of drinking water.

We used drillers' logs of water wells to delineate primary and secondary recharge areas and discharge areas, based on the presence or absence of confining layers and relative water levels in the principal and shallow unconfined aquifers. Well-log information is summarized in appendix A. The use of drillers' logs requires interpretation because of the variable quality of the logs. Correlation of geology from well logs is difficult because lithologic descriptions prepared by various drillers are generalized and commonly inconsistent. Use of water-level data from well logs is also problematic because levels in the shallow unconfined aquifer are commonly not recorded, and because water levels were measured during different seasons and years.

Confining layers are defined as any fine-grained (clay and/or silt) layer thicker than 20 feet (6 m) (Anderson and others, 1994). Some logs note both clay and sand in the same interval, with no information describing relative percentages; these are not classified as confining layers (Anderson and others, 1994). If both clay and sand are checked and the word "sandy" is written in the remarks column, then the layer is assumed to be a predominantly clay confining layer (Anderson and others, 1994). Some drillers' logs show clay together with gravel, cobbles, or boulders; these units are also not classified as confining layers, although in some areas in Utah layers of clay containing gravel, cobbles, or boulders function as confining layers.

The primary recharge areas for the principal aquifer are the bedrock uplands surrounding and within the valley, and basin fill lacking thick clay layers, generally along valley margins (figure 3). Ground-water flow in primary recharge areas has a downward component. If present, secondary recharge areas exist where clay layers are thicker than 20 feet (6 m) and the hydraulic gradient is downward. Areas of secondary recharge extend toward the valley center until the hydraulic gradient is upward (figure 3). The hydraulic gradient is upward where the potentiometric surface of the principal aquifer is higher than the water table in the shallow unconfined aquifer (Anderson and others, 1994). Water-level data for the shallow uncon-

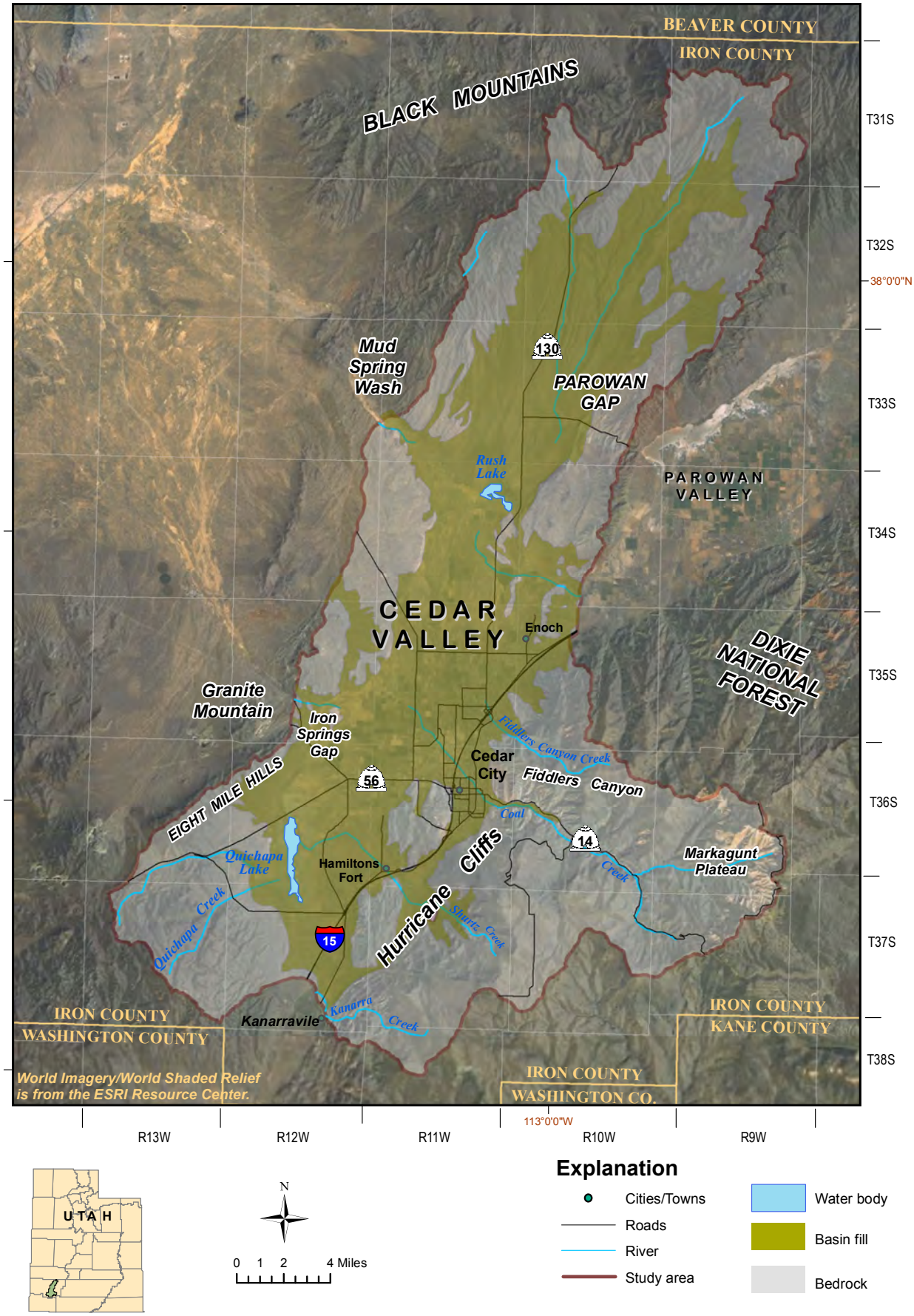


***Figure 1.*** *Location of Cedar Valley study area.*

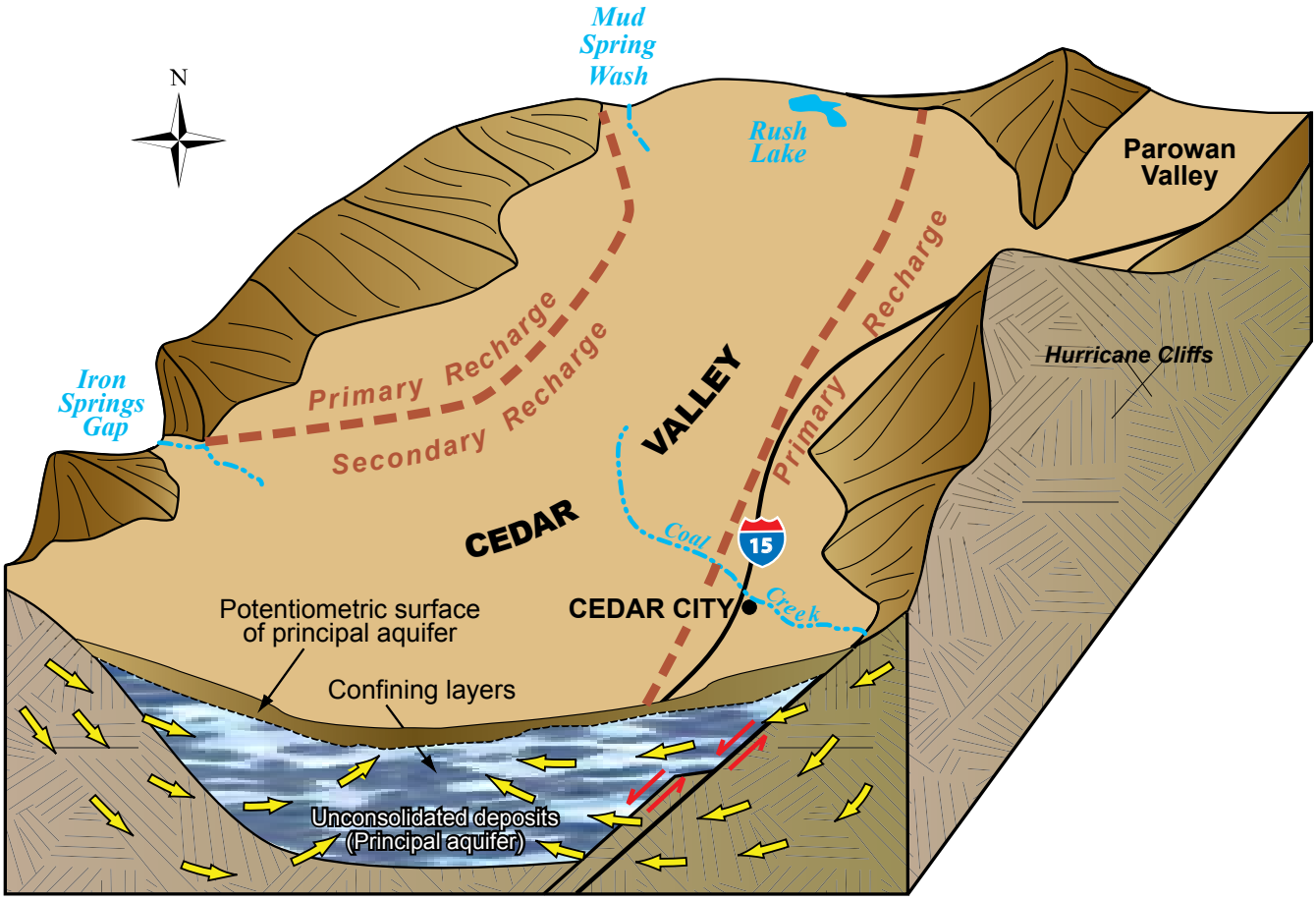


***Figure 2.*** *Schematic block diagram showing ground-water conditions in the principal basin-fill aquifer in Cedar Valley. Yellow arrows indicate ground-water flow direction.*

fined aquifer are not common, but are recorded on some water-well logs. Where confining layers extend to the ground surface, secondary recharge is mapped where the potentiometric surface in the principal aquifer is below the ground surface.

Ground-water discharge areas are at lower elevations than recharge areas. In discharge areas, the water in confined aquifers discharges to the land surface or to a shallow unconfined aquifer (figure 3). For this to happen, the hydraulic head in the principal aquifer must be higher than the water table in the shallow unconfined aquifer. Otherwise, downward pressure from the shallow aquifer exceeds the upward pressure from the confined aquifer, creating a net downward hydraulic gradient as in secondary recharge areas. Flowing (artesian) wells, indicative of discharge areas, are marked on drillers' logs and some flowing wells are shown on U.S. Geological Survey 7.5-minute quadrangle maps. Wells having potentiometric surfaces above the top of the confining layer can be identified from water-well logs. Surface water, springs, or phreatophytic plants characteristic of wetlands can also indicate ground-water discharge, but in some instances the discharge may be from a shallow unconfined aquifer. An understanding of the topography, surficial geology, and ground-water hydrology is necessary before using wetlands to indicate discharge from the principal aquifer.

We generally did not map small discharge areas defined by single well logs where surrounded completely by secondary recharge. Contaminants entering the aquifer system above these wells may be less likely to affect the principal aquifer than in the surrounding areas of secondary recharge.

## Ground-Water Quality Classification

The purpose of aquifer classification is to recognize the value (quality) of the water resource in Utah, as outlined under Section 317-6-5, Ground Water Classification for Aquifers, Utah Administrative Code (December 1, 2009). Ground-water quality classes under the Utah Water Quality Board classification scheme are based largely on total-dissolved-solids (TDS) concentrations (table 1) (for the ranges of chemical-constituent concentrations used in this report, including those for TDS, milligrams per liter [mg/L] equals parts per million). If any contaminant exceeds Utah's ground water quality (health) standards (and,

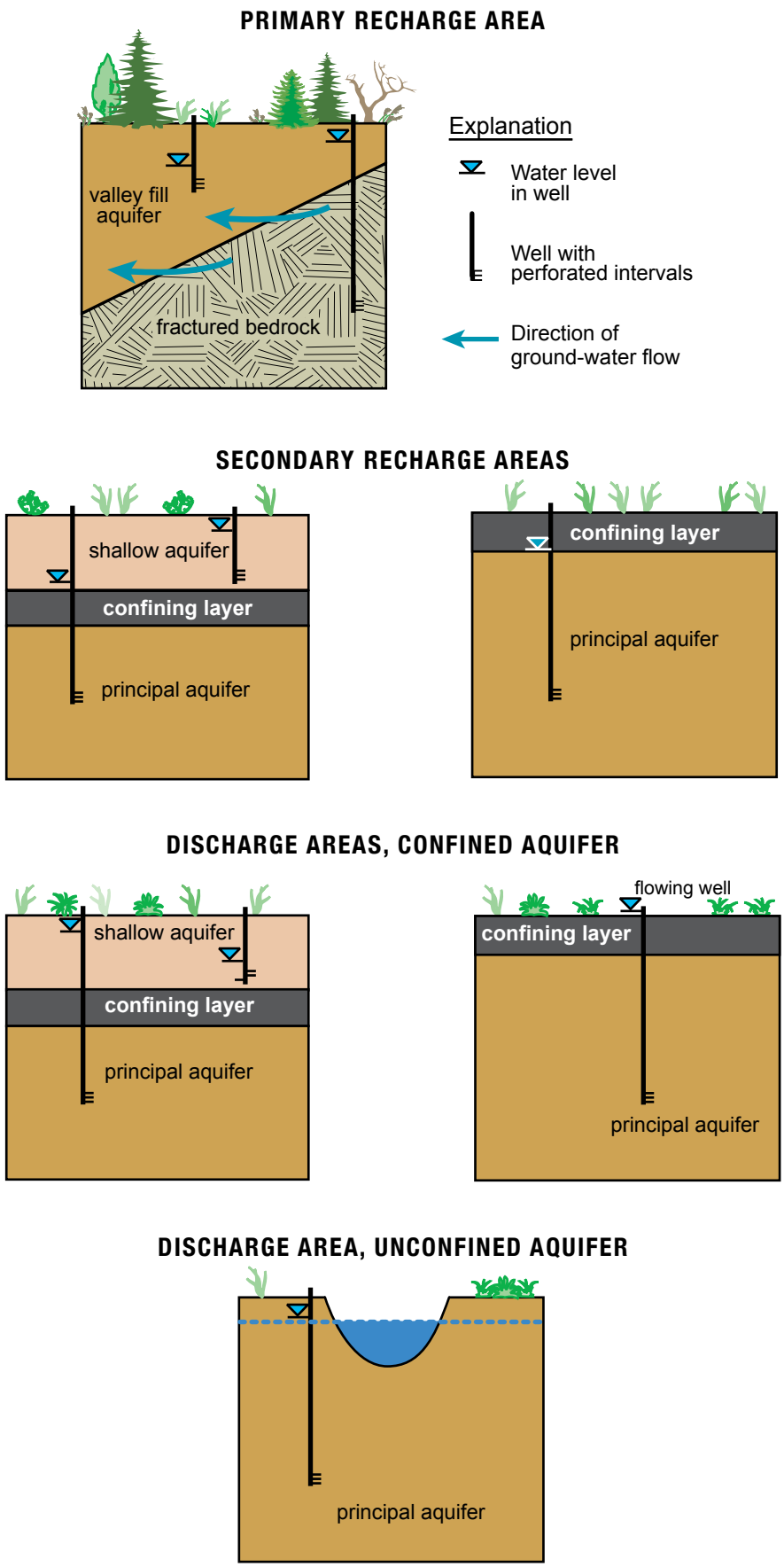


***Figure 3.*** *Relative water levels in wells in recharge and discharge areas (modified from Snyder and Lowe, 1998).*

if human caused, cannot be cleaned up within a reasonable time period), the ground water is classified as Class III, Limited Use ground water. Note that Class IB (Irreplaceable ground water) and Class IC (Ecologically Important ground water) are not based on TDS concentrations.

To classify the quality of ground water in the Cedar Valley basin-fill aquifer, we used ground-water quality data from the U.S. Geological Survey, Utah Division of Water Quality, Utah Division of Drinking Water, Southern Utah University, and Ford Chemical. The U.S. Geological Survey data are from a previous study (Brooks and Mason, 2005) that was specifically designed to provide ground-water quality data necessary for classification. Table 2 summarizes the constituents analyzed for and, where appropriate, drinking water health standards for the constituents; water-quality data are in appendix B.

Another component of the classification process is to document existing and potential pollution sources that may threaten the public's drinking-water supply. We mapped potential pollution sources (appendix C) based on the Utah Division of Drinking Water's Drinking Water Source Protection Rules.

## Septic-Tank Density Analysis

The purpose of septic-tank density analyses is to provide recommended septic-tank-system densities using the mass-balance approach to evaluate potential water-quality degradation. For our mass-balance analysis, we use nitrate as the constituent of interest because it is a common pollutant associated with septic-tank systems (but not necessarily the pollutant of greatest concern), and because it is inexpensive to analyze. The potential health risks to humans posed by nitrate in ground water is discussed below. A mass-balance analysis may be used as a gross model for evaluating the possible impact of proposed developments using septic-tank sys-

***Table 1.*** *Ground-water quality classes under the Utah Water Quality Board's total-dissolved-solids- (TDS) based classification system (modified from Utah Division of Water Quality, 1998).*

| Ground-Water Quality Class | TDS Concentration | Beneficial Use |
|---|---|---|
| Class IA/IB[1]/IC[2] | less than 500 mg/L[3] | Pristine/Irreplaceable/Ecologically Important |
| Class II | 500 to less than 3000 mg/L | Drinking Water[4] |
| Class III | 3000 to less than 10,000 mg/L | Limited Use[5] |
| Class IV | 10,000 mg/L and greater | Saline[6] |

[1]Irreplaceable ground water (class IB) is a source of water for a community public drinking-water system for which no other reliable supply of comparable quality and quantity is available due to economic or institutional constraints; it is a ground-water quality class that is not based on TDS.
[2]Ecologically Important ground water (class IC) is a source of ground-water discharge important to the continued existence of wildlife habitat; it is a ground-water quality class that is not based on TDS.
[3]For concentrations less than 7000 mg/L, mg/L is about equal to parts per million (ppm).
[4]Water having TDS concentrations in the upper range of this class must generally undergo some treatment before being used as drinking water.
[5]Generally used for industrial purposes.
[6]May have economic value as brine.

tems for wastewater disposal on ground-water quality, allowing planners to more efficiently determine appropriate average septic-tank system densities.

In the mass-balance approach, we added the nitrogen mass from the projected additional septic tanks to the current nitrogen mass and then diluted it with the amount of ground-water flow available for mixing plus the water added by the septic-tank systems themselves. We used the following equation to determine the projected nitrate concentration resulting from additional septic tanks, and thus to determine how many septic-tank systems can be added before exceeding a designated target nitrate concentration:

$$N_P = \frac{[(ST_T - ST_C)Q_{ST}] * N_L + [N_A(Q_M + [ST_T * Q_{ST}])]}{[ST_T * Q_{ST}] + Q_M}$$

where:

$N_P$ is the projected nitrate concentration (mg/L),

$N_A$ is the ambient (background) nitrate concentration for the domain (mg/L),

$N_L$ is the estimated average nitrate concentration from each septic tank (mg/L),

$ST_T$ is the total number of septic tanks in the system (variable, unitless),

$ST_C$ is the current number of septic tanks (constant, unitless),

$Q_{ST}$ is the flow from each septic tank in liters per second (L/s), and

$Q_M$ is the ground-water flow computed from the model (L/s).

To determine a recommended septic-tank system density, we divided the domain area acreage by the total number of septic tanks ($ST_T$) that existed at the projected nitrate concentration ($N_P$):

$$\text{Tank Density} = \frac{\text{Domain acreage}}{ST_T}$$

where $ST_T$ is defined above.

To provide recommended septic-tank densities for Cedar Valley using the mass-balance approach to evaluate potential water-quality degradation, we used an existing ground-water flow model (Brooks and Mason, 2005) to estimate ground-water flow in the basin fill available for mixing (dilution). Using the model, we divided the basin fill into three ground-water flow domains based on similar characteristics of flow per unit area. For each domain, we determined area acreage, ground-water flow volumes, number of existing septic-tank systems, and present-day background nitrate concentrations. Then, using the appropriate amount of wastewater and accompanying nitrogen load introduced per septic-tank system, we projected nitrogen loadings in each domain based on increasing numbers of septic tank soil-absorption systems. By limiting allowable degradation of ground-water nitrate concentrations to varying amounts of water-quality degradation determined to be acceptable by local government officials, we were then able to derive septic-density recommendations for each domain.

## Location and Geography

Cedar Valley is in eastern Iron County, southwestern Utah, between 38°07'15" and 37°32'15" north latitude and 113°23'15" and 112°49' west longitude (figure 1). It is a northeast-southwest-trending, elongate valley bordered by the Black Mountains to the north, the Markagunt Plateau to the east, low-lying mountains and hills to the west, and the Harmony Mountains to the southwest. Cedar Val-

***Table 2.*** *Utah and EPA primary and secondary drinking water-quality standards and analytical methods for some chemical constituents sampled in Cedar Valley, Iron County, Utah.*

| CHEMICAL CONSTITUENT | EPA ANALYTICAL METHOD[1] | WATER-QUALITY STANDARD (mg/L) |
|---|---|---|
| **Nutrients:** | | |
| total nitrate/nitrite | 353.2 | 10.0 |
| ammonia as nitrogen | 350.3 | - |
| total phosphorous and dissolved total phosphate | 365.1 | - |
| **Dissolved metals (as listed in State of Utah Public Health Laboratory online manual):** | | |
| arsenic | 200.9 | 0.01 |
| barium | 200.7 | 2.0 |
| cadmium | 200.9 | 0.005 |
| chromium | 200.9 | 0.1 |
| copper | 200.7 | 1.3 |
| lead | 200.9 | 0.015 |
| mercury | 245.1 | 0.002 |
| selenium | 200.9 | 0.05 |
| silver* | 200.9 | 0.1 |
| zinc* | 200.7 | 5.0 |
| **General Chemistry**: **(as listed in State of Utah Public Health Laboratory online manual)** | | |
| total dissolved solids (TDS) | 160.1 | 2000[+**] or (500*[++]) |
| pH* | 150.1 | between 6.5 and 8.5 |
| aluminum* | 200.7 | 0.05 to 0.2 |
| Calcium | 200.7 | - |
| sodium | 200.7 | - |
| boron | 200.7 | - |
| bicarbonate | 406C | - |
| carbon dioxide | 406C | - |
| carbonate | 406C | - |
| chloride* | 407A | 250 |
| total alkalinity | 310.1 | - |
| total hardness | 314A | - |
| specific conductance | 120.1 | - |
| iron* | 200.7 | 0.3 |
| potassium | 200.7 | - |
| hydroxide | 406C | - |
| sulfate *[++] | 375.2 | 250 |
| magnesium | 200.7 | - |
| manganese | 200.7 | 0.5 |

- No drinking-water quality standard exists for the chemical constituent.
*For secondary standards (exceeding these concentrations does not pose a health threat).
[+] Maximum contaminant level is reported from the Utah Administrative Code R309-200 (Utah Division of Drinking Water).
[**]For public water-supply wells, if TDS is greater than 1000 mg/L, the supplier shall satisfactorily demonstrate to the Utah Water Quality Board that no better water is available. The Board shall not allow the use of an inferior source of water if a better source of water is available.
[++]TDS and sulfate levels are given in the Primary Drinking Water Standards, R309-200. They are listed as secondary standards, excess of recommended levels cause consumer complaint.
[1] http://www.epa.gov/safewater/methods/analyticalmethods_ogwdw.html#one

ley is approximately 32 miles (51 km) long and ranges from 8 miles (13 km) wide at its northern boundary to less than 1 mile (1.6 km) wide in the south. The floor of Cedar Valley covers 270 square miles (700 km$^2$); its drainage basin encompasses more than 580 square miles (1502 km$^2$). Elevations range from 11,307 feet (3446 m) at Brian Head in the Markagunt Plateau to about 5350 feet (1631 m) at the outlet at Mud Springs Wash in the northwest part of the valley.

Coal Creek, the principal perennial stream in Cedar Valley, flows westward from the Markagunt Plateau and has deposited a large alluvial fan in the Cedar City area (Bjorklund and others, 1978). Shirts Creek, formerly known as Shurtz Creek, a smaller perennial stream flowing westward from the Markagunt Plateau, enters Cedar Valley near Hamiltons Fort. Fiddlers Canyon Creek, one of the larger intermittent and ephemeral streams flowing westward from the Markagunt Plateau, enters Cedar Valley between Cedar City and Enoch. Quichapa Creek is a perennial stream flowing northeastward into the valley from the Harmony Mountains. Surface water flows westward out of Cedar Valley via Mud Springs Wash and Iron Springs Gap only during rare flash floods following heavy local precipitation (Bjorklund and others, 1978). Some spring runoff accumulates in Quichapa and Rush Lakes, which are shallow playa lakes.

## Population and Land Use

From 2000–2007, the population of Iron County (most of the people in the county live in Cedar Valley) increased by 28.85% from 33,779 to 43,526 (Demograph-

ic and Economic Analysis Section, 2008). The population of Iron County is projected to be 103,920 by 2050 (Demographic and Economic Analysis Section, 2005).

Government, trade, and the service industry are the principal sources of employment in Iron County (Utah Division of Water Resources, 1995, table 4-4). Although agricultural land is being subdivided for residential and commercial uses, agricultural commodity production, mostly beef, dairy, and irrigated crops, will likely continue to be an important part of Cedar Valley's economy (Utah Division of Water Resources, 1995).

### Climate

Cedar Valley's climate is characterized by large daily temperature variations, moderately cold winters, and warm, dry summers (Bjorklund and others, 1978). Temperatures at Cedar City airport range from a maximum of 105°F (41°C) to a minimum of about -26°F (-32°C) (Moller and Gillies, 2008); the maximum daily temperature variation is greatest in summer when fluctuations can be as much as 40°F (22°C) (Ashcroft and others, 1992). The normal mean annual temperature at the Cedar City airport was 50.9°F (10.5°C) from 1971 to 2000 (Moller and Gillies, 2008) . The growing season (the number of consecutive frost-free days) in Cedar Valley averages 133 days at the Cedar City airport (Moller and Gillies, 2008).

The Markagunt Plateau averages 35.7 inches (90.7 cm) of precipitation annually at Brian Head (Moller and Gillies, 2008), mostly as snow during winter. Annual precipitation in Cedar Valley ranges from about 8 to 14 inches (20 to 36 cm) (Bjorklund and others, 1978). At the Cedar City airport, normal mean annual precipitation was 11.41 inches (29.9 cm) and reference mean annual evapotranspiration was 49.11 inches (124.7 cm) from 1971 to 2000 (Moller and Gillies, 2008). Most precipitation is generated in winter and spring by humid air masses moving southeastward from the north Pacific (Bjorklund and others, 1978). Snow is common in Cedar Valley from December through March, and snowstorms occur occasionally during April and May (Bjorklund and others, 1978).

## PREVIOUS INVESTIGATIONS

Gilbert (1875), Howell (1875), Powell (1879), and Dutton (1880) conducted early reconnaissance studies of the geology and physiography of southwestern Utah, including descriptions of the Cedar Valley area. Coal and ore deposits of the Cedar Valley region were investigated early in the 1900s by Lee (1907), Leith and Harder (1908), and Richardson (1909). Averitt (1962, 1967), Averitt and Threet (1973), Rowley (1975, 1976), Mackin and others (1976), Mackin and Rowley (1976), Rowley and Threet (1976), Maldonado and Williams (1993a, b), and Moore and Nealey (1993) produced 7.5-minute geologic quadrangle maps of the Cedar Valley area (figure 4). Rowley (1978) mapped the geology of the Thermo 15' quadrangle. Steven and others (1990) mapped the geology of the Richfield 1º x 2º quadrangle which includes the northern part of the study area. Averitt (1962), Threet (1963), Stewart and others (1972a, b), and Maldonado and others (1997) studied the structure of the Cedar Valley region. Huntington and Goldthwait (1904), Mackin (1960), Averitt (1962), Hamblin (1970, 1984), Rowley and others (1978), Anderson and Mehnert (1979), Anderson (1980), and Anderson and Christenson (1989) studied the Hurricane fault zone and discussed its significance as a possible boundary between the Basin and Range and Colorado Plateau physiographic provinces. Blank and Mackin (1967) made a geologic interpretation of an aeromagnetic survey of the southwest part of the study area. Eppinger and others (1990) assessed the mineral resources of the Cedar City 1º x 2º quadrangle. Rowley and others produced an interim geologic map for the Cedar City 30' x 60' quadrangle.

Meinzer (1911) conducted an early reconnaissance investigation of water resources in western Utah, including Cedar Valley (which he called Rush Lake Valley). Thomas and Taylor (1946) completed the first comprehensive investigation of ground-water conditions in Cedar and Parowan Valleys. Descriptions of the status of ground-water development in Cedar Valley were provided by Thomas and others (1952), and Barnell and Nelson (in Waite and others, 1954). Sandberg (1963, 1966) described the ground-water resources for selected basins in southwestern Utah, including Cedar Valley. Barnett and Mayo (1966) made recommendations regarding ground-water management and warned of a potential water-resources crisis in Cedar Valley. Bjorklund and others (1977, 1978) reevaluated ground-water conditions in Cedar and Parowan Valleys and produced water budgets for each valley. Wallace and Lowe (1998a, 1999) and Lowe and Wallace (1999a,b) recommended septic-tank system density/lot size for the entire Cedar Valley using Bjorklund and others' (1978) water budget. Lowe and others (2000) and Wallace and others (2001) provided septic-tank system density/lot-size recommendations for three subdivision areas in Cedar Valley. Wallace and Lowe (2000) and Lowe and Wallace (2001) evaluated the potential contribution of geologic nitrogen to nitrate in ground water in the Enoch area. Howells and others (2002) provided selected hydrologic data for Cedar Valley collected from 1930–2001. Hurlow (2002) evaluated the relation of ground water to geology in the Cedar Valley drainage basin. Brooks and Mason (2005) evaluated the hydrologic system and water quality in Cedar Valley, and developed a digital ground-water flow model for the basin-fill aquifer.

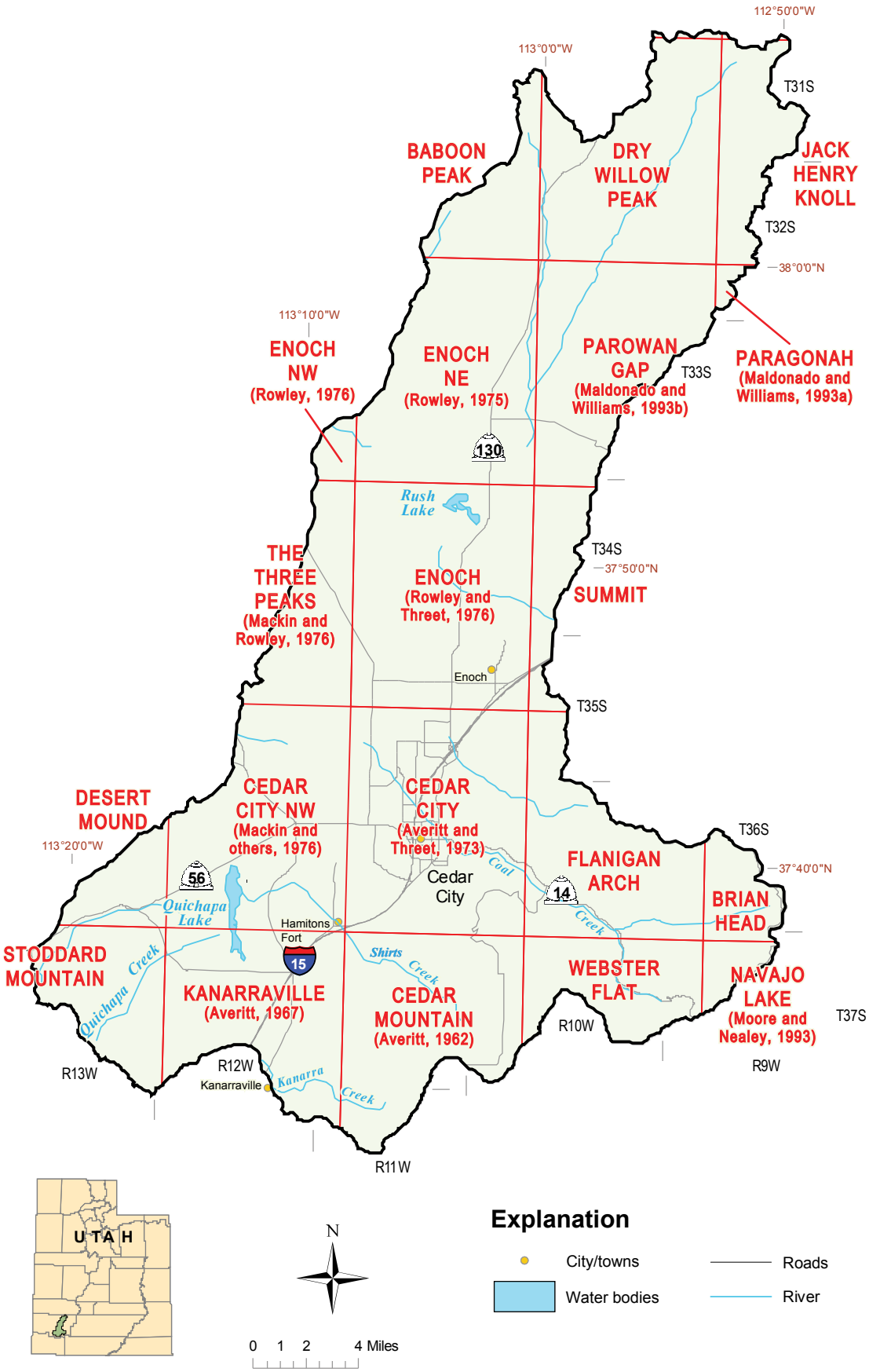


***Figure 4.*** *Geologic mapping for 7.5-minute quadrangles in Cedar Valley, Iron County, Utah.*

## GEOLOGIC SETTING

The Cedar Valley drainage basin is in the transition zone between the Basin and Range and Colorado Plateau physiographic provinces (Stokes, 1977). Many geologists consider the Hurricane fault zone, which probably first formed in the Pliocene, to be the boundary between the provinces (Anderson and Mehnert, 1979). The general location of the Hurricane fault zone is marked by the sheer Hurricane Cliffs, which are up to 2000 feet (610 m) high (Hamblin, 1970). The width of the fault zone, located at the base of the cliffs, is quite variable, but locally up to several miles wide (Averitt, 1962). Although the Hurricane fault zone is considered seismically active and potentially capable of producing future surface-faulting earthquakes, most movement occurred during the Pliocene and Pleistocene; the elapsed time since the last surface-faulting event is likely between 5000 and 10,000 years (Pearthree and others, 1998). Total vertical displacement along the Hurricane fault zone is estimated between 1500 and 4000 feet (457 and 1220 m) (Kurie, 1966; Anderson and Mehnert, 1979).

The Markagunt Plateau, east of the Hurricane Cliffs, has some features characteristic of the Colorado Plateau physiographic province, such as high elevation and relief dominated by gently dipping sedimentary rocks that are locally disrupted by folds and faults. However, aligned volcanic cones and prevalent northeast-trending block faults of the Markagunt Plateau are more typical of the Basin and Range physiographic province. Geomorphic features of the Markagunt Plateau include (1) narrow, predominantly westward sloping, V-shaped valleys, (2) steep-sided sharp-crested ridges, (3) structurally controlled drainage alignments, (4) elongated closed basins, and (5) hillside trenches or depressions (Anderson and Christenson, 1989).

Cedar Valley to the west of the Hurricane Cliffs is characterized by geomorphic features typical of other closed basins in the Basin and Range physiographic province. Cedar Valley is an asymmetrical graben formed by down dropping along valley margin normal faults from Miocene to Quaternary time; the asymmetry is due to greater displacement that occurred on the eastern basin-bounding fault system (of which the Hurricane fault zone is part) than on faults on the west side of the valley (Hurlow, 2002). The basin margins consist of broad alluvial-fan slopes that grade basinward into slightly undulating plains, the lowest depressions of which contain lakes, swamps, and dry alkali flats (Meinzer, 1911). A low divide, created by the alluvial fan deposited by Coal Creek, separates Cedar Valley into two subbasins. The south basin drains into saline ephemeral Quichapa Lake; the north basin partly drains into ephemeral Rush Lake, and water from Coal Creek may also drain to depressions farther south (Meinzer, 1911).

Stratigraphic units in the Cedar Valley area range from Triassic to Quaternary in age (figures 5 and 6). Consolidated rocks have a maximum combined thickness of more than 16,000 feet (4900 m) (Bjorklund and others, 1978). Unconsolidated to poorly consolidated basin-fill deposits are up to 3900 feet (1200 m) thick in Cedar Valley (Cook and Hardman, 1967; Hurlow, 2002); these deposits are thickest in the eastern part of the basin. Hurlow (2002) subdivided the basin fill into three seismically defined units (A, B, and C) having likely differences in water-yielding characteristics to help Brooks and Mason (2005) assign layers in their ground-water flow model.

## GROUND-WATER CONDITIONS

### Introduction

Ground water in Cedar Valley occurs in two types of aquifers: fractured bedrock and basin-fill deposits (figure 2). Ground water in fractured-rock aquifers is recharged primarily from infiltration of precipitation and streamflow, and flows primarily through fractures. Herein, we focus on the basin-fill aquifers.

### Occurrence

The Cedar Valley basin-fill aquifer consists primarily of Quaternary alluvial sediments, composed of discontinuous, lenticular, commonly elongated, poorly to well-sorted bodies of sand, clay, gravel, and boulders (Thomas and Taylor, 1946), interbedded with lava flows and containing some lacustrine and eolian deposits (Bjorklund and others, 1978). Based on water-well data, the thickness of Quaternary basin fill is estimated to be at least 1000 feet (300 m) (Thomas and Taylor, 1946; Anderson and Mehnert, 1979). A gravity survey indicates basin fill may be as much as 3900 feet (1200 m) thick in the eastern part of the complexly faulted Cedar Valley graben (Cook and Hardman, 1967). Seismic-reflection profiles indicate the basin fill has a maximum thickness of 3800 feet (1160 m) near Rush Lake (Hurlow, 2002).

Ground water in the Cedar Valley basin-fill aquifer occurs under confined, unconfined, and perched conditions in unconsolidated basin-fill deposits (figure 2) (Bjorklund and others, 1978). The basin-fill aquifer is generally under unconfined conditions along the higher elevation margins of Cedar Valley where it typically consists of coarse, granular, permeable sediments (Bjorklund and others, 1978), deposited primarily in alluvial fans (Thomas and Taylor, 1946). The basin-fill aquifer is generally under leaky confined conditions in the central, lower elevation areas of the valley (figure 2) (Sandberg, 1966; Bjorklund and others, 1978) where water-yielding coarser grained deposits are capped by or contain intervening beds of low-

| Age (Ma) | Period | Map Symbol and Unit Name | | Description | Approximate Thickness in feet (m) |
|---|---|---|---|---|---|
| | QUATERNARY | Qs Sedimentary deposits | | Interbedded gravel, sand, silt, and clay. | 0 - 150+ (0 - 45) |
| | | QTb Basalt | | Flows and small cinder cones. | 0 - 330+ (0 - 100) |
| 2.6 | QUATERNARY-TERTIARY | QTs Sedimentary deposits | | Interbedded gravel, sand, silt, and clay. | 0 - 1330 (0 - 405) |
| | | Seismically defined basin-fill units (subsurface only; not shown on figure 6) | A | Interbedded gravel, sand, silt, clay, and sedimentary breccia. | 0 - 1330 (0 - 405) |
| | | | B | | 0 - 1825 (0 - 555)<br>0 - 980 (0 - 300) |
| | | | C | | 0 - 980 (0 - 300) |
| | TERTIARY | Ti Intrusive rocks | | Quartz monzonite intrusions of the "Iron Axis." "iron axis" | |
| | | Tv Volcanic rocks | | Interbedded ash-flow tuff, volcanic breccia, flows, and related sedimentary deposits.<br>Some deposits are younger than unit Ti. | 0 - 4000<br>(0 - 1200) |
| | | TKs Sedimentary rocks | | Interbedded mudstone, siltstone, sandstone, conglomerate, and limestone. | 2190 - 2320<br>(665 - 705) |
| 66 | CRETACEOUS | Ks Sedimentary rocks | | Interbedded sandstone, mudstone, conglomerate, and coal. | 2700 - 3600<br>(825 - 1100) |
| 144 | JURASSIC | Js Sedimentary rocks | | Interbedded sandstone, siltstone, mudstone, and limestone. | 3900 - 5150<br>(1200 - 1575) |
| 205 | TRIASSIC | TRs Sedimentary rocks | | Interbedded sandstone, siltstone, mudstone, gypsiferous mudstone, and minor conglomerate. | 2100 - 2400<br>(640 - 730) |

***Figure 5.*** *Generalized stratigraphic column for Cedar Valley drainage basin (Hurlow, 2002). Units correspond to those on figure 6.*

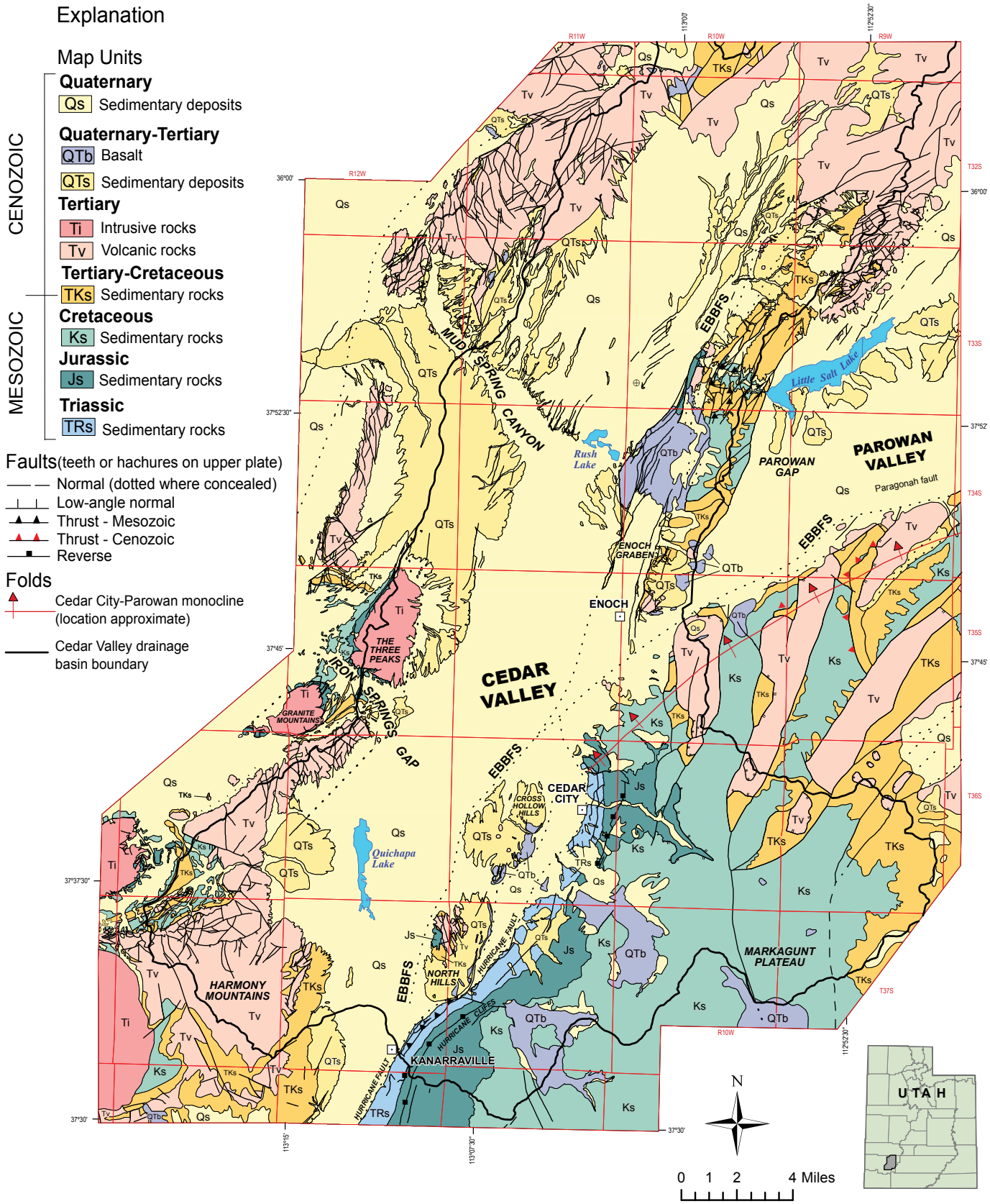


***Figure 6.*** *Generalized geologic map of Cedar Valley drainage basin and adjacent areas. EBBFS is eastern basin-bounding fault system (from Hurlow, 2002).*

permeability silt and clay (Bjorklund and others, 1978). The low-permeability sediments are extensive enough to locally form effective confining beds or layers, but they are not continuous enough to form major layers in the basin fill where the ground-water system acts as a single, complex aquifer (Thomas and Taylor, 1946). The boundary between confined and unconfined conditions is indefinite and gradational, and shifts as the potentiometric surface of the basin-fill aquifer system rises and falls with changes in recharge and discharge (Bjorklund and others, 1978). Upward ground-water gradients in the central, lower elevation areas of Cedar Valley were once sufficient to supply flowing wells that covered an approximate area of 50 square miles (130 $km^2$) in 1939 (Thomas and Taylor, 1946, plate 18), but no flowing wells have existed in Cedar Valley since 1975 (Bjorklund and others, 1978).

Depth to ground water in wells ranges from near the ground surface in the central portion of the valley to about 250 feet (76 m) below the surface along the valley margins (Bjorklund and others, 1978). Most wells have static-water levels of less than 100 feet (30 m) below the land surface. Depths to ground water in wells in the Coal Creek alluvial-fan area range from about 200 feet (60 m) near Cedar City to about 10 feet (3 m) in the distal portions of the fan (Bjorklund and others, 1978). Depths to ground water range from about 150 feet (46 m) along the mountain front to about 10 feet (3 m) in the lower portions of the valley in the Hamiltons Fort/Kanarraville area, from about 10 feet (3 m) near Quichapa Lake to about 100 feet (30 m) along the mountain front to the southwest, and from about 10 feet (3 m) near Rush Lake to about 50 feet (15 m) a few miles northeast of Rush Lake (Bjorklund and others, 1978).

The withdrawal of large amounts of ground water during the irrigation season causes seasonal changes in water levels (Sandberg, 1966), as does seasonal variation in precipitation and streamflow (Thomas and Taylor, 1946). There is a general pattern of declining water levels during the irrigation season, typically from May through September, and rising water levels from October through May (Bjorklund and others, 1978). Seasonal changes in ground-water levels exceeding 30 feet (9 m) were observed in 1974 in the center of the valley northwest of Cedar City, but water levels declined less than 5 feet (1.5 m) in most areas along the western side of the valley during the same year (Bjorklund and others, 1978, figure 6).

Longer term changes in water level depend on annual precipitation and evapotranspiration, and on annual well pumpage. Between 1940 and 1974, the amount of ground-water discharge from wells, springs, and evapotranspiration exceeded recharge to the ground-water system which resulted in an overall decline in ground-water levels in the basin-fill aquifer (Bjorklund and others, 1978, p. 33). Due to concerns caused by declining water levels, the Utah State Engineer closed the entire Cedar Valley basin to new appropriations of water rights in 1966; portions of Cedar Valley had already been closed to new appropriations since the 1940s (Utah Division of Water Resources, 1995). Average annual ground-water levels had declined as much as 30 feet (9 m) in some areas of Cedar Valley between 1940 and 1974, which was attributed primarily to withdrawal from wells (Bjorklund and others, 1978, figure 11). Between 1963 and 1993, water-level declines greater than 10 feet (3 m) were limited to the area west of Quichapa Lake (Barnett and Mayo, 1966), indicating long-term recharge and discharge are relatively in balance for most of Cedar Valley's basin-fill aquifer (Utah Division of Water Resources, 1995). However, ground-water levels in much of Cedar Valley declined from March 1975 to March 2005, with the largest declines (about 36 feet [11 m]) occurring north of Enoch (Burden and others, 2005) (figure 7).

The alluvial deposits yield water at rates ranging from 1 to 4000 gallons per minute (4–15,100 L/min) (Bjorklund and others, 1978). The most productive aquifers consist of beds of coarse, clean, well-sorted gravel and sand that readily yield large quantities of water to wells (Bjorklund and others, 1978). Sandberg (1966), based on data from 10 wells in the Cedar Valley basin-fill aquifer, calculated a range for specific capacity of 10 to 50 gallons per minute per foot of drawdown (12–58 L/min per m of drawdown) with an average of 28 gallons per minute per foot of drawdown (32 L/min per m of drawdown). Bjorklund and others (1978) compiled data from six multiple-well aquifer tests completed in gravelly aquifer material in Cedar Valley and calculated a range for average hydraulic conductivity of 13 to 251 feet per day (4–77 m/d), a transmissivity range of 2540 to 52,000 square feet per day (230–4830 $m^2$/d), and a storage coefficient range of 0.0005 to 0.2.

Ground-water flow is generally from the higher elevation recharge areas to lower elevation discharge areas. In southern Cedar Valley, ground water flows northward from the Kanarraville area, northeastward from the Harmony Mountains, and southeastward from the Eightmile Hills (Bjorklund and others, 1978, plate 5). Ground water in the vicinity of the Coal Creek alluvial fan moves northward and northwestward from the apex of the fan and then moves either southward toward Quichapa Lake or westward toward Iron Springs Gap (Thomas and Taylor, 1946). Ground water in northern Cedar Valley generally moves northwestward toward Rush Lake and then continues toward Mud Spring Wash (Bjorklund and others, 1978). Horizontal hydraulic gradients are generally flat in the central, lower elevation areas of Cedar Valley, such as near Quichapa Lake. Hydraulic gradients are about 25 feet per mile (5 m/km) at Iron Springs Gap and 50 feet per mile (9 m/km) at Mud Spring Wash (Sandberg, 1966).

## Recharge and Discharge

Ultimately, most recharge to the basin-fill aquifer comes directly or indirectly from precipitation within the Cedar

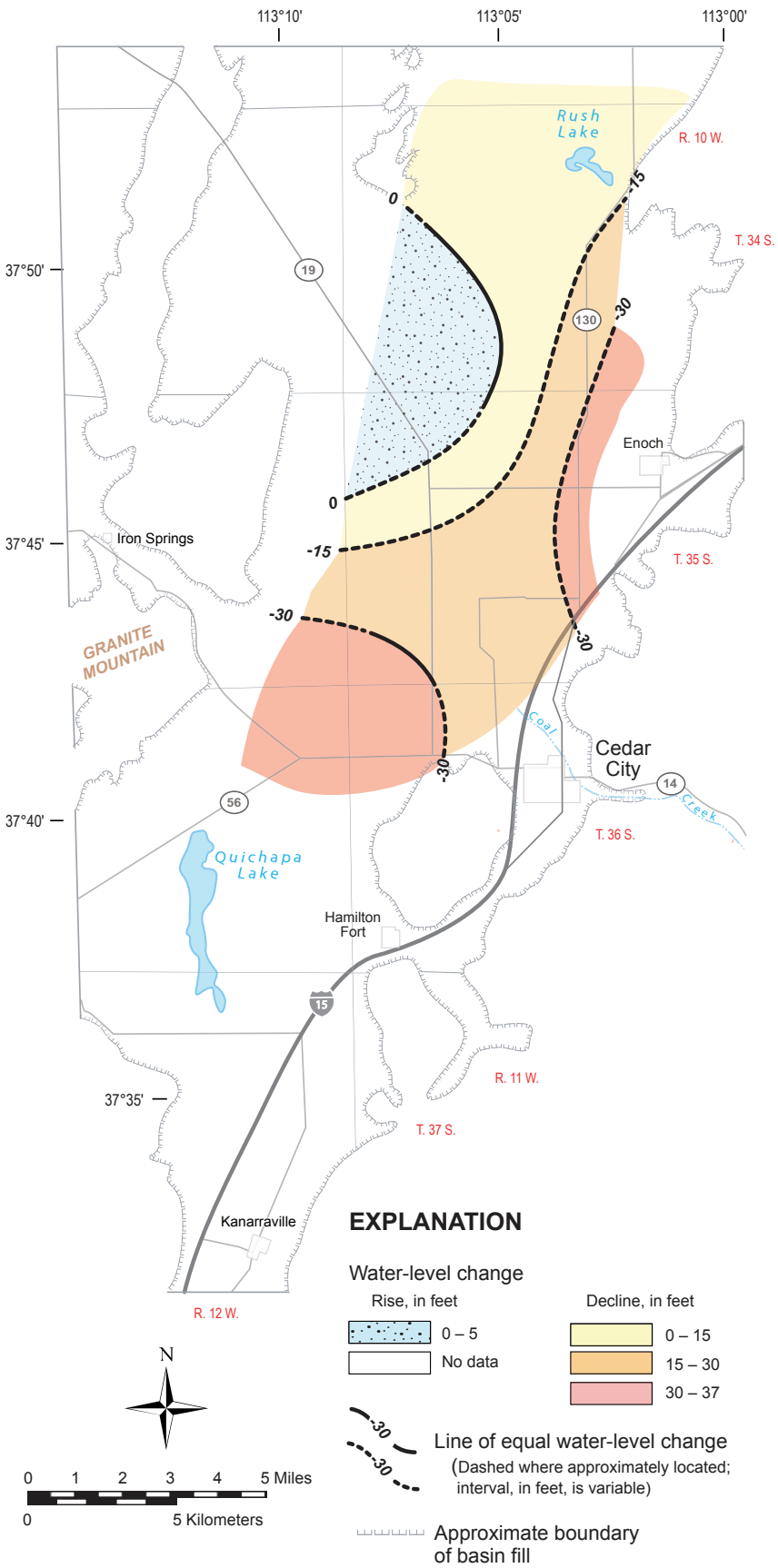


***Figure 7.*** *Change of water level in Cedar Valley from spring 1975 to spring 2005 (modified from Burden and others, 2005).*

Valley drainage basin (Sandberg, 1966). Recharge to the Cedar Valley basin-fill aquifer is from (1) infiltration of irrigation from ground-water sources, (2) seepage from streams and major irrigation canals, (3) infiltration of irrigation from surface-water sources, (4) infiltration of land-applied wastewater effluent, (5) infiltration of irrigation applied to lawns and gardens, (6) infiltration of precipitation falling on unconsolidated basin-fill, (7) bedrock inflow from the surrounding hills and mountains, and (8) subsurface inflow from Parowan Valley (table 3) (Brooks and Mason, 2005). Precipitation falling on unconsolidated basin fill and bedrock inflow from upland areas are the greatest sources of recharge, followed by infiltration of irrigation from ground- and surface-water sources and seepage from streams and major irrigation canals (Brooks and Mason, 2005).

Discharge from the basin-fill aquifer in Cedar Valley occurs through (1) ) well withdrawals, (2 evapotraspiration, and (3) subsurface outflow through Iron Springs Gap and Mud Spring Wash (table 3) (Brooks and Mason, 2005). Water-well pumpage is by far the greatest source of discharge.

## Ground-Water Quality from Previous Studies

Ground-water quality in Cedar Valley is generally good and is suitable for most uses (Utah Division of Water Resources, 1995). Ground water in the basin-fill aquifer is generally classified as calcium- or magnesium-sulfate type. Sodium-chloride-type ground water is present near Rush Lake and calcium-bicarbonate-type ground water is present southwest of Quichapa Lake (Bjorklund and others, 1978). Thomas and Taylor (1946) reported TDS concentrations ranging from about 150 mg/L, just west of Quichapa Lake, to more than 1700 mg/L for certain wells on the Coal Creek alluvial fan. Bjorklund and others (1978, table 5) reported TDS concentrations in ground water ranging from 166 to 2752 mg/L. Sandberg (1966) reported TDS concentrations in ground water ranging from 281 to 3750 mg/L. For this study, based on water-quality data collected by Howells and others (2002) and from public water-supply wells within the study area (Rachael Cassady, Utah Division of Drinking Water, written communication, 2001), TDS range from 184 to 2190 mg/L with an average of 584 mg/L (plate 1).

***Table 3.*** *Ground-water budget for 2000, Cedar Valley, Iron County, Utah (modified from Brooks and Mason, 2005).*

| **Recharge** | **( acre-feet)** |
|---|---|
| Precipitation on unconsolidated basin fill | 10,300 |
| Bedrock inflow from surrounding hills and mountains | 9900 |
| Recharge from irrigation with ground water | 7100–8600 |
| Seepage from streams and major irrigation canals | 4700–5100 |
| Recharge from irrigation with surface water | 4900 |
| Subsurface inflow | 2000 |
| Recharge from land application of wastewater effluent | 1500 |
| Recharge from irrigation of lawns and gardens | 600–1000 |
| Total recharge (rounded) | 41,000–43,000 |
| **Discharge** | |
| Wells | 36,000 |
| Evapotranspiration | 3000 |
| Subsurface outflow | 1000 |
| Springs | Negligible |
| Total discharge (rounded) | 40,000 |

The type of water and quantity of dissolved solids are largely influenced by local geology. Ground water with high TDS concentrations and high calcium and sulfate concentrations exists in the Coal Creek and Fiddlers Canyon alluvial-fan areas because Mesozoic rocks in the drainage basin contain abundant gypsum (Thomas and Taylor, 1946). Ground water with high total-dissolved-solids concentrations and high sodium and chloride concentrations near the playa areas of Rush and Quichapa Lakes (Bjorklund and others, 1978) is typical of such playa lake settings. Ground water in the area recharged by Quichapa Creek has low TDS concentrations and is the least hard water in the basin-fill aquifer because its drainage basin is underlain almost exclusively by Tertiary volcanic rocks, which contain few soluble minerals.

In addition to calcium, sulfate, and chloride, another chemical constituent, nitrate, typically associated with human activities, has been identified in Cedar Valley. Nitrate concentrations in ground water have been analyzed and reported in two ways in the literature for Cedar Valley: nitrate as nitrogen and nitrate as nitrate. The values for nitrate-as-nitrate are reported as higher values than the corresponding nitrate-as-nitrogen values. The U.S. Environmental Protection Agency drinking-water quality (health) standard for nitrate as nitrogen is 10 mg/L (U.S. Environmental Protection Agency, 2009), and 45 mg/L as for nitrate as nitrate.

Thomas and Taylor (1946, p. 107) reported nitrate-as-nitrate concentrations ranging from 0.0 to 260 mg/L for wells in Cedar Valley; they noted that the highest nitrate concentration in ground water was found in the Fiddlers Canyon alluvial-fan area, and that this high-nitrate ground water also contained high chloride and sulfate concentrations. Some of the wells in the Coal Creek alluvial-fan area were also high in nitrate and sulfate, but not high in chloride concentrations (Thomas and Taylor, 1946, p. 107). Sandberg (1966) reported nitrate-as-nitrate concentrations in Cedar Valley ranging from 1.0 to 109 mg/L. Bjorklund and others (1978) reported nitrate-as-nitrogen concentrations in Cedar Valley ranging from 0.0 to 14 mg/L. For this study, based on water-quality data collected by the U.S. Geological Survey (Howells and others, 2002), from public water-supply wells within the study area (Rachael Cassady, Utah Division of Drinking Water, written communication, 2001), and from 1974 to 2000 data reported by Lowe and Wallace (2001), nitrate-as-nitrogen concentrations range from less than 0.06 to 57.4 mg/L.

Thomas and Taylor (1946) noted that nitrate concentrations greater than a few mg/L in shallow ground water is considered an indication of water-quality degradation typically associated with human activities. However, they noted (Thomas and Taylor, 1946, p. 110) that depths for most of the wells having high nitrate concentration in Cedar Valley exceed 100 feet (30 m), suggesting a geologic source of nitrate possibly associated with soluble salts in the basin fill rather than an anthropogenic origin. Wallace and Lowe (2000) and Lowe and Wallace (2001) also suggested that historically high nitrate concentrations in the Enoch area may be due in part to a geologic source of nitrogen, and documented nitrogen-bearing strata in the Straight Cliffs Formation in Fiddlers Canyon to the southeast of Enoch.

## GROUND-WATER RECHARGE AREA MAPPING

### Recharge and Discharge Areas

Primary recharge areas (plate 2) include the bedrock uplands (including Cross Hollow and North Hills east of Quichapa Lake) and the upper parts of alluvial fans along the basin margins in the eastern and western parts of the study area; northern Cedar Valley north of Rush Lake is also mapped as a primary recharge area, although there are few wells in the area. Basin fill in these areas consists mostly of sand and gravel lacking thick silt and clay layers (figure 3). Secondary recharge areas (plate 2) having

a thick confining layer and a downward vertical ground-water flow gradient (figure 3) cover much of the central part of the study area.

Although some wells have discharge area characteristics (figure 3) in the central part of Cedar Valley, they are isolated and surrounded by wells with secondary recharge area characteristics (plate 2). Therefore, we did not map a discharge area in Cedar Valley.

### Potential for Water-Quality Degradation

Based solely on ground-water recharge- and discharge-area mapping, the potential for ground-water contamination in Cedar Valley is moderate to high. Much of the water in the principal basin-fill aquifer comes from bedrock uplands with few pollutants that could enter the system. In some areas on the Markagunt Plateau, this circumstance is changing due to increased residential development using septic-tank systems. Additionally, many potential contamination sources are on the basin-fill deposits. Some of these potential contamination sources are in primary recharge areas where the principal aquifer has no significant hydrogeologic barriers to limit contamination by pesticides or other water-borne contaminants. Care must be taken in siting potential contaminant sources, such as feed lots and septic tanks, especially in primary recharge areas. The widespread clay layers in the center of Cedar Valley may provide some protection to the principal aquifer, but their lateral continuity is unknown.

## GROUND-WATER QUALITY CLASSIFICATION

### Introduction

Ground-water quality classification, based primarily on TDS (table 1), is a tool for local governments in Utah to use for managing potential ground-water contamination sources and for protecting the quality of their ground-water resources. The following information, much of which is from the Utah Division of Water Quality's (1998) *Aquifer Classification Guidance Document* by Lowe and Wallace (1999c, 1999d), outlines the purposes and requirements of ground-water quality classification.

### Background Information About Ground-Water Quality Classification

On October 4, 1984, Utah Governor Bangerter issued an Executive Order stating, "The quality of ground water will be protected to a degree commensurate with current and probable future uses. Preventive measures will be taken to minimize contamination of the resource so that current and future public and private beneficial uses will not be impaired." Based on public comments, the former Division of Environmental Health (now Department of Environmental Quality) implemented an anti degradation approach using "differential protection" based on the quality or value of the ground-water resource. The policy of differential protection recognizes possible impacts on ground water from human activities, but limits any adverse impacts to pre-established acceptable levels tied directly to the existing ground-water quality. Ground-water quality classification is one of the principal means for implementing the differential protection policy because it establishes the quality of the ground-water resource.

The Utah Ground Water Quality Protection Regulations, initially adopted in 1989, allow the Utah Water Quality Board to classify the ground-water quality of all or parts of aquifers as a method for maintaining quality in areas where sufficient information is available. Such information includes a comprehensive understanding of the aquifer system supported by factual data for existing water quality, potential contaminant sources, and current ground-water uses. Ground-water quality classification (or reclassification) may be initiated by either the Utah Water Quality Board or by a petition submitted by a licensed professional geologist or engineer on behalf of a company or governmental entity. At least one public hearing is required before the Utah Water Quality Board rules on the proposed classification. Once the ground-water quality of an aquifer is classified, commensurate protection levels are applied to classified areas based on the differential protection policy.

### Ground-Water Quality Classification: A Planning Tool

Ground-water quality classification is a planning tool for local governments to use in making land-use management decisions. It allows local governments to use ground-water quality as a reason for permitting or not permitting a proposed activity or land use based on the differential protection policy. Many facilities and/or activities can and do have an impact on ground-water quality, but are not regulated by state or federal laws. Such facilities/activities include septic tanks, animal feed lots, land application of animal wastes, and some industrial/manufacturing activities. Many of these facilities/activities are permitted through local land use management programs. From this perspective, ground-water quality classification can be a useful tool for local governments, if they so desire, to manage their ground-water resources based on the beneficial use established by ground-water quality classification.

Ground-water quality classification has many potential applications as a land-use management tool. One example is using ground-water quality classification to establish zoning that will locate industrial facilities in areas where ground-water quality is already poor, such as in some areas around Great Salt Lake. Additionally, ground-water quality

classification can be used as a basis for determining the density of development in areas that use septic tanks for wastewater disposal. Ground-water quality classification also can be used as a basis for encouraging developers to invest in the infrastructure needed to connect a proposed subdivision onto an existing sewer line, rather than dispose of domestic wastewater using septic-tank systems. However, ground-water quality classification does not result in any mandatory requirement for local governments to take specific actions, such as land-use zoning restrictions, technical assessments, or monitoring.

## Results

### Data Sources for the Basin-fill Aquifer

The Central Iron County Water Conservancy District petitioned the Utah Water Quality Board to classify the principal basin-fill aquifer in Cedar Valley as shown on plate 3. The Utah Water Quality Board approved this classification on October 18, 2002. The classification is based on (1) data from 72 wells sampled between 1979 and 2000 by the U.S. Geological Survey, (2) data from 28 wells from analyses supplied to the Utah Division of Drinking Water between 1974 and 2000, and (3) nitrate data from 19 wells sampled between 1979 and 1981 and analyzed by various laboratories including Southern Utah University, Ford Chemical, and the Utah Division of Epidemiology and Laboratory Services (Lowe and Wallace, 2001). Some areas, where insufficient data exist, require extrapolation of ground-water quality conditions. The basis for extrapolation was based on local geologic characteristics. The classes (plate 3) are as follows:

**Class IA- Pristine ground water:** For this class, TDS concentrations in Cedar Valley range from 184 to 492 mg/L. The north end of Cedar Valley is classified as Pristine ground water based on rock types in the drainage basin and land use; the geologic units are primarily volcanic rocks having low solubility, and little human activity occurs in this part of Cedar Valley. Class IA areas are the most common ground-water quality class mapped in Cedar Valley (plate 3), covering about 82 percent of the total basin-fill area.

**Class II- Drinking Water Quality ground water:** For this class, TDS concentrations in Cedar Valley range from 506 to 2190 mg/L. Class II areas are found along the western margin of the Markagunt Plateau in the eastern portions of the valley, and in three smaller areas: south of Rush Lake, northeast of Quichapa Lake, and at the mouth of Mud Spring Canyon (plate 3). The areas having Drinking Water Quality ground water cover about 17 percent of the total basin-fill area.

**Class III- Limited Use ground water:** For this class, no TDS values between 3000 mg/L to 10,000 mg/L were identified. However, we identified nitrate concentrations exceeding drinking-water-quality standards of greater than 10 mg/L, and such water is considered Limited Use ground water. The wells having nitrate concentrations exceeding 10 mg/L, the U.S. Environmental Protection Agency drinking-water quality standard, are in the Enoch area west of Fiddlers Canyon (plate 2) (Lowe and Wallace, 2001). High nitrate levels may be due to contamination from septic-tank systems, feed lots, and/or fertilizer; however, geologic nitrogen in some strata in the Straight Cliffs Formation may also be a source of nitrate in ground water in the Enoch area (Lowe and Wallace, 2001). The area where ground water has elevated nitrate concentrations (ranging from 10.42 to 57.4 mg/L) is mapped as Class III (plate 3), and covers about 1 percent of the total basin-fill area.

### Land-Use Planning Considerations

**Current beneficial uses of ground water:** Cedar Valley has 2780 perfected water-well rights, of which 20 of which are for public-supply wells. Plate 2 shows the location of water-supply wells. Ground water from wells in Cedar Valley is used as follows: 76 percent for irrigation, 19 percent for public supply, 5 percent for domestic and stock-watering purposes, and less than 1 percent for industry (Burden and others, 2005).

**Potential for ground-water quality degradation:** We mapped potential ground-water contaminant sources including facilities related to mining, agricultural practices, and waste-water treatment facilities (appendix C, plate 4). A primary objective was to identify potential contaminant sources to establish a relationship between water quality and land-use practices. We mapped approximately 630 potential contaminant sources in the following categories in Cedar Valley:

1. mining sites, which include abandoned and active gravel mining operations and borrow pits, coal mines, and cinder pits,
2. agricultural areas that potentially contribute nitrate, which include (a) irrigated and non-irrigated farms, (b) active and abandoned animal feed lots, corrals, and stable/barnyards, and (c) grazing or pasture land,
3. industrial sites that potentially contribute pesticides, metals, solvents, petroleum products, and polychlorinated biphenyl (PCB), including salt production/storage facilities, transportation facilities, transformer stations, and excavating facilities,
4. small businesses, some of which may contribute pollutants such as solvents into the ground-water system, such as laundromats, beauty parlors, and dry cleaners,
5. large lawns that may contribute fertilizer and pes-

ticides, including parks, cemeteries, and nurseries,

6. service stations, including auto shops and gas stations that may contribute fuel, oil, antifreeze, and solvents; junkyard/salvage operations that may contribute pollutants such as metals and solvents,
7. waste-disposal sites that may contribute pollutants such as solvents, metals, and nitrate,
8. storage tanks that may contribute pollutants such as fuel and oil, and
9. medical facilities, including dental, health clinics, pharmaceutical, and veterinarian services, that may contribute pollutants such as metals and solvents.

In addition to the above-described potential contaminants, plate 4 shows the distribution of septic tank soil-absorption systems in Cedar Valley. Approximately 3300 septic-tank systems exist in Cedar Valley (Kelly Crane, Nolte Associates, Inc., written communication, March, 2009), and may contribute contaminants such as nitrate and solvents. All approved water wells, shown on plate 3, are also considered potential contaminant sources because pollutants can be conveyed to the water table via the well bore.

**Possible land-use planning applications of this ground-water quality classification:** Ground-water quality classification is a tool that can be used in Utah to manage potential ground water contamination sources and protect the quality of ground water resources. Ground-water quality classification, in concert with septic-tank density/water-quality degradation studies (Hansen, Allen, and Luce, Inc., 1994; Wallace and Lowe, 1998a, 1999), has been used in Heber Valley in Wasatch County and Ogden Valley in Weber County to require the sizes of lots using septic-tank systems for wastewater disposal to be at least 5 and 3 acres (0.02 and 0.01 $km^2$), respectively.

The ground-water quality classification, in conjunction with the septic-tank density/water-quality degradation analysis presented below, provides a means to set maximum densities for development using septic-tank systems for wastewater disposal in Cedar Valley. The ground-water quality classification may also be used as a basis for prohibiting the dumping of poor quality water and other liquid or solid wastes into creek beds, canals, and ditches.

## SEPTIC-TANK DENSITY/WATER-QUALITY DEGRADATION ANALYSIS

### Introduction

Land-use planners have long used septic-tank suitability maps to determine where wastewater from these systems will likely percolate within an acceptable range. However, they recently learned that percolation alone does not remediate many constituents found in wastewater, including nitrate. Under aerobic conditions, ammonium from septic-tank effluent can convert to nitrate, contaminating ground water and posing potential health risks to humans, primarily very young infants (Comley, 1945; Fan and others, 1987; Bouchard and others, 1992). Studies involving laboratory rats ingesting a combination of nitrite and heptamethyleneimine in drinking water reported an increase in tumor occurrence (Taylor and Lijinsky, 1975). However, epidemiological investigations involving human beings have shown conflicting evidence. An association between stomach cancer in human beings and nitrate in drinking water was reported in Colombia and Denmark (Cuello and others, 1976, Fraser and others, 1980). Conversely, investigations in the United Kingdom and other countries indicate no correlation exists between nitrate levels and cancer incidence (Forman, 1985; Al-Dabbagh and others, 1986; Croll and Hayes, 1988).

With continued population growth and installation of septic tank soil-absorption systems in new developments, the potential for nitrate contamination will increase. One way to evaluate the potential impact of septic-tank systems on ground-water quality is to perform a mass-balance calculation (Hansen, Allen, and Luce, Inc., 1994; Zhan and McKay, 1998; Lowe and Wallace, 1999a, 1999b; Wallace and Lowe, 1999; Lowe and others, 2000, 2003, 2004, 2007). This type of analysis may be used as a gross model for evaluating the possible impact of proposed developments using septic-tank systems for wastewater disposal on ground-water quality, allowing planners to more effectively determine appropriate average septic-system densities.

### Ground-Water Contamination from Septic Tank Systems

#### Pathogens

As the effluent from a septic-tank soil absorption system leaves the drain field and percolates into the underlying soil, it can have high concentrations of pathogens, such as viruses and bacteria. Organisms such as bacteria can be mechanically filtered by fine-grained soils and are typically removed after traveling a relatively short distance in the unsaturated zone. However, in coarse-grained soils, or soils containing preferential flow paths like cracks, worm burrows, or root holes, these pathogens can reach the water table. Pathogens can travel up to 40 feet (12 m) in the unsaturated zone in some soils (Franks, 1972). Some viruses can survive up to 250 days (U.S. Environmental Protection Agency, 1987), which is the minimum ground-water time of travel for public water-supply wells or springs to be separated from potential biological contamination sources.

## Household and Industrial Chemicals

Many household and industrial chemicals (table 4) are commonly disposed of through septic-tank systems and, unless they volatilize easily, are not remediated by percolation through soils in the unsaturated zone. Contamination from these chemicals can be minimized by reducing their disposal via septic-tank systems, thus maximizing the potential for dilution of those chemicals that do reach ground water (Lowe and Wallace, 1999e).

## Phosphate

Phosphate, typically derived from organic material or some detergents, is discharged from septic-tank systems (Fetter, 1980). Whereas phosphate (and phosphorus) commonly contributes to eutrophication of surface waters (Fetter, 1980), it is generally not associated with water-quality degradation from septic-tank systems (Lowe and Wallace, 1999e). Phosphates are removed from septic-tank system effluent by absorption onto fine-grained soil particles and by precipitation with calcium and iron (Fetter, 1980). In most soils, complete removal of phosphate is common (Franks, 1972).

## Nitrate

Ammonia and organic nitrogen, mostly from the human urinary system, are commonly present in wastewater within septic tanks (table 4). Typically, almost all ammonia is converted into nitrate before leaving the septic-tank soil-absorption system drain field. Once nitrate passes below the zone of aerobic bacteria and the roots of plants, negligible attenuation occurs as it travels through the soil (Franks, 1972). Once in ground water, nitrate becomes mobile and can persist in the environment for long periods of time. Areas having high densities of septic-tank systems risk elevated nitrate concentrations reaching unacceptable levels. In the early phases of ground-water quality degradation associated with septic-tank systems, nitrate is likely to be the only pollutant detected (Deese, 1986). Regional nitrate contamination from septic-tank discharge has been documented on Long Island, New York, where many densely populated areas without sewer systems exist (Fetter, 1980).

A typical single-family septic-tank system in Cedar Valley discharges about 221 gallons (837 L) of effluent per day containing nitrogen (or nitrate as nitrogen) concentrations of around 53.4 mg/L. Therefore, distances between septic-tank system drain fields and sources of culinary water must be sufficient to allow dilution of nitrate in the effluent to levels below the ground-water quality standard.

We consider nitrate to be the key indicator for use in determining the number or density of septic-tank systems that should be allowed in Cedar Valley. Projected nitrate concentrations in all or parts of aquifers can be estimated for increasing septic-tank system densities using a mass balance approach.

***Table 4.*** *Typical characteristics of wastewater in septic-tank systems (from Hansen, Allen, and Luce, Inc., 1994).*

| Parameter | Units | Quantity |
|---|---|---|
| Total Solids | mg/L | 680–1000 |
| Volatile Solids | mg/L | 380–500 |
| Suspended Solids | mg/L | 200–290 |
| Volatile Suspended Solids | mg/L | 150–240 |
| BOD | mg/L | 200–290 |
| Chemical Oxygen Demand | mg/L | 680–730 |
| Total Nitrogen | mg/L | 35–170 |
| Ammonia | mg/L | 6–160 |
| Nitrites and Nitrates | mg/L | <1 |
| Total Phosphorus | mg/L | 18–29 |
| Phosphate | mg/L | 6–24 |
| Total Coliforms | *MPN/100 mL | 1010–1012 |
| Fecal Coliforms | *MPN/100 mL | 108–1010 |
| pH | - | 7.2–8.5 |
| Chlorides | mg/L | 86–128 |
| Sulfates | mg/L | 23–48 |
| Iron | mg/L | 0.26–3.0 |
| Sodium | mg/L | 96–110 |
| Alkalinity | mg/L | 580–775 |
| P-Dichlorobenzene** | mg/L | 0.0039 |
| Toluene** | mg/L | 0.0200 |
| 1,1,1-Trichloroethane* | mg/L | 0.0019 |
| Xylene** | mg/L | 0.0028 |
| Ethylbenzene** | mg/L | 0.004 |
| Benzene** | mg/L | 0.005 |

* Most probable number of coliform per 100 milliliters of water
** Volatile Organics are the maximum concentrations

## The Mass-Balance Approach

### General Methods

We use a mass-balance approach for water quality degradation assessments because it has been used elsewhere in the western United States (Hansen, Allen, and Luce, Inc., 1994; Wallace and Lowe, 1998a, 1998b, 1998c, 1999; Zhan and McKay, 1998; Lowe and Wallace, 1999a, 1999b; Lowe and others, 2000, 2003, 2004, 2007), is a practical method to apply under time, budget, and data availability/acquisition constraints; and it provides a quantitative basis for land-use planning decisions. In the mass-balance approach to compute projected nitrate concentrations, the average nitrogen mass expected from projected new septic tanks is added to the existing, ambient (background) mass of nitrogen in ground water and then diluted with the known (or estimated) ground-water flow available for mixing, plus water that is added to the system by septic tanks. We used a discharge of 221 gallons (837 L) of effluent per day for a domestic home based on a per capita indoor usage of 71.5 gallons (270.7 L) per day (Utah Division of Water Resources, 2001, p. 23) multiplied by Iron County's 2008 average 3.09 person household (Utah Governor's Office of Planning and Budget, 2010). We used an estimated nitrogen loading of 53.4 mg/L of effluent per domestic septic tank for nitrogen loadings based on: (1) an average 3.09 people per household, (2) an average nitrogen loading of 17 grams of nitrogen per capita per day (Kaplan, 1988, p. 149), (3) 270.7 liters per capita per day water use, and (4) an assumed retainment of 15 % of the nitrogen in the septic tank (to be later removed during pumping) (Andreoli and others, 1979, in Kaplan, 1988, p. 148). This estimated nitrogen loading is close to Bauman and Schafer's (1985, in Kaplan, 1988, p. 147) nitrogen (or nitrate as nitrogen) concentration in septic-tank effluent of 62 ± 21 mg/L based on the averaged means from 20 previous studies. We determined ground-water flow available for mixing, the major control on nitrate concentration in aquifers when using the mass-balance approach (Lowe and Wallace, 1997), using a numerical ground-water flow model (Brooks and Mason, 2005).

### Limitations

There are many limitations to any mass-balance approach (see, for example, Zhan and McKay [1998]; Lowe and Wallace, [1999a, b]; Lowe and others, [2000]). We identify the following limitations to our application of the mass-balance approach:

1. calculations of ground-water flow available for mixing are based on a numerical model and simulation of ground-water flow, and are subject to model limitations,

2. background nitrate concentration is attributed to natural sources, agricultural practices, and use of septic-tank systems, but projected nitrate concentrations are based on septic-tank systems only and do not include nitrate from other potential sources (such as lawn and garden fertilizer),

3. calculations do not account for localized, high-concentration nitrate plumes associated with individual or clustered septic-tank systems,

4. calculations assume that the septic-tank effluent from existing homes is in a steady-state condition with the aquifer, and

5. the approach assumes negligible denitrification and instantaneous ground-water mixing for the entire aquifer or mixing zone below the site.

Additionally, calculations do not account for changes in ground-water conditions due to ground-water withdrawal from wells, are based on aquifer parameters that must be extrapolated to larger areas where they may not be entirely representative, and may be based on existing data that do not represent the entire valley.

Although many caveats exist in applying this mass-balance approach, we believe it is the best available method in land-use planning because it provides a general basis for making recommendations for septic-tank system densities. In addition, the approach is cost-effective and can be applied in areas with limited information.

## Ground-Water Flow Calculations

### Introduction

Ground-water flow rates and volumes are required in this study to investigate the potential role of septic-tank effluent in water-quality degradation of ground water in Cedar Valley. In order to achieve this objective, we estimated cell-by-cell flow rates and volumes for 13 flow zones/regions by modifying the transient numerical ground-water flow model developed by Brooks and Mason (2005), which simulated ground-water flow in the basin-fill aquifer of the study area for the period 1938–2000.

### Original Version of Brooks and Mason (2005) Model

Brooks and Mason (2005) used the U.S. Geological Survey (USGS) modular finite-difference code MODFLOW 2000 (Harbaugh and others, 2000) to construct three-layer steady-state and transient models for simulating the basin-fill hydrologic system in Cedar Valley. Calibrated water

levels from the steady-state model were used as starting water levels for the transient model simulation. The transient model simulates 63 yearly stress periods from 1938 to 2000, with the first 12 stress periods defined as steady-state stress periods to represent the steady-state conditions prevailed during 1938–1949.

Model construction began with the steady-state model. Areally, Brooks and Mason (2005) discretized the hydrologic area represented by the models into a grid of rectangular cells, with each cell having homogeneous properties. The rectangular model grid contains 91 rows and 34 columns. Cell size is variable and active cells range in size from about 55 to 250 acres (22-100 $hm^2$). Small cell-size areas generally represent areas having more data. The model grid was rotated clockwise about 23 degrees from north so cell faces are generally parallel to the boundary of the unconsolidated basin fill.

Vertically, the model is composed of three layers of unconsolidated basin fill with a maximum total simulated thickness of 3000 feet (900 m). The top layer (layer 1) was assigned a saturated thickness of 50 feet (15 m) to represent unconfined conditions at the top of the ground-water system throughout the valley. The bottom of layer 1 was set at about 50 feet (15 m) below the ground surface. The thicknesses of layers 2 and 3 are similar and range from 20 to 1450 feet (6–440 m).

Brooks and Mason (2005) assigned no-flow boundaries to contacts between unconsolidated basin fill and consolidated rock around the basin fill. However, at most locations around the valley, estimated inflow from consolidated rock was simulated as wells in cells near the boundary. Brooks and Mason's (2005) model simulates recharge from irrigation, precipitation, and seepage from Coal Creek as specified flow boundaries using the Recharge Package (Harbaugh and others, 2000). Brooks and Mason's (2005) model simulates inflow from consolidated rock and Parowan Valley as a specified flow boundary using the Well Package (Harbaugh and others, 2000) in the active cells of layers 2 and 3 near no-flow boundaries.

Brooks and Mason's (2005) model simulates discharge to evapotranspiration in layer 1 using the Evapotranspiration Package (Harbaugh and others, 2000). Brooks and Mason's (2005) model simulates discharge to wells in all layers using the Well Package (Harbaugh and others, 2000). Brooks and Mason's (2005) model simulates the outflow through unconsolidated basin fill in Iron Springs Gap, Mud Springs Canyon, and near Kanarra in all model layers using the General Head Boundary (GHB) Package (Harbaugh and others, 2000). Brooks and Mason's (2005) model simulates discharge to springs near Enoch in layer 1 using the Drain Package (Harbaugh and others, 2000).

Brooks and Mason (2005) calibrated the model to steady-state conditions to adequately determine the distribution of recharge and discharge rates, values and distribution of hydraulic conductivity, conductance of drains, general head boundaries, and horizontal flow boundaries. Brooks and Mason (2005) used ground-water levels measured in March 1939 and March 1950, and compared the conceptual ground-water flow budget for the steady-state period to simulated values to determine if the model adequately simulated the ground-water system for the late 1930s and 1940s. The steady-state model was then converted into a transient model, and the final calibrated steady-state simulation was used as the starting conditions for the transient simulation. The transient simulation was calibrated by adjusting the model to more accurately simulate measured water-level fluctuations and the water-budget components until measured water levels and flow components reasonably matched the simulated water levels and flow (Brooks and Mason, 2005).

For more details on the models developed by Brooks and Mason (2005), please visit the link http://pubs.usgs.gov/sir/2005/5170/.

## Modified Version of Brooks and Mason (2005) Model

Brooks and Mason (2005) developed the original model using a modified version of MODFLOW-2000 with instances instead of stress periods; this is not supported by the regular public domain MODFLOW-2000 (Harbaugh and others, 2000) code embedded in the Groundwater Modeling System (GMS) (Aquaveo, 2008) Graphical User Interface (GUI) used at the Utah Geological Survey. Due to software incompatibility, we were not able to use the original Brooks and Mason (2005) simulations. After consultation with Brooks (the main simulation developer), we reconstructed the model using the same boundary conditions, recharge and discharge boundaries and flow rates, and hydraulic parameter boundaries and rates (hydraulic conductivity, anisotropy, and specific yield) as the original calibrated model using the regular public domain U.S. Geological Survey MODFLOW-2000 (Harbaugh and others, 2000) embedded in GMS GUI (Aquaveo, 2008).

To obtain the overall flow rates and volumes for each flow zone throughout the model's basin-fill area of our septic-tank density study, we made a few changes to the original version of Brooks and Mason (2005) model. First, we combined the vertical model's three-layer system into one layer (convertible layer) with a maximum total simulated thickness of 3000 feet (900 m). Second, we changed the variable grid cell size into a constant rectangular grid cell size (3094 cells with 2088 by 2264 feet [636 by 690 m] cell size and a cell's area of about 108 acres [44 $hm^2$]) throughout the entire model's domain. Third, we changed the coordinate system projection into North American Datum 1927 – Zone 12 in order to be consistent with other data

and map overlays in our study. Fourth, we used the calibrated values of various parameters in the original model as initial values in this new modified model so that no further calibration is needed. Similar to the original model, the active area of the modified model is 234.7 square miles (608 $km^2$), or 150,220 acres (60,790 $hm^2$) (1638 cells out of 3094 total cells).

We ran the modified simulation using the regular public domain MODFLOW-2000 and embedded Layer Property Flow (LPF) package (Harbaugh and others, 2000) for both steady-state and transient conditions for the period 1938-2000. Similar to the original Brooks and Mason (2005) model, the transient model consists of 63 annual stress periods with one-year time step each. The first 13-year stress periods/time steps were assigned as steady state. Since the original simulation was calibrated, the results of the new modified model were considered acceptable with no further calibration.

### Results of modified simulations and flow calculations

Our objectives of modifying the original model were to obtain reasonable ground-water flow estimates. The modified model simulations helped to identify the ground-water flow patterns and estimate the quantity of ground water flowing through the basin-fill sediments.

The simulation provided the ground-water level distribution and ground-water flow directions. The most recent stress period/time step (year 2000) of the transient simulation was used to estimate ground-water flow patterns and volumetric flow budgets in this modeling. Figure 8 shows simulated ground-water level distribution and flow directions in the last stress period/time step of the transient model. Figure 9 shows simulated cell-to-cell flow rates in the last stress period/time step of the transient model. The figure shows four cell-to-cell flow ranges in both cubic feet per day and cubic feet per second per acre. These four cell-to-cell flow ranges were used to subdivide the entire basin-fill model domain into 13 flow zones with one weighted average flow rate for each zone (figure 10). Table 5 shows the flow zone IDs, number of active model cells, areas, and total cell-to-cell flow rates for each flow zone in the entire model's domain. Flow zone areas range from 550 acres (220 $hm^2$) for Zone-1 to 63,829 acres (25,800 $hm^2$) for Zone-8. Flow rates range from 0.03 cubic feet per second (0.000058 cfs/acre; 0.0008 $m^3/s$) for Zone-1 to 193 cubic feet per second (0.013 cfs/acre; 5.5 $m^3/s$) for Zone-9.

### Model Limitations

As is the case for any ground-water flow model, we made assumptions to approximate the actual ground-water flow in the study area. As mentioned above, we combined the original three-layer model into a one-layer model with equivalent hydraulic properties integrated from the calibrated values of the original model, and assumed no further calibration was necessary. In our case, however, that concern is of limited importance because the layers in the original model have similar hydraulic property boundaries and values, the calibrated values of hydraulic properties in the original model were used in this modified model, and the resulting simulated water level distribution is very similar to the original model's output.

## Septic-Tank System/Water-Quality Degradation Analyses

### Introduction

We calculated projected domain-specific nitrate concentrations in three ground-water flow domains (tables 6 and 7, plate 5) by applying a mass-balance approach using domain-specific parameters, such as the existing nitrogen load (present-day background nitrate concentration) and amount of ground water available for mixing (table 6), and our estimated 221 gallons per day (837 L/day) contributed by each septic-tank system, with an estimated nitrogen loading of 53.4 mg/L of septic-tank effluent. We also defined a fourth domain (domain 4) for which the mass-balance approach was not applied (plate 6), due to the sparse data (septic tanks, water-quality analyses) available. The mass-balance approach predicts the impact of nitrate from use of septic-tank systems over a defined area.

We calculated one graph of nitrate concentration versus number of septic tanks each for domains 1 through 3 based on a range of parameters that affect the amount of ground water available for dilution. We obtained the current number of septic-tank systems in each domain from Nolte Associates, Inc. (Kelly Crane, Nolte Associates, Inc., written communication, March 2009). We supplemented these data by identifying potential sites of septic systems from buildings and house dwellings plotted from aerial photographs. Tables 6, 7, and 8 list the number of septic-tank systems estimated for each domain. The exact number of septic-tank systems in-use and not in-use is unknown; we estimate that about 2200 septic-tank systems have been permitted in Cedar Valley.

For this analysis, we used a total of 2200 septic tanks for all the domains, and ranges from a low of 5 (domain 4) to a high of 835 (domain 2) (table 8). Present-day background nitrate concentrations for each domain range from 0.38 mg/L (domain 1) to 6.07 mg/L (domain 3) (table 6). For domains 1, 2, and 3, allowable degradation above current background levels of nitrate were set at 1.00 mg/L for domain 1, 0.35 mg/L for domain 2, and 0.20 mg/L for domain 3 (table 7), based on discussions with Iron County govern-

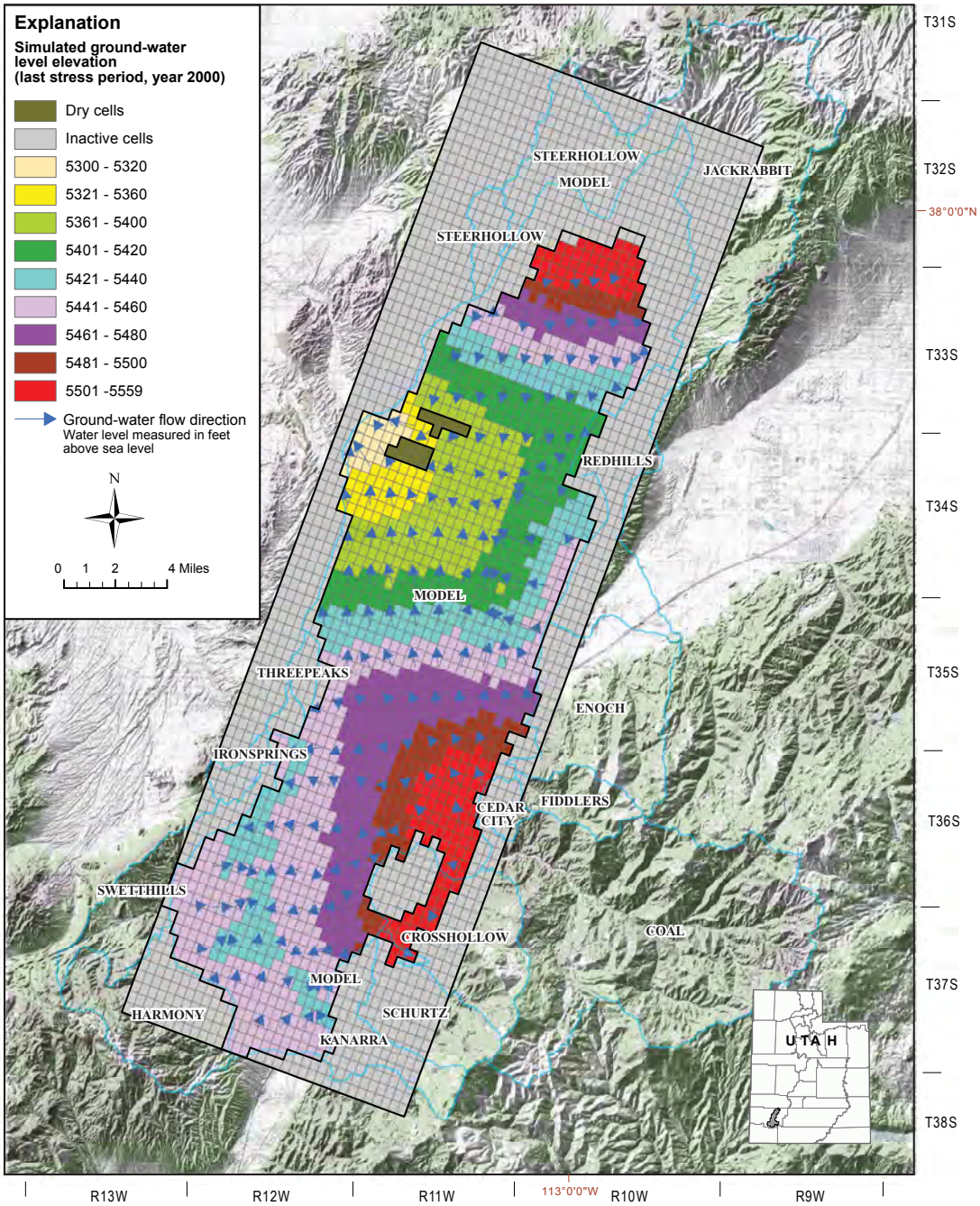


***Figure 8.*** *Simulated water levels of the modified ground-water flow model (last stress period, 2000) for Cedar Valley, Iron County, Utah.*

ment officials on April 22, 2010. For domain 4, for which the mass-balance approach was not applied because of limited data, we assign a lot-size recommendation of 15 acres (6 $hm^2$) to be protective of ground-water quality.

## Results

**Domain 1:** Figure 11 shows a plot of projected nitrate concentration versus septic-tank density and number of septic-tank systems in model domain 1 along the northern and southwestern margins of Cedar Valley (plate 5). The present-day background nitrate concentration for model domain 1 is 0.38 mg/L (table 6). There are an estimated 541 septic systems in model domain 1 (tables 6 and 7). Model domain 1 has an area of 20,726 acres (8388 $hm^2$) (table 6), so the existing average septic-system density is 38 acres per system (15 $hm^2$/system) (table 7, figure 11). Based on our analyses (table 6), estimated ground-water flow available for mixing in model domain 1 is 14 cubic feet per second (0.4 $m^3$/s) (table 6). For model domain 1 to maintain an overall nitrate concentration of 1.38 mg/L (which allows 1 mg/L of degradation), the total number

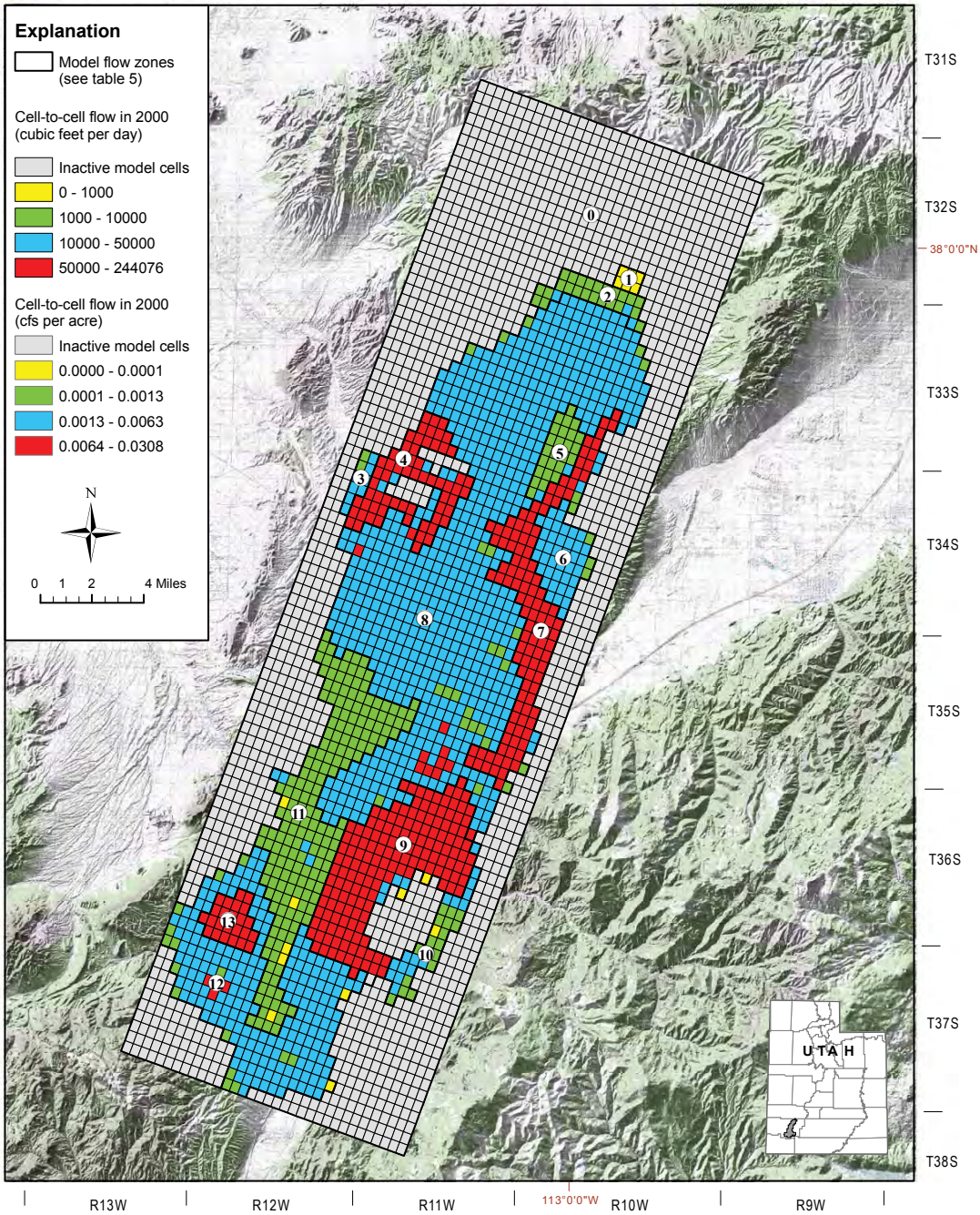


***Figure 9.*** *Simulated cell-to-cell flow zones and flow rates of the modified ground-water flow model (last stress period, 2000) for Cedar Valley, Iron County, Utah.*

of homes using septic tank soil-absorption systems should not exceed 1360 (figure 11, table 7) based on the estimated nitrogen load of 53.4 mg/L per septic-tank system. This corresponds to a septic-system density of about 15.5 acres per system (6.3 $hm^2$/system) in model domain 1 (table 7, figure 11).

**Domain 2:** Figure 12 shows a plot of projected nitrate concentration versus septic-tank density and number of septic-tank systems in model domain 2 in the central and southern parts of Cedar Valley (plate 5). Present-day background nitrate concentration for model domain 2 is 5.35 mg/L (table 6). We estimate 838 septic systems are located in model domain 2 (tables 6 and 7). Model domain 2 has an area of 94,550 acres (38,260 $hm^2$) (table 6), so the average septic-system density is 113 acres per system (46 $hm^2$/system) (table 7). Based on our analyses, estimated ground-water flow available for mixing in domain 2 is 279 cubic feet per second (7.9 $m^3$/s) (table 6). For model domain 2 to maintain an overall nitrate concentration of 5.7 mg/L (which allows 0.35 mg/L of degradation), the total number of homes using septic tank soil-absorption

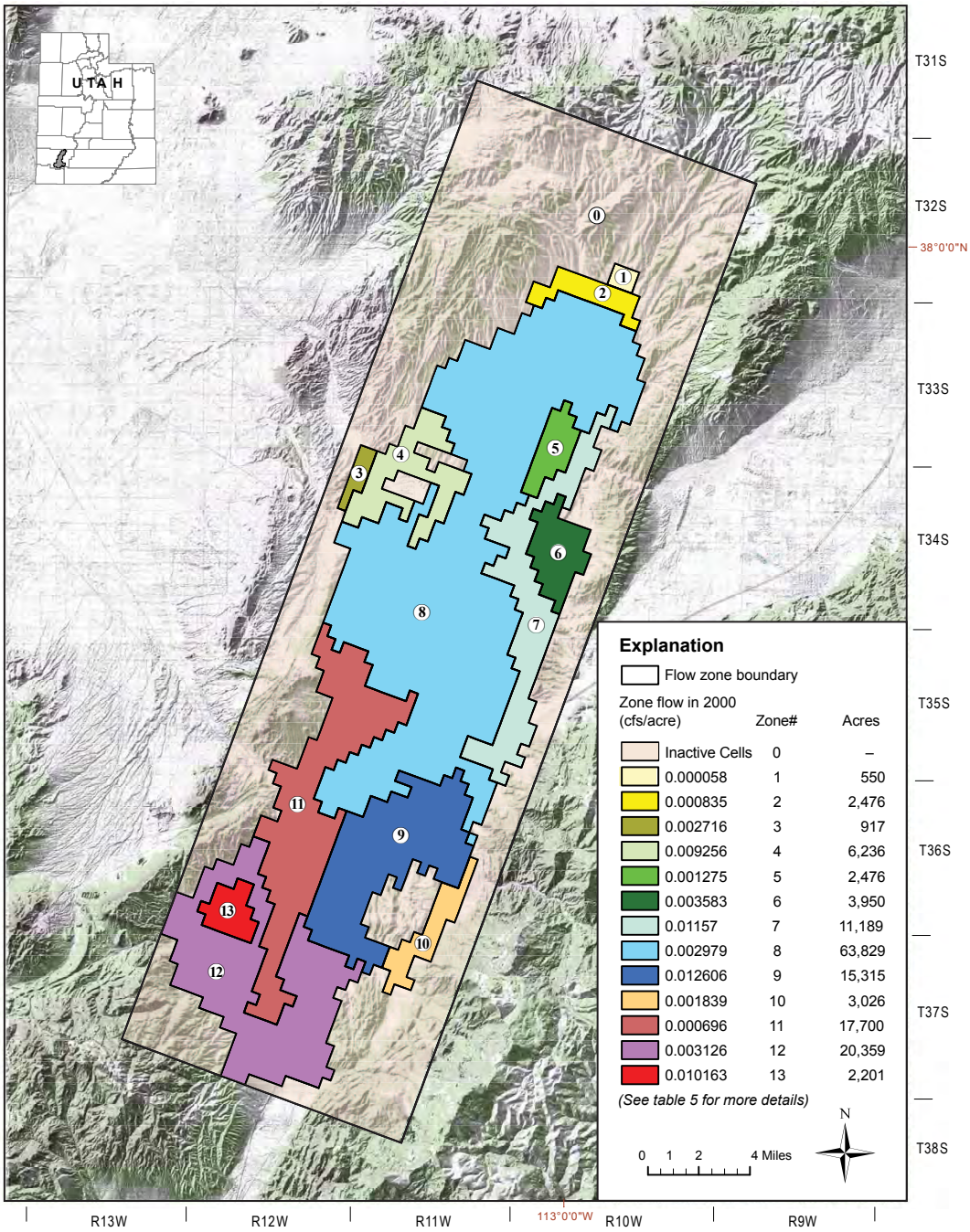


***Figure 10.*** *Summary of simulated flow rates per acre for 13 flow zones of the modified ground-water flow model (last stress period, 2000) for Cedar Valley, Iron County, Utah.*

systems should not exceed 6900 (table 7, figure 12) based on the estimated nitrogen load of 53.4 mg/L per septic-tank system. This corresponds to a septic-system density of 13.7 acres per system (2 $hm^2$/system) in model domain 2 (table 7, figure 12).

**Domain 3:** Figure 13 shows a plot of projected nitrate concentration versus septic-tank density and number of septic-tank systems in model domain 3 in eastern and southwestern Cedar Valley (plate 5). Present-day background nitrate concentration for model domain 3 is 6.07 mg/L (table 6). An estimated 821 septic systems are presently in model domain 3 (tables 6 and 7). Model domain 3 has an area of 34,940 acres (14,140 $hm^2$) (table 6), so the average septic-tank system density is 28 acres per system (11 $hm^2$/system) (table 7). Based on our analyses (table 6), estimated ground-water flow available for mixing in model domain 3 is 402 cubic feet per second (11.4 $m^3$/s) (table 6). For model domain 3 to maintain an overall nitrate concentration of 6.27 mg/L (which allows 0.2 mg/L of degradation), the total number of homes using septic tank soil-absorption systems should not exceed 5700 (table 7, figure 13) based on the estimated nitrogen load of 53.4 mg/L per septic-tank system (figure 14, table 7). This

***Table 5.*** *Flow zone IDs, number of active model cells, areas, and total cell-to-cell flow rates for 13 integrated flow zones.*

| Zone-ID | # Model Cells | Area (acres) | Cell-to-Cell flow (cubic feet per second) | Cell-to-Cell flow (cubic feet per second/acre) |
|---|---|---|---|---|
| **0** | **1456** | **133,528** | **Inactive model grid cells** | |
| 1 | 6 | 550 | 0.03 | 0.000058 |
| 2 | 27 | 2476 | 2.07 | 0.000835 |
| 3 | 10 | 917 | 2.49 | 0.002716 |
| 4 | 68 | 6236 | 57.72 | 0.009256 |
| 5 | 27 | 2476 | 3.16 | 0.001275 |
| 6 | 43 | 3943 | 14.13 | 0.003583 |
| 7 | 122 | 11,188 | 129.46 | 0.01157 |
| 8 | 696 | 63,829 | 190.17 | 0.002979 |
| 9 | 167 | 15,315 | 193.07 | 0.012606 |
| 10 | 33 | 3026 | 5.57 | 0.001839 |
| 11 | 193 | 17,700 | 12.33 | 0.000696 |
| 12 | 222 | 20,359 | 63.63 | 0.003126 |
| 13 | 24 | 2201 | 22.37 | 0.010163 |

***Table 6.*** *Parameters used to perform a mass-balance analysis for ground-water-flow model domains in Cedar Valley, Iron County, Utah.*

| Calculated flow domain | Area (acres) | Flow+ (cubic feet per second) | Flow per acre (cfs per acre) | Current average nitrate concentration (background) (mg/L) | Number of wells sampled | Current number of septic tanks* |
|---|---|---|---|---|---|---|
| 1 | 20,726 | 14 | 0.0007 | 0.38 | 13 | 541 |
| 2 | 94,500 | 279 | 0.003 | 5.35 | 85 | 838 |
| 3 | 34,940 | 402 | 0.012 | 6.07 | 78 | 821 |

+ Data were derived using ground-water flow computer model.
* Number of septic tanks was estimated by digitizing buildings from aerial photographs and verified by Cedar City (Nolte Engineering, written communication, 2009).

***Table 7.*** *Results of the mass-balance analysis for Cedar Valley, Iron County, using the best-estimate nitrogen loading of 53.4 mg N/L+ for different ground-water-flow model domains and allowable degradation limits set by Iron County government officials.*

| Domain | Current density (acres/system) | Current number of septic tanks | Allowable degradation with respect to nitrate concentration* (mg/L) | Calculated nitrate concentration (mg/L) | Total # projected septic tanks | Calculated lot-size (acres per system) |
|---|---|---|---|---|---|---|
| 1 | 40 | 541 | 1.00 | 1.38 | 1360 | 15.5 |
| 2 | 55 | 838 | 0.35 | 5.7 | 6900 | 13.7 |
| 3 | 28 | 821 | 0.20 | 6.27 | 5700 | 6.1 |

+ Best-estimate calculation is based on a nitrogen load of 17 g N per capita per day (from Kaplan, 1988) for a 3.09-person household and 71.5 gallons per capita as the amount of indoor use water generated per household based on the 2002 Utah State Water Plan (Utah Division of Water Resources, 2001 [revised 2002]).
*Determined in consultation with Iron County government officials in Cedar City on April 22, 2010.

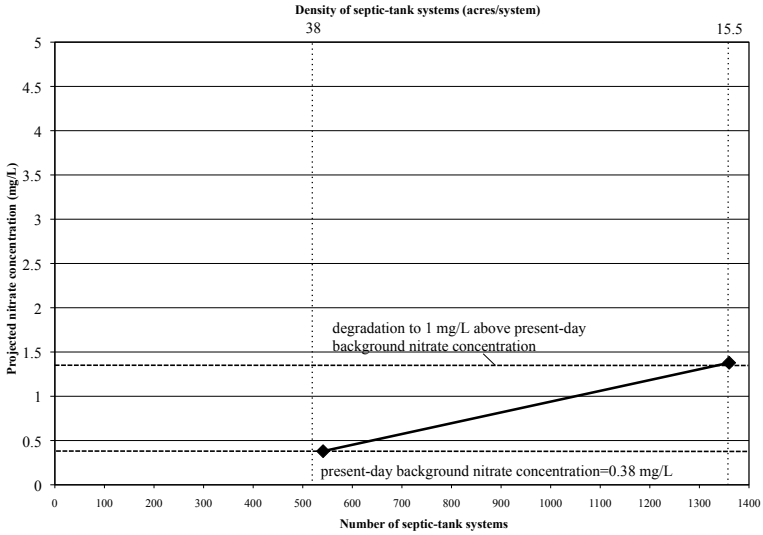


***Figure 11.*** *Projected and current septic-tank density and number of systems versus nitrate concentration for domain 1 in Cedar Valley, Utah, based on 541 existing septic tanks (see tables 6 and 7).*

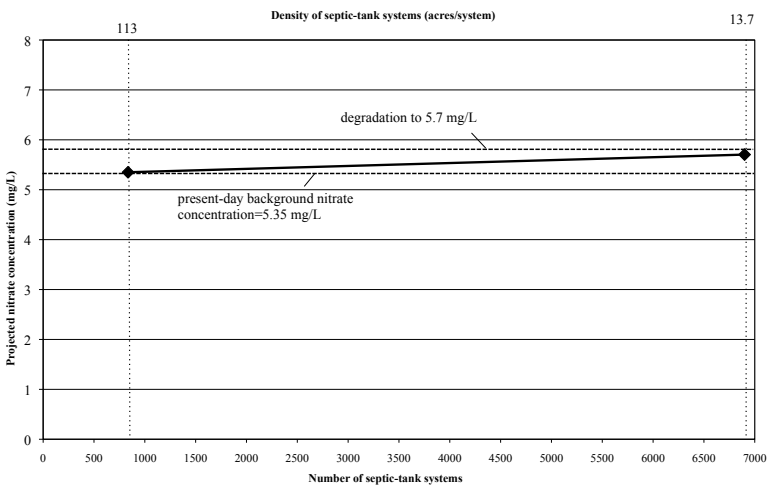


***Figure 12.*** *Projected and current septic-tank density and number of systems versus nitrate concentration for domain 2 in Cedar Valley, Iron County, Utah, based on 838 existing septic tanks (see tables 6 and 7).*

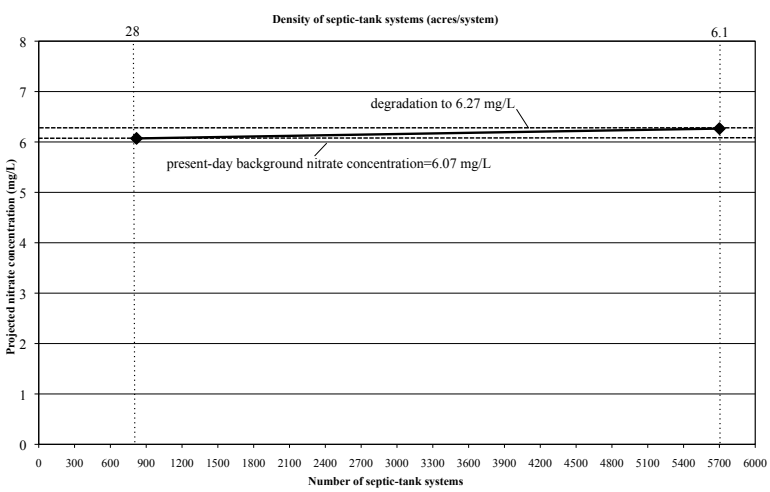


***Figure 13.*** *Projected and current septic-tank density and number of systems versus nitrate concentration for domain 3 in Cedar Valley, Iron County, Utah, based on 821 existing septic tanks (see tables 6 and 7).*

corresponds to a septic-system density of about 6.1 acres per system (2.5 $hm^2$/system) in model domain 3 (table 7).

## Recommendations for Land-Use Planning

These approximations of nitrate concentrations/water-quality degradation provide a conservative (worst case) first approximation of long-term ground-water pollution from septic-tank systems. The graphs of projected nitrate concentration versus number of septic-tank systems in each area show recommended septic-tank density for each domain based on the parameters described above. However, due to sparse data, (septic tanks and water quality data), we do not believe the mass-balance approach should be applied to the northern part of Cedar Valley. We therefore define a land-use planning domain, domain 4, in northern Cedar Valley (plate 6).

Present-day background nitrate concentration for land-use planning domain 4 is 2.6 mg/L. Five septic-tank systems are estimated to be in land-use planning domain 4 (table 8). Land-use planning domain 4 has an area of 61,237 acres (24,783 $hm^2$), so the average septic-tank system density is 12,250 acres per system (4960 $hm^2$/system) (table 8).

For land-use planning purposes, we round the calculated lot-sizes (table 7) to 15 acres (6 $hm^2$) for land-use planning domains 1 and 2, and 5 acres (2 $hm^2$) for land-use planning domain 3, and apply the most conservative of these recommendations (15 acres [6 $hm^2$]) to land-use planning domain 4 (table 8, plate 6). Land-use planning domain 1 (plate 6) has an area of 17,700 acres (7,160 $hm^2$), so our lot-size recommendation of 15 acres (6 $hm^2$) for land-use planning domain 1 would allow for a total of 1180 septic-tank systems; as there are currently 541 septic-tank systems in land-use planning domain 1, the maximum additional septic-tank systems that could be added is 639 (table 8). Land-use planning domain 2 (plate 6) has an area of 48,918 acres (19,800 $hm^2$), so our lot-size recommendation of 15 acres (6 $hm^2$) for land use planning domain 2 would allow for a total of 3261 septic-tank systems; as there are currently 836 septic-tank systems in land-use planning domain 2, the maximum additional septic-tank systems that could be added is 2426 (table 8). Land-use planning domain 3 (plate 6) has an area of 22,365 acres (9050 $hm^2$), so our lot-size recommendation of 5 acres (2 $hm^2$) for land use planning domain 3 would allow for a total of 4473 septic-tank systems; as there are currently

***Table 8.*** *Recommended lot sizes and allowable number of septic tanks in land-use planning domains based on mass-balance analysis and allowable degradation limits set by Iron County government officials in Cedar Valley, Iron County, Utah.*

| Domain | Current density (acres/system) | Current number of septic tanks | Area (acres) | Projected number of new septic tanks based on lot-size recommendation and acreage | Total number of septic tanks in land-use planning domain | Recommended lot size (acres/system) |
|---|---|---|---|---|---|---|
| 1 | 33 | 541 | 17,700 | 639 | 1180 | 15 |
| 2 | 59 | 835 | 48,918 | 2,426 | 3261 | 15 |
| 3 | 27 | 819 | 22,365 | 3,654 | 4473 | 5 |
| 4* | 12,250 | 5 | 61,237 | 4,077 | 4082 | 15 |

+ best-estimate calculation is based on a nitrogen load of 17 g N per capita per day (from Kaplan, 1988) for a 3.09-person household and 71.5 gallons per capita as the amount of indoor use water generated per household based on the 2002 Utah State Water Plan (Utah Division of Water Resources, 2002.

* Due to an insufficient amount of data in domain 4, we provide the most conservative recommendation of 15 acre lot size to be protective of ground water (see text for explanation)

819 septic-tank systems in land-use planning domain 3, the maximum additional septic-tank systems that could be added is 3654 (table 8). Land-use planning domain 4 (plate 6) has an area of 61,237 acres (24,780 $hm^2$), so our lot-size recommendation of 15 acres (6 $hm^2$) for land use planning domain 4 would allow for a total of 4082 septic-tank systems; as there are currently 5 septic-tank systems in land-use planning domain 2, the maximum additional septic-tank systems that could be added is 4077 (table 8).

Our lot-size recommendations apply to development using septic-tank systems for wastewater disposal, and are not relevant to development using well-engineered, well-constructed sewer lagoon systems. However, poorly engineered, poorly constructed sewer lagoon systems could have even greater negative impact on ground-water quality than septic-tank systems.

## SUMMARY AND CONCLUSIONS

Ground water is the principal source of drinking water in Cedar Valley. Most public water supply is from the basin-fill aquifer. The basin-fill aquifer consists primarily of Quaternary alluvial sediments, composed of discontinuous, lenticular, commonly elongated, poorly to well-sorted bodies of sand, clay, gravel, and boulders, interbedded with lava flows and containing some lacustrine and eolian deposits. Based on water-well data, the thickness of Quaternary basin fill is estimated to be at least 1000 feet (300 m); a gravity survey indicates basin fill may be as much as 3900 feet (1,200 m) thick in the eastern part of Cedar Valley.

Primary recharge areas include the bedrock uplands, the upper parts of alluvial fans along the basin margins in the eastern and western parts of the study area, and northern Cedar Valley north of Rush Lake. Basin fill in these areas consists mostly of sand and gravel lacking thick silt and clay layers. Secondary recharge areas having a thick confining layer and a downward vertical ground-water flow gradient cover much of the central part of the study area. Although some wells have discharge area characteristics in the central part of Cedar Valley, they are isolated and surrounded by wells with secondary recharge area characteristics. Therefore, we did not map a discharge area in Cedar Valley.

Based solely on ground-water recharge- and discharge-area mapping, the potential for ground-water contamination in Cedar Valley is moderate to high. Much of the water in the principal basin-fill aquifer comes from bedrock uplands where few pollutants exist that could enter the system. However, there are many potential contamination sources on the basin-fill deposits. Some of these potential contamination sources are in primary recharge areas where the principal aquifer has no significant hydrogeologic barriers to contamination from pesticides or other water-borne contaminants. We recommend caution be taken in siting potential contaminant sources, such as feed lots and septic tanks, especially in primary recharge areas. The widespread clay layers in the center of Cedar Valley may provide some protection to the principal aquifer, but their lateral continuity is unknown.

Ground-water quality classification is a relatively new tool that can be used in Utah to manage potential ground water contamination sources and protect the quality of ground water resources. The results of the ground-water quality classification for Cedar Valley, approved by the Utah Water Quality Board in 2002, indicate that the basin fill aquifer contains mostly high-quality ground water resources that warrant protection. Eighty-two percent of ground-water wells representing the aquifer in the area is classified as Class IA, and 17% is classified as Class II, based on chemical analyses of water from 119 wells sampled between

1974 and 2000 (TDS range of 140 to 1818 mg/L). Additionally, 1% of the ground-water wells representing the aquifer in the Enoch area is classified as Class III due to ground water exceeding the drinking-water quality standard of 10 mg/L for nitrate-as-nitrogen.

Septic tank soil-absorption systems are used to dispose of domestic wastewater in much of Cedar Valley. Many constituents in septic-tank effluent are known to undergo little remediation in the soil environment as they travel through the unsaturated zone to ground water; once in ground water, dilution is the principal mechanism for lowering concentrations of these constituents. We used nitrate in septic-tank effluent as an indicator for evaluating the dilution of constituents in wastewater that reach aquifers; this evaluation uses a mass-balance approach based principally on ground-water flow available for mixing with effluent constituents in the aquifer of concern. The mass-balance approach for the basin-fill aquifer in Cedar Valley, the principal source of drinking water, indicates two categories of recommended maximum septic-tank system densities are appropriate for development using septic tank soil-absorption systems for wastewater disposal: 5 and 15 acres per system (2 and 6 $hm^2$/system). These recommended minimum lot sizes are based on hydrogeologic parameters incorporated in the ground-water flow model and geographically divided into three ground-water flow domains on the basis of flow-volume similarities; a fourth domain was assigned to northern Cedar Valley due to insufficient data. We recommended a maximum septic-tank system density of 15 acres per system (6 $hm^2$/system) for this domain due to an expected low amount of ground-water available for mixing in much of the area.

## ACKNOWLEDGMENTS

This study was partly funded by the Iron County and the Central Iron County Water Conservancy District, the Utah Division of Water Rights. We thank Kelly Crane, Nolte Associates, Inc., for supplying estimates for the number of septic-tank systems in Cedar Valley, and Bill Nelson, Iron County, for providing sewer service district boundaries. We thank Rich Emerson and Kim Nay, Utah Geological Survey, for preparing the maps and figures for this paper. We thank Hugh Hurlow, Paul Inkenbrandt, Robert Ressetar, and Kimm Harty, Utah Geological Survey, for providing helpful reviews of this report.

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# APPENDICES

# APPENDIX A

RECORDS OF WATER WELLS USED TO DELINEATE RECHARGE AND DISCHARGE AREAS

## WELL-NUMBERING SYSTEM

The numbering system for wells in this study is based on the Federal Government cadastral land-survey system that divides Utah into four quadrants (A–D) separated by the Salt Lake Base Line and Meridian (figure A.1). The study area includes the southwestern quadrant (C). The wells are numbered with this quadrant letter (C), followed by township and range, all enclosed in parentheses. The next set of characters indicates the section, quarter section, quarter-quarter section, and quarter-quarter-quarter section designated by letters a through d, indicating the northeastern, northwestern, southwestern, and southeastern quadrants, respectively. A number after the hyphen corresponds to an individual well within a quarter-quarter-quarter section. For example, the well (C-37-11)9adb-1 would be the first well in the northwestern quarter of the southeastern quarter of the northeastern quarter of section 9, Township 37 South, Range 11 West (NW¼SE¼NE¼ section 9, T. 37 S., R. 11 W.).

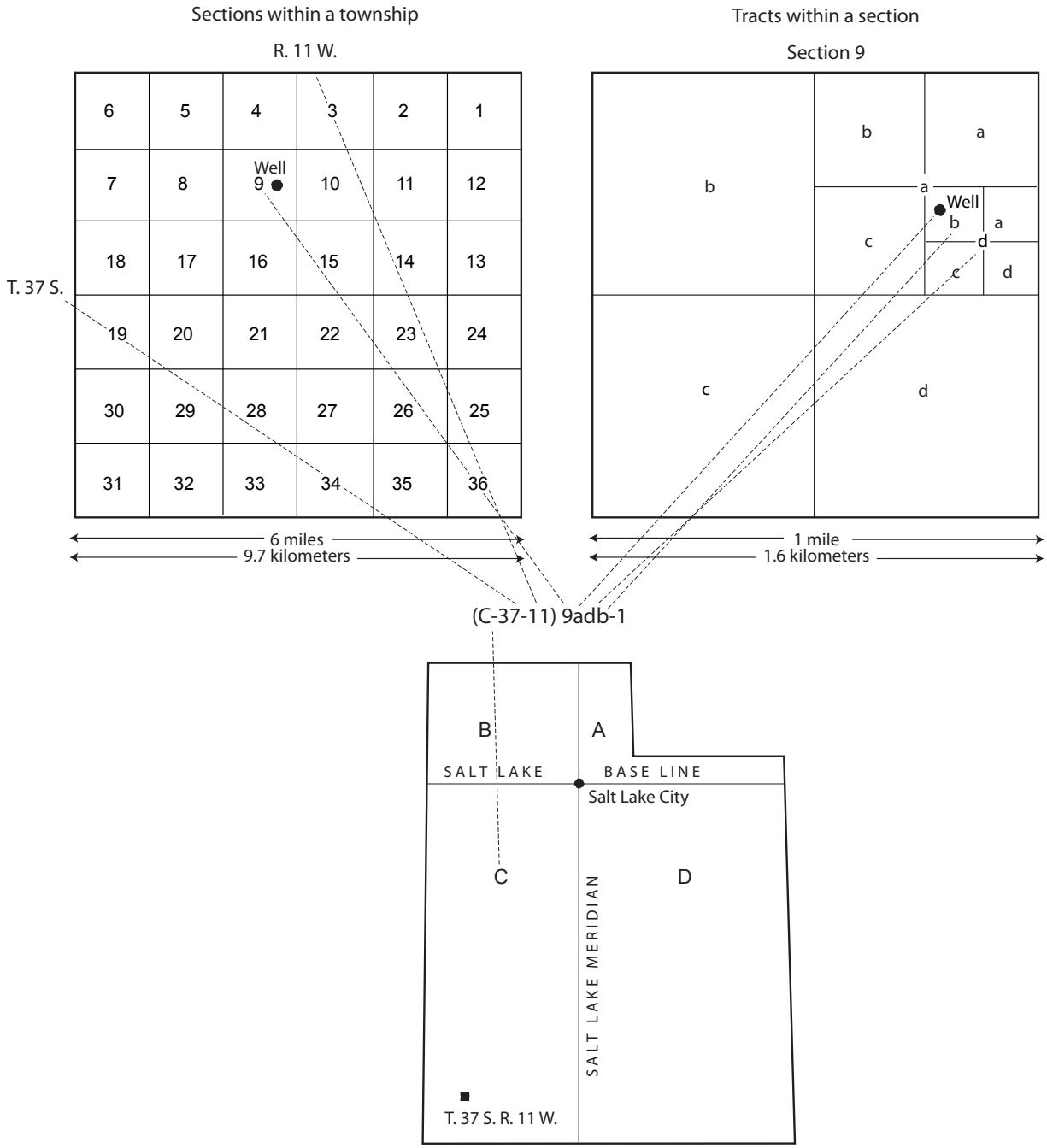


***Figure A1.*** *Numbering system for wells in Utah (see text for additional explanation).*

***Table A1.*** *Records of wells used to construct recharge area map, Cedar Valley, Iron County, Utah.*

| Site Number | Local Well number | Year well drilled | Elev-ation (ft) | Well depth (ft) | Re-charge area | Water level (ft) | Water level date | Top of confining layer (ft) | Bottom of confining layer (ft) | Depth to bedrock (ft) | Top of perfor-ations (ft) | Bottom of perfor-ations (ft) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | (C-33-11) 33cca-1 | 1997 | 5378 | 190 | 1 | 7 | 05/12/97 | 0 | 25 | N | 40 | 190MI | |
| 6 | (C-34-10) 31caa-1 | 1951 | 5487 | 220 | 1 | 47 | 05/10/51 | 0 | 25 | N | 32 | 188MI | |
| 7 | (C-34-11) 33dac-1 | 1967 | 5452 | 289 | 1 | 28 | 10/16/67 | 0 | 30 | N | 97 | 276MI | |
| 8 | (C-34-11) 1abc-1 | 1993 | 5410 | 153 | 1 | 95 | 01/11/93 | 0 | 25 | N | -- | -- | |
| 9 | (C-34-11) 1daa-1 | 1961 | 5395 | 120 | Y | 18 | 02/03/61 | -- | -- | N | -- | -- | |
| 10 | (C-34-11) 1acb-1 | 1967 | 5398 | 159 | Y | 15 | 12/07/67 | -- | -- | N | 37 | 121MI | |
| 11 | (C-34-11) 2add-1 | 1978 | 5420 | 100 | Y | 70 | ??/??/78 | -- | -- | N | 80 | 95 | |
| 12 | (C-34-11) 3cca-1 | 1945 | 5385 | 510 | N | 6 | 11/01/45 | 42 | 70 | N | 7 | -- | |
| 13 | (C-34-11) 3cdb-1 | 1947 | 5385 | 345 | N | 9 | 06/11/47 | 30 | 52 | N | 12 | 76MI | |
| 14 | (C-34-11) 9ccd-1 | 1970 | 5403 | 130 | 1 | 37 | 12/01/70 | 2 | 60 | N | 117 | 127 | |
| 15 | (C-34-11) 13bbc-1 | 1942 | 5388 | 121 | N | 6 | 06/20/42 | 45 | 100 | N | 20 | 121MI | |
| 16 | (C-34-11) 20dba-1 | 1955 | 5430 | 117 | 1 | 26 | 10/13/55 | 7 | 27 | N | 46 | 52 | |
| 17 | (C-34-11) 21dcd-1 | 1946 | 5424 | 168 | 1 | 20 | 06/15/46 | 23 | 80 | N | 85 | -- | |
| 18 | (C-34-11) 23bda-1 | 1972 | 5406 | 596 | 1 | 90 | 11/01/72 | 26 | 210 | N | 200 | 596 | |
| 19 | (C-34-11) 23bdd-1 | 1945 | 5412 | 302 | 1 | 21 | 08/02/45 | 0 | 35 | N | 35 | -- | |
| 20 | (C-34-11) 23bcd-1 | 1946 | 5415 | 162 | 1 | 20 | 04/13/46 | 0 | 58 | N | 36 | 78MI | |
| 21 | (C-34-11) 23abb-1 | 1946 | 5407 | 338 | 1 | 16 | 04/18/46 | 0 | 20 | N | 20 | 264MI | |
| 23 | (C-34-11) 28cbd-1 | 1979 | 5437 | 160 | 1 | 23 | 07/06/79 | 0 | 40 | N | 50 | 90 | |
| 24 | (C-34-11) 31ccc-1 | 1980 | 5595 | 322 | 1 | 223 | 09/16/80 | 55 | 110 | N | 190 | 268 | |
| 25 | (C-34-11) 31ccb-1 | 1971 | 5595 | 253 | 1 | 223 | 09/08/71 | 33 | 100 | N | 232 | 242 | |
| 26 | (C-34-11) 33dac-1 | 1993 | 5452 | 530 | 1 | 45 | 05/17/93 | 0 | 25 | N | 295 | 515MI | |
| 27 | (C-34-11) 33dbd-1 | 1984 | 5450 | 230 | 1 | 20 | 07/27/84 | 20 | 50 | N | 190 | 230 | |
| 28 | (C-34-11) 33dad-1 | 1983 | 5452 | 188 | 1 | 20 | 06/25/83 | 19 | 55 | N | 148 | 188 | |
| 29 | (C-34-11) 33ddb-1 | 1979 | 5451 | 255 | 1 | 23 | 11/16/79 | 0 | 78 | N | 108 | 126 | |
| 30 | (C-34-11) 33dcd-1 | 1964 | 5453 | 250 | N | 28 | 06/12/64 | 81 | 112 | N | 79 | 228MI | |
| 31 | (C-34-11) 33dac-1 | 1967 | 5455 | 289 | 1 | 28 | 10/16/67 | 0 | 30 | N | 97 | 276MI | |
| 32 | (C-34-11) 33bca-1 | 1965 | 5442 | 161 | 1 | 38 | 05/22/65 | 15 | 48 | N | 141 | 161 | |
| 33 | (C-34-11) 33bbc-1 | 1964 | 5452 | 125 | Y | 25 | 04/27/64 | -- | -- | N | 82 | 112 | |
| 34 | (C-34-11) 34cca-1 | 1996 | 5452 | 360 | 1 | 30 | 10/08/96 | 0 | 47 | N | 280 | 360 | |
| 35 | (C-34-11) 28dcd-1 | 1959 | 5437 | 300 | 1 | 30 | 11/10/59 | 89 | 111 | N | 60 | 261 | |
| 36 | (C-34-11) 35abc-1 | 1949 | 5443 | 255 | 1 | 26 | 10/01/49 | 31 | 60 | N | -- | -- | |
| 37 | (C-34-11) 36dcc-3 | 1952 | 5460 | 148 | N | +F | 04/03/52 | 98 | 102 | N | 16 | 130 | flowing well |
| 38 | (C-34-11) 36bcc-1 | 1995 | 5446 | 320 | 1 | 72 | 02/06/95 | 89 | 132 | N | 200 | 320MI | |
| 39 | (C-34-11) 36aad-1 | 1952 | 5481 | 131 | N | 2 | 02/15/52 | -- | -- | N | 20 | 115 | |
| 40 | (C-35-10) 7adc-1 | 1999 | 5620 | 450 | 1 | 110 | 04/01/99 | 0 | 23 | N | 150 | 450 | |
| 41 | (C-35-10) 8cca-1 | 1968 | 5730 | 232 | Y | 140 | 12/20/68 | -- | -- | N | 150 | 230 | |
| 42 | (C-35-10) 8ccd-1 | 1997 | 5740 | 276 | Y | 167 | 04/24/97 | -- | -- | N | 246 | 276 | |
| 43 | (C-35-10) 18abc-1 | 1995 | 5640 | 200 | Y | 136 | 03/21/95 | -- | -- | N | 151 | 194 | |
| 44 | (C-35-10) 30bbb-1 | 1995 | 5795 | 400 | 1 | 302 | 05/04/95 | 68 | 89 | N | 240 | 400MI | |
| 45 | (C-35-11) 1ccc-1 | 1996 | 5461 | 830 | 1 | 53 | 03/06/96 | 100 | 165 | N | 300 | 830MI | |
| 46 | (C-35-11) 1bbb-1 | 1998 | 5454 | 430 | 1 | 55 | 08/25/98 | 60 | 96 | N | 340 | 420MI | |

***Table A1.*** *continued*

| Site Number | Local Well number | Year well drilled | Elev-ation (ft) | Well depth (ft) | Re-charge area | Water level (ft) | Water level date | Top of confining layer (ft) | Bottom of confining layer (ft) | Depth to bedrock (ft) | Top of perfor-ations (ft) | Bottom of perfor-ations (ft) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | (C-35-11) 1ccc-1 | 1982 | 5468 | 368 | 1 | 67 | 05/09/82 | 80 | 138 | N | -- | -- | |
| 48 | (C-35-11) 2acc-1 | 1975 | 5465 | 250 | 1 | 60 | 09/28/75 | 70 | 155 | N | 223 | 224 | |
| 49 | (C-35-11) 3ccc-1 | 1983 | 5468 | 750 | Y | 40 | 10/10/83 | -- | -- | N | 390 | 690 | |
| 50 | (C-35-11) 3ccc-1 | 1983 | 5468 | 165 | Y | 21 | 05/13/83 | -- | -- | N | 127 | 165 | |
| 51 | (C-35-11) 4abd-1 | 1970 | 5460 | 195 | Y | 25 | 05/26/70 | -- | -- | N | 84 | 153MI | |
| 52 | (C-35-11) 4daa-1 | 1996 | 5467 | 460 | 1 | 12 | 07/27/96 | 0 | 75 | N | 120 | 446MI | |
| 53 | (C-34-11) 33dcd-1 | 1949 | 5453 | 516 | 1 | 2 | 10/20/49 | 24 | 45 | N | 53 | 516 | |
| 54 | (C-35-11) 4abd-1 | 1973 | 5461 | 312 | 1 | 43 | 09/01/73 | 34 | 56 | N | 200 | 312 | |
| 55 | (C-35-11) 4baa-1 | 1996 | 5457 | 300 | 1 | 24 | 07/09/96 | 1 | 21 | N | 260 | 300 | |
| 56 | (C-35-11) 4bdb-1 | 1995 | 5464 | 300 | 1 | 50 | 08/23/95 | 0 | 23 | N | 180 | 300 | |
| 57 | (C-35-11) 4add-1 | 1994 | 5465 | 385 | 1 | 33 | 12/27/94 | 0 | 87 | N | 268 | 368 | |
| 58 | (C-35-11) 4dda-1 | 1993 | 5472 | 352 | 1 | 55 | 11/02/93 | 0 | 75 | N | 338 | 348 | |
| 59 | (C-35-11) 5cdd-1 | 1998 | 5473 | 280 | 1 | 30 | 09/19/98 | 0 | 142 | N | 142 | 170MI | |
| 61 | (C-35-11) 6cbd-1 | 1996 | 5522 | 209 | 1 | 154 | 08/16/96 | 67 | 113 | N | 169 | 209 | |
| 62 | (C-35-11) 7dbd-1 | 1980 | 5480 | 110 | Y | 75 | 12/22/80 | -- | -- | N | 70 | 110 | |
| 63 | (C-35-11) 7bcb-1 | 1946 | 5489 | 190 | 1 | 38 | 11/11/46 | 0 | 60 | N | -- | -- | |
| 64 | (C-35-11) 8ddd-1 | 1953 | 5493 | 260 | 1 | 20 | 04/30/53 | 0 | 23 | N | 30 | -- | |
| 65 | (C-35-11) 8dab-1 | 1994 | 5486 | 210 | 1 | 32 | 05/27/94 | 3 | 45 | N | 160 | 210 | |
| 66 | (C-35-11) 8ddd-1 | 1943 | 5493 | 198 | 1 | 17 | 05/27/43 | 0 | 86 | N | 86 | 198MI | |
| 67 | (C-35-11) 8cdd-1 | 1971 | 5492 | 300 | 1 | 45 | 11/20/71 | 0 | 52 | N | 200 | 300 | |
| 68 | (C-35-11) 8bbd-1 | 1992 | 5483 | 195 | 1 | 28 | 12/05/92 | 5 | 45 | N | 175 | 195 | |
| 69 | (C-35-11) 9aaa-1 | 1996 | 5478 | 360 | 1 | 30 | 03/20/96 | 0 | 54 | N | 70 | 360MI | |
| 70 | (C-35-11) 9dad-1 | 1993 | 5487 | 400 | 1 | 42 | 06/09/93 | 17 | 78 | N | 280 | 400 | |
| 71 | (C-35-11) 9dbb-1 | 1992 | 5485 | 205 | 1 | 30 | 12/23/92 | 42 | 63 | N | 185 | 205 | |
| 72 | (C-35-11) 9abb-1 | 1998 | 5475 | 465 | 1 | 20 | 12/04/98 | 0 | 43 | N | 180 | 465MI | |
| 73 | (C-35-11) 9cbd-1 | 1989 | 5485 | 250 | 1 | 20 | 10/18/89 | 1 | 65 | N | 120 | 190MI | |
| 74 | (C-35-11) 9ccd-1 | 1945 | 5492 | 142 | 1 | 18 | 09/10/45 | 0 | 25 | N | 130 | 142 | |
| 75 | (C-35-11) 10ddc-1 | 1994 | 5493 | 273 | Y | 36 | 05/24/94 | -- | -- | N | 153 | 273MI | |
| 76 | (C-35-11) 11ccd-1 | 1948 | 5496 | 163 | 1 | 14 | 06/23/48 | 0 | 40 | N | -- | -- | |
| 77 | (C-35-11) 10dac-1 | 1998 | 5488 | 460 | 1 | 42 | 01/29/98 | 0 | 94 | N | 300 | 460MI | |
| 78 | (C-35-11) 10cca-1 | 1983 | 5488 | 145 | Y | 22 | 04/26/83 | -- | -- | N | 120 | 145 | |
| 79 | (C-35-11) 10ccc-1 | 1989 | 5495 | 400 | 1 | 40 | 07/18/89 | 96 | 167 | N | 200 | 400 | |
| 80 | (C-35-11) 10ddc-1 | 1968 | 5494 | 320 | 1 | 41 | 06/14/68 | 85 | 133 | N | 253 | 303MI | |
| 81 | (C-35-11) 10cdd-2 | 1955 | 5490 | 152 | 1 | 20 | 05/03/55 | 0 | 28 | N | -- | -- | |
| 82 | (C-35-11) 10dbb-1 | 1995 | 5485 | 470 | 1 | 29 | 01/11/95 | 0 | 26 | N | 435 | 455 | |
| 83 | (C-35-11) 10bad-1 | 1983 | 5481 | 295 | 1 | 22 | 08/23/83 | 0 | 54 | N | -- | -- | |
| 84 | (C-35-11) 10ccc-1 | 1946 | 5496 | 273 | 1 | 20 | 04/15/46 | 0 | 54 | N | 57 | 273MI | |
| 85 | (C-35-11) 11dca-1 | 1960 | 5494 | 301 | 1 | 30 | 02/14/60 | 0 | 28 | N | 216 | 293MI | |
| 86 | (C-35-11) 11ccc-1 | 1970 | 5492 | 300 | N | 32 | 12/11/70 | 75 | 140 | N | 216 | 300 | |
| 87 | (C-35-11) 11aaa-1 | 1974 | 5467 | 400 | 1 | 45 | 07/23/74 | 12 | 60 | N | 240 | 400 | |
| 88 | (C-35-11) 11cdc-1 | 1944 | 5494 | 268 | N | 7 | 06/12/44 | -- | -- | N | 147 | 152 | |
| 89 | (C-35-11) 12add-1 | 1994 | 5485 | 810 | 1 | 48 | 10/20/94 | 0 | 34 | N | 200 | 810MI | |

***Table A1.*** *continued*

| Site Number | Local Well number | Year well drilled | Elev-ation (ft) | Well depth (ft) | Re-charge area | Water level (ft) | Water level date | Top of confining layer (ft) | Bottom of confining layer (ft) | Depth to bedrock (ft) | Top of perfor-ations (ft) | Bottom of perfor-ations (ft) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 90 | (C-35-11) 12dbb-1 | 1994 | 5480 | 320 | 1 | 60 | 12/20/94 | 6 | 120 | N | 240 | 320MI | |
| 91 | (C-35-11) 12dcb-1 | 1996 | 5487 | 327 | 1 | 30 | 11/20/96 | 11 | 105 | N | 284 | 310MI | |
| 92 | (C-35-11) 12dab-1 | 1996 | 5485 | 353 | 1 | 55 | 10/14/96 | 0 | 75 | N | 276 | 346 | |
| 93 | (C-35-11) 12dbc-1 | 1993 | 5485 | 334 | 1 | 42 | 11/02/93 | 0 | 251 | N | 254 | 334 | |
| 94 | (C-35-11) 12dcc-1 | 1982 | 5492 | 329 | Y | 45 | 06/29/82 | -- | -- | N | 245 | 305 | |
| 95 | (C-35-11) 12ccc-1 | 1968 | 5488 | 700 | 1 | 20 | 02/17/68 | 0 | 90 | N | 100 | 700 | |
| 96 | (C-35-11) 12dcd-1 | 1943 | 5496 | 216 | Y | 12 | 06/23/43 | -- | -- | N | 30 | 216 | poor descriptions |
| 97 | (C-35-11) 13dca-1 | 1950 | 5535 | 153 | 1 | 45 | 11/09/50 | 6 | 50 | N | 122 | 141MI | |
| 98 | (C-35-11) 13bad-1 | 1945 | 5497 | 202 | 1 | 55 | 08/22/45 | 0 | 27 | N | 55 | 202 | |
| 99 | (C-35-11) 13cac-1 | 1949 | 5514 | 167 | 1 | 24 | 08/06/49 | 6 | 35 | N | 95 | 133MI | |
| 100 | (C-35-11) 13dda-1 | 1945 | 5555 | 206 | 1 | 50 | 07/21/45 | 0 | 40 | N | 62 | 113 | |
| 101 | (C-35-11) 14aac-1 | 1960 | 5495 | 665 | Y | 18 | 05/01/60 | -- | -- | N | 80 | 120 | |
| 102 | (C-35-11) 14bbb-1 | 1976 | 5492 | 501 | Y | 35 | 09/26/76 | -- | -- | N | 200 | 501 | |
| 103 | (C-35-11) 14bac-1 | 1956 | 5499 | 202 | N | 28 | 08/15/56 | 66 | 94 | N | 58 | 202 | |
| 104 | (C-35-11) 15daa-1 | 1980 | 5510 | 402 | 1 | 52 | 04/28/80 | 0 | 58 | N | 180 | 404MI | |
| 105 | (C-35-11) 15acc-1 | 1978 | 5507 | 495 | Y | 40 | 07/19/78 | -- | -- | N | 232 | 495 | |
| 106 | (C-35-11) 15aac-1 | 1960 | 5500 | 245 | 1 | 55 | 08/04/60 | 0 | 30 | N | 212 | 233MI | |
| 107 | (C-35-11) 15dba-2 | 1937 | 5495 | 267 | N | 4 | ??/??/37 | -- | -- | N | -- | -- | |
| 108 | (C-35-11) 15abb-1 | 1955 | 5495 | 185 | 1 | 21 | 06/01/55 | 20 | 46 | N | 128 | 150 | |
| 109 | (C-35-11) 15dab-1 | 1961 | 5507 | 272 | N | 28 | 01/13/61 | 0 | 30 | N | 75 | 272MI | |
| 110 | (C-35-11) 16acd-1 | 1975 | 5504 | 860 | N | 52 | 07/18/75 | 26 | 48 | N | 416 | 712MI | |
| 111 | (C-35-11) 16dcc-1 | 1995 | 5514 | 300 | 1 | 35 | 11/20/95 | 0 | 38 | N | 220 | 300 | |
| 112 | (C-35-11) 16acc-1 | 1972 | 5504 | 510 | 1 | 100 | 10/20/72 | 0 | 31 | N | 180 | 500 | |
| 113 | (C-35-11) 16aab-1 | 1960 | 5494 | 120 | 1 | 41 | 09/02/60 | 0 | 83 | N | 110 | 116 | |
| 114 | (C-35-11) 17dcd-1 | 1993 | 5509 | 325 | 1 | 35 | 02/04/93 | 0 | 30 | N | 205 | 318MI | |
| 115 | (C-35-11) 17aac-1 | 1995 | 5495 | 185 | 1 | 40 | 10/21/95 | 0 | 80 | N | 165 | 171 | |
| 116 | (C-35-11) 17dcd-1 | 1999 | 5509 | 240 | 1 | 25 | ??/??/99 | 0 | 23 | N | 220 | 240 | |
| 117 | (C-35-11) 19bda-1 | 1963 | 5505 | 501 | N | 45 | 07/18/63 | 200 | 228 | N | 400 | 495 | |
| 118 | (C-35-11) 19dcc-1 | 1995 | 5513 | 500 | 1 | 54 | 11/29/95 | 0 | 20 | N | 338 | 435MI | |
| 119 | (C-35-11) 19cbd-1 | 1993 | 5518 | 800 | 1 | 50 | 05/17/93 | 0 | 101 | N | 200 | 800MI | |
| 120 | (C-35-11) 19bda-2 | 1946 | 5505 | 163 | 1 | 52 | 11/02/46 | 0 | 50 | N | -- | -- | |
| 121 | (C-35-11) 19acc-1 | 1940 | 5505 | 145 | 1 | 24 | 04/22/40 | 0 | 50 | N | -- | -- | |
| 122 | (C-35-11) 19acd-1 | 1995 | 5508 | 472 | 1 | 46 | 05/19/95 | 45 | 99 | N | -- | -- | |
| 123 | (C-35-11) 21bcc-1 | 1995 | 5525 | 470 | 1 | 88 | 07/28/95 | 0 | 65 | N | 416 | 461MI | |
| 124 | (C-35-11) 21abd-1 | 1975 | 5520 | 317 | Y | 45 | 07/19/75 | -- | -- | N | 150 | 317 | |
| 125 | (C-35-11) 21cdd-1 | 1976 | 5538 | 255 | 1 | 78 | 07/28/76 | 70 | 90 | N | 217 | 232 | |
| 126 | (C-35-11) 21cab-1 | 1989 | 5528 | 420 | 1 | 70 | 09/03/89 | 0 | 67 | N | 380 | 420 | |
| 127 | (C-35-11) 21dcc-1 | 1982 | 5546 | 300 | 1 | 32 | 08/08/82 | 31 | 63 | N | 100 | 300 | |
| 128 | (C-35-11) 21cda-1 | 1979 | 5535 | 304 | 1 | 90 | 06/18/79 | 9 | 42 | N | 224 | 304 | |
| 129 | (C-35-11) 21abb-1 | 1945 | 5517 | 136 | Y | 28 | 11/15/45 | -- | -- | N | 132 | 136 | |
| 130 | (C-35-11) 21cdb-1 | 1967 | 5532 | 251 | 1 | 50 | 06/07/67 | 0 | 45 | N | 60 | 233MI | |
| 131 | (C-35-11) 21dbd-2 | 1940 | 5541 | 232 | 1 | 33 | 05/18/40 | 0 | 68 | N | -- | -- | |

***Table A1.*** *continued*

| Site Number | Local Well number | Year well drilled | Elev-ation (ft) | Well depth (ft) | Re-charge area | Water level (ft) | Water level date | Top of confining layer (ft) | Bottom of confining layer (ft) | Depth to bedrock (ft) | Top of perfor-ations (ft) | Bottom of perfor-ations (ft) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 132 | (C-35-11) 21bab-1 | 1993 | 5518 | 450 | 1 | 120 | 07/28/93 | 84 | 110 | N | 380 | 450 | |
| 133 | (C-35-11) 21cad-1 | 1994 | 5526 | 435 | 1 | 80 | 10/14/94 | 82 | 238 | N | 238 | 435MI | |
| 134 | (C-35-11) 21dcc-1 | 1973 | 5539 | 370 | 1 | 66 | 02/09/63 | 110 | 157 | N | 284 | 295 | |
| 135 | (C-35-11) 22acb-2 | 1948 | 5525 | 238 | 1 | 29 | 07/01/48 | 0 | 71 | N | 202 | 238 | |
| 136 | (C-35-11) 22bbb-1 | 1994 | 5517 | 400 | 1 | 70 | 03/14/94 | 31 | 55 | N | 100 | 400 | |
| 137 | (C-35-11) 22adc-1 | 1948 | 5529 | 118 | 1 | 21 | 09/12/48 | 0 | 97 | N | 101 | 116 | |
| 138 | (C-35-11) 22dbd-1 | 1982 | 5535 | 300 | Y | 42 | 07/27/82 | -- | -- | N | 140 | 280 | |
| 139 | (C-35-11) 23abb-1 | 1987 | 5523 | 635 | Y | 71 | 07/02/87 | -- | -- | N | 120 | 635 | |
| 140 | (C-35-11) 23bdd-1 | 1954 | 5545 | 161 | 1 | 55 | 09/14/54 | 0 | 25 | N | 95 | 143MI | |
| 141 | (C-35-11) 23bcc-2 | 1948 | 5528 | 176 | 1 | 24 | 03/24/48 | 0 | 50 | N | 84 | 176 | |
| 142 | (C-35-11) 23abd-1 | 1952 | 5545 | 178 | 1 | 21 | 01/07/52 | 73 | 152 | N | 155 | 178 | |
| 143 | (C-35-11) 24cca-1 | 1980 | 5712 | 430 | Y | 160 | 09/05/80 | -- | -- | N | 100 | 430MI | |
| 144 | (C-35-11) 24bdd-1 | 1948 | 5605 | 141 | 1 | 110 | 07/16/48 | 90 | 110 | N | 115 | 140MI | |
| 145 | (C-35-11) 24ddc-1 | 1948 | 5538 | 182 | Y | 142 | 11/24/48 | -- | -- | N | 167 | 182 | |
| 146 | (C-35-11) 24bcc-1 | 1997 | 5591 | 300 | Y | 141 | 05/22/97 | -- | -- | N | 126 | 286MI | |
| 147 | (C-35-11) 26dcb-1 | 1989 | 5700 | 250 | 1 | 20 | 10/18/89 | 1 | 65 | N | 120 | 190MI | |
| 148 | (C-35-11) 26cba-1 | 1972 | 5612 | 265 | Y | 57 | 10/15/72 | -- | -- | N | 120 | 265 | |
| 149 | (C-35-11) 26cbd-1 | 1993 | 5638 | 300 | 1 | 156 | 11/03/93 | 0 | 28 | N | 220 | 300 | |
| 150 | (C-35-11) 26ddb-1 | 1970 | 5740 | 280 | Y | 201 | 08/05/70 | -- | -- | N | 220 | 280 | poor descriptions |
| 151 | (C-35-11) 27bcc-1 | 1994 | 5555 | 335 | 1 | 60 | 04/04/94 | 0 | 35 | N | 200 | 335 | |
| 152 | (C-35-11) 27bba-1 | 1994 | 5543 | 506 | 1 | -- | 02/08/94 | 0 | 26 | N | -- | -- | dry hole |
| 153 | (C-35-11) 27dbb-1 | 1957 | 5560 | 228 | Y | 62 | 04/13/57 | -- | -- | N | 100 | 190 | |
| 154 | (C-35-11) 27bab-2 | 1997 | 5542 | 404 | 1 | 90 | 06/13/97 | 0 | 34 | N | 80 | 404 | |
| 155 | (C-35-11) 27cad-1 | 1991 | 5563 | 261 | 1 | 80 | 09/30/91 | 0 | 23 | N | 120 | 261 | |
| 156 | (C-35-11) 27bda-1 | 1989 | 5553 | 101 | Y | 42 | 11/25/89 | -- | -- | N | 61 | 101 | |
| 157 | (C-35-11) 27bcb-1 | 1970 | 5548 | 198 | 1 | 64 | 11/05/70 | 28 | 66 | N | 66 | 190MI | |
| 158 | (C-35-11) 27aba-1 | 1975 | 5540 | 200 | N | 44 | 07/07/75 | -- | -- | N | 50 | 172MI | |
| 159 | (C-35-11) 27dbb-1 | 1960 | 5562 | 156 | Y | 156 | 08/19/60 | -- | -- | N | 82 | 156MI | |
| 160 | (C-35-11) 27bab-1 | 1995 | 5544 | 118 | Y | 48 | 03/27/95 | -- | -- | N | 78 | 118 | |
| 161 | (C-35-11) 27bab-2 | 1956 | 5544 | 204 | 1 | 49 | 04/19/56 | 0 | 38 | N | 53 | 191MI | |
| 162 | (C-35-11) 27bcc-1 | 1952 | 5553 | 101 | 1 | 49 | 12/23/52 | 0 | 30 | N | 85 | 101 | |
| 163 | (C-35-11) 28aac-1 | 1977 | 5547 | 354 | Y | 85 | 09/05/77 | -- | -- | N | -- | -- | |
| 164 | (C-35-11) 28adb-1 | 1983 | 5554 | 298 | 1 | 42 | 05/26/83 | 0 | 30 | N | 161 | 298 | |
| 165 | (C-35-11) 28adc-1 | 1993 | 5556 | 300 | 1 | 70 | 02/23/93 | 0 | 54 | N | 220 | 300 | |
| 166 | (C-35-11) 28ccc-1 | 1948 | 5557 | 172 | 1 | 64 | 11/15/48 | 4 | 34 | N | 132 | 172 | |
| 167 | (C-35-11) 28aba-1 | 1945 | 5544 | 88 | Y | 38 | 11/19/45 | -- | -- | N | 80 | 88 | |
| 168 | (C-35-11) 28abc-1 | 1943 | 5546 | 94 | Y | 18 | 09/25/43 | -- | -- | N | 84 | 94 | poor descriptions |
| 169 | (C-35-11) 28aca-1 | 1993 | 5551 | 276 | 1 | 69 | 08/27/93 | 0 | 34 | N | 156 | 276 | |
| 170 | (C-35-11) 29add-1 | 1950 | 5544 | 423 | 1 | 44 | 07/31/50 | 0 | 82 | N | 123 | 423MI | |
| 171 | (C-35-11) 29add-1 | 1950 | 5544 | 418 | 1 | 18 | 08/31/50 | 0 | 74 | N | -- | -- | |
| 172 | (C-35-11) 29dcd-1 | 1939 | 5552 | 204 | Y | 41 | 06/06/39 | -- | -- | N | 86 | 204 | |
| 173 | (C-35-11) 29dcb-1 | 1975 | 5545 | 120 | 1 | 52 | 03/25/75 | 0 | 20 | N | 96 | 100 | |

***Table A1.*** *continued*

| Site Number | Local Well number | Year well drilled | Elev-ation (ft) | Well depth (ft) | Re-charge area | Water level (ft) | Water level date | Top of confining layer (ft) | Bottom of confining layer (ft) | Depth to bedrock (ft) | Top of perfor-ations (ft) | Bottom of perfor-ations (ft) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 174 | (C-35-11) 29abd-1 | 1978 | 5536 | 300 | 1 | 80 | 09/28/78 | 0 | 40 | N | 200 | 300 | |
| 175 | (C-35-11) 29abd-1 | 1978 | 5536 | 290 | 1 | 40 | 09/18/78 | 0 | 30 | N | 230 | 290 | |
| 176 | (C-35-11) 29adc-1 | 1962 | 5544 | 432 | N | 59 | 01/07/62 | 130 | 166 | N | 80 | 371MI | |
| 177 | (C-35-11) 29cca-1 | 1996 | 5536 | 609 | 1 | 71 | 11/20/96 | 0 | 63 | N | 50 | 609 | |
| 178 | (C-35-11) 30acc-1 | 1995 | 5522 | 426 | 1 | 42 | 03/08/95 | 0 | 43 | N | 361 | 424MI | |
| 179 | (C-35-11) 30abb-1 | 1992 | 5515 | 440 | 1 | 52 | 11/25/92 | 0 | 113 | N | 361 | 425 | |
| 180 | (C-35-11) 30abb-1 | 1996 | 5515 | 56 | 1 | 56 | 11/28/96 | 0 | 49 | N | 337 | 377 | |
| 181 | (C-35-11) 30aaa-1 | 1990 | 5521 | 335 | 1 | 13 | 08/17/90 | 0 | 64 | N | 295 | 330 | |
| 182 | (C-35-11) 30bad-1 | 1980 | 5516 | 325 | 1 | 32 | 06/05/80 | 90 | 143 | N | 306 | 307 | |
| 183 | (C-35-11) 30dcc-1 | 1956 | 5526 | 200 | 1 | 41 | 03/10/56 | 2 | 28 | N | -- | -- | |
| 184 | (C-35-11) 30adb-1 | 1995 | 5525 | 281 | 1 | 55 | 11/27/95 | 0 | 80 | N | 275 | 278 | |
| 185 | (C-35-11) 30adc-1 | 1994 | 5527 | 321 | 1 | 60 | 11/21/94 | 0 | 170 | N | -- | -- | |
| 186 | (C-35-11) 30adb-1 | 1993 | 5526 | 295 | 1 | 82 | 09/10/93 | 0 | 31 | N | -- | -- | |
| 187 | (C-35-11) 30adb-1 | 1993 | 5526 | 270 | 1 | 91 | 07/26/93 | 105 | 145 | N | -- | -- | |
| 188 | (C-35-11) 31bac-1 | 1954 | 5523 | 200 | 1 | 48 | 08/13/54 | 1 | 30 | N | 157 | 196MI | |
| 189 | (C-35-11) 31acd-1 | 1951 | 5536 | 472 | N | 14 | 05/19/51 | 97 | 168 | N | 80 | 472MI | |
| 190 | (C-35-11) 31cab-2 | 1956 | 5524 | 153 | 1 | 34 | 03/28/56 | 0 | 32 | N | -- | -- | |
| 191 | (C-35-11) 31dab-1 | 1952 | 5536 | 188 | Y | 38 | 04/24/52 | -- | -- | N | 172 | 182 | |
| 192 | (C-35-11) 31dbd-1 | 1977 | 5535 | 298 | 1 | 51 | 04/11/77 | 40 | 84 | N | 172 | 265MI | |
| 193 | (C-35-11) 31cbb-1 | 1992 | 5520 | 250 | 1 | 33 | 11/16/92 | 33 | 62 | N | 210 | 250 | |
| 194 | (C-35-11) 31bdb-1 | 1995 | 5524 | 760 | 1 | 52 | 03/16/95 | 27 | 109 | N | 280 | 760MI | |
| 195 | (C-35-11) 32bda-1 | 1975 | 5546 | 415 | Y | 55 | 04/19/75 | -- | -- | N | 216 | 384MI | |
| 196 | (C-35-11) 32dac-1 | 1981 | 5563 | 158 | Y | 62 | 02/17/81 | -- | -- | N | 140 | 151 | |
| 197 | (C-35-11) 32aac-1 | 1974 | 5554 | 195 | 1 | 69 | 12/10/74 | 2 | 40 | N | 110 | 147MI | |
| 198 | (C-35-11) 32ccd-1 | 1961 | 5553 | 253 | Y | 74 | 09/13/61 | -- | -- | N | 97 | 222MI | |
| 199 | (C-35-11) 32daa-1 | 1974 | 5564 | 201 | Y | 85 | 10/16/74 | -- | -- | N | 160 | 195 | |
| 200 | (C-35-11) 32abd-2 | 1945 | 5555 | 256 | 1 | 43 | 07/06/45 | 0 | 60 | N | 75 | 256 | |
| 201 | (C-35-11) 32daa-1 | 1945 | 5566 | 258 | 1 | 50 | 06/06/45 | 0 | 50 | N | 78 | 258 | |
| 202 | (C-35-11) 32bda-1 | 1964 | 5546 | 252 | Y | 64 | 02/17/64 | -- | -- | N | 82 | 250 | |
| 203 | (C-35-11) 32aad-1 | 1955 | 5556 | 147 | 1 | 76 | 09/07/55 | 6 | 42 | N | -- | -- | |
| 204 | (C-35-11) 32aca-1 | 1936 | 5555 | 223 | 1 | 41 | 07/29/36 | 0 | 55 | N | 60 | 223 | |
| 205 | (C-35-11) 32add-1 | 1940 | 5565 | 200 | Y | 52 | 03/20/40 | -- | -- | N | 70 | 200 | |
| 206 | (C-35-11) 32cdd-1 | 1953 | 5556 | 164 | 1 | 58 | 09/19/53 | 0 | 42 | N | 63 | 130MI | |
| 207 | (C-35-11) 32acc-1 | 1994 | 5553 | 85 | 1 | 85 | 08/04/94 | 46 | 77 | N | -- | -- | |
| 208 | (C-35-11) 33aac-1 | 1994 | 5575 | 265 | 1 | 90 | 08/11/94 | 0 | 40 | N | 198 | 208MI | |
| 209 | (C-35-11) 33bac-1 | 1980 | 5568 | 405 | Y | 60 | 06/01/80 | -- | -- | N | 185 | 405 | |
| 210 | (C-35-11) 33aac-2 | 1952 | 5575 | 148 | 1 | 148 | 12/19/52 | 0 | 35 | N | 127 | 148MI | |
| 211 | (C-35-11) 33dbd-1 | 1951 | 5585 | 206 | Y | 78 | 05/12/51 | -- | -- | N | 81 | 200MI | |
| 212 | (C-35-11) 33ccd-1 | 1971 | 5575 | 217 | Y | 88 | 12/30/71 | -- | -- | N | 100 | 215 | |
| 213 | (C-35-11) 33aba-1 | 1952 | 5572 | 140 | Y | 72 | 12/09/52 | -- | -- | N | 118 | 140MI | |
| 214 | (C-35-11) 33abd-1 | 1956 | 5578 | 217 | Y | 85 | 02/25/56 | -- | -- | N | 85 | 217 | |
| 215 | (C-35-11) 33bbb-1 | 1954 | 5557 | 120 | Y | 70 | 12/16/54 | -- | -- | N | 100 | 114 | |

***Table A1.*** *continued*

| Site Number | Local Well number | Year well drilled | Elev-ation (ft) | Well depth (ft) | Re-charge area | Water level (ft) | Water level date | Top of confining layer (ft) | Bottom of confining layer (ft) | Depth to bedrock (ft) | Top of perfor-ations (ft) | Bottom of perfor-ations (ft) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 216 | (C-35-11) 34cdd-1 | 1994 | 5625 | 303 | Y | 140 | 09/04/94 | -- | -- | N | 223 | 303 | |
| 217 | (C-35-11) 34baa-1 | 1961 | 5579 | 241 | Y | 103 | 07/29/61 | -- | -- | N | 108 | 241 | |
| 218 | (C-35-11) 34acd-1 | 1943 | 5595 | 100 | Y | 80 | 09/20/43 | -- | -- | N | 80 | 100 | |
| 219 | (C-35-11) 34aac-1 | 1946 | 5592 | 140 | Y | 68 | 11/13/46 | -- | -- | N | 80 | 140 | |
| 220 | (C-35-11) 35cba-1 | 1973 | 5637 | 250 | Y | 100 | 06/05/73 | -- | -- | N | 100 | 150 | |
| 221 | (C-35-11) 35cda-1 | 1961 | 5682 | 238 | Y | 200 | 05/23/61 | -- | -- | N | 200 | 238 | |
| 222 | (C-35-12) 13cbb-1 | 1992 | 5625 | 350 | 1 | 130 | 08/18/92 | 128 | 155 | N | 130 | 350MI | |
| 223 | (C-35-12) 13cba-1 | 1993 | 5612 | 332 | Y | 226 | 07/13/93 | -- | -- | N | 232 | 255 | |
| 224 | (C-35-12) 14dad-1 | 1993 | 5615 | 335 | Y | 237 | 06/19/93 | -- | -- | N | 279 | 334 | |
| 225 | (C-35-12) 14acc-1 | 1993 | 5715 | 540 | Y | 220 | 06/08/93 | -- | -- | N | 300 | 540 | |
| 226 | (C-35-12) 23ccc-1 | 1998 | 5525 | 235 | Y | 101 | 08/19/98 | -- | -- | N | 195 | 235 | |
| 227 | (C-35-12) 23dad-1 | 1943 | 5505 | 132 | 1 | 28 | 07/19/43 | 0 | 54 | N | -- | -- | |
| 228 | (C-35-12) 24aaa-1 | 1993 | 5505 | 195 | 1 | 58 | 10/02/93 | 5 | 60 | N | 115 | 194 | |
| 229 | (C-35-12) 24cab-1 | 1998 | 5510 | 200 | 1 | 48 | 09/14/98 | 0 | 64 | N | | | |
| 230 | (C-35-12) 25bca-1 | 1980 | 5498 | 200 | Y | 37 | 08/15/80 | -- | -- | N | 142 | 152 | |
| 231 | (C-35-12) 26dcd-1 | 1994 | 5491 | 313 | 1 | 70 | 09/14/94 | 1 | 43 | N | 277 | 313 | |
| 232 | (C-35-12) 27bcb-1 | 1957 | 5505 | 297 | 1 | 16 | 05/07/57 | 19 | 50 | N | 63 | 297 | |
| 233 | (C-35-12) 27bbd-1 | 1958 | 5460 | 270 | 1 | 45 | 06/12/58 | 0 | 45 | N | 92 | 270 | |
| 235 | (C-35-12) 34dcd-1 | 1959 | 5481 | 144 | 1 | 22 | 10/18/59 | 0 | 37 | N | 72 | 120MI | |
| 236 | (C-35-12) 35adc-1 | 1997 | 5495 | 520 | 1 | 68 | 02/20/97 | 0 | 98 | N | 140 | 520 | |
| 237 | (C-35-12) 36aaa-1 | 1996 | 5516 | 698 | 1 | 30 | 03/22/96 | 6 | 45 | N | 212 | 540MI | |
| 238 | (C-35-12) 36dda-1 | 1994 | 5517 | 595 | 1 | 22 | 03/28/94 | 19 | 52 | N | 200 | 595MI | |
| 239 | (C-35-12) 36bdc-1 | 1972 | 5513 | 415 | Y | 53 | 09/12/72 | -- | -- | N | 182 | 392 | |
| 240 | (C-35-12) 36daa-1 | 1937 | 5520 | 400 | Y | 7 | 08/26/37 | -- | -- | N | 180 | 400 | poor descriptions |
| 243 | (C-36-11) 5dca-1 | 1955 | 5562 | 162 | Y | 58 | 03/23/55 | -- | -- | N | 65 | 159MI | |
| 244 | (C-36-11) 5abd-1 | 1939 | 5565 | 166 | 1 | 51 | 05/10/39 | 0 | 60 | N | 70 | 166 | |
| 245 | (C-36-11) 5dcd-1 | 1943 | 5556 | 110 | Y | 49 | 08/08/43 | -- | -- | N | 70 | 110 | |
| 246 | (C-36-11) 5dbd-1 | 1962 | 5557 | 203 | Y | 90 | 09/13/62 | -- | -- | N | 126 | 200 | |
| 247 | (C-36-11) 5abb-1 | 1940 | 5560 | 105 | 1 | 57 | 07/10/40 | 0 | 67 | N | -- | -- | |
| 248 | (C-36-11) 5dcc-1 | 1957 | 5553 | 204 | 1 | 72 | 05/10/57 | 22 | 42 | N | 100 | 180 | |
| 249 | (C-36-11) 6ccc-1 | 1974 | 5514 | 324 | 1 | 28 | 04/30/74 | 83 | 160 | N | 186 | 291MI | |
| 250 | (C-36-11) 6cdc-1 | 1942 | 5522 | 295 | 1 | 10 | 05/02/42 | 0 | 40 | N | 168 | 178 | |
| 251 | (C-36-11) 6acb-1 | 1948 | 5527 | 172 | 1 | 24 | 12/12/48 | 18 | 60 | N | -- | -- | |
| 252 | (C-36-11) 6bac-1 | 1950 | 5522 | 187 | Y | 21 | 12/18/50 | -- | -- | N | 139 | 172MI | |
| 253 | (C-36-11) 7aba-1 | 1965 | 5534 | 352 | 1 | 54 | 04/27/65 | 3 | 42 | N | 102 | 345MI | |
| 254 | (C-36-11) 7baa-1 | 1962 | 5523 | 234 | 1 | 51 | 11/05/62 | 57 | 80 | N | 223 | 233 | |
| 255 | (C-36-11) 7baa-2 | 1947 | 5525 | 180 | 1 | 32 | 03/20/47 | 30 | 60 | N | -- | -- | |
| 256 | (C-36-11) 7baa-3 | 1951 | 5525 | 175 | 1 | 22 | 12/03/51 | 12 | 35 | N | 135 | 175 | |
| 257 | (C-36-11) 8cbb-1 | 1984 | 5538 | 501 | 1 | 72 | 08/17/84 | 10 | 56 | N | 201 | 501 | |
| 258 | (C-36-11) 8dda-1 | 1989 | 5615 | 308 | Y | 250 | 08/01/89 | -- | -- | N | 228 | 308 | |
| 259 | (C-36-11) 8bda-1 | 1955 | 5552 | 190 | Y | 48 | 05/23/55 | -- | -- | N | 60 | 190 | |
| 260 | (C-36-11) 8bba-1 | 1936 | 5544 | 158 | 1 | 34 | 05/12/36 | 0 | 107 | N | 50 | 158 | poor desrciptions |

***Table A1.*** *continued*

| Site Number | Local Well number | Year well drilled | Elev-ation (ft) | Well depth (ft) | Re-charge area | Water level (ft) | Water level date | Top of confining layer (ft) | Bottom of confining layer (ft) | Depth to bedrock (ft) | Top of perfor-ations (ft) | Bottom of perfor-ations (ft) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 261 | (C-36-11) 8cbb-1 | 1955 | 5533 | 240 | 1 | 47 | 11/30/55 | 0 | 52 | N | 52 | 230MI | |
| 262 | (C-36-11) 10bcd-1 | 1996 | 5678 | 205 | Y | 172 | 01/25/96 | -- | -- | N | 140 | 200 | |
| 263 | (C-36-11) 10bcd-1 | 1996 | 5685 | 215 | Y | 176 | 01/19/96 | -- | -- | N | 147 | 207 | |
| 264 | (C-36-11) 11bdb-1 | 1968 | 5755 | 670 | Y | 214 | 07/14/68 | -- | -- | 530 | 221 | 623 | |
| 266 | (C-36-11) 16bbc-1 | 1963 | 5642 | 180 | 1 | 100 | 08/09/63 | 65 | 85 | N | 165 | 175 | |
| 267 | (C-36-11) 17bbb-1 | 1985 | 5533 | 535 | 1 | 71 | 10/17/85 | 4 | 54 | N | 250 | 505 | |
| 268 | (C-36-11) 17bdb-1 | 1994 | 5605 | 350 | Y | 160 | 09/20/94 | -- | -- | N | 290 | 330 | |
| 269 | (C-36-11) 17abc-1 | 1983 | 5730 | 370 | Y | 290 | 09/23/83 | -- | -- | N | 170 | 370MI | |
| 270 | (C-36-11) 17bac-1 | 1965 | 5540 | 116 | Y | 80 | 10/04/65 | -- | -- | N | 103 | 107 | |
| 271 | (C-36-11) 17baa-1 | 1955 | 5549 | 117 | Y | 75 | 09/07/55 | -- | -- | N | 100 | 108 | |
| 272 | (C-36-11) 17acb-1 | 1990 | 5595 | 273 | Y | 140 | 01/11/90 | -- | -- | N | 233 | 273 | |
| 273 | (C-36-11) 18bdd-1 | 1994 | 5515 | 390 | 1 | 67 | 05/28/94 | 15 | 57 | N | 110 | 390 | |
| 274 | (C-36-11) 18bca-1 | 1960 | 5515 | 372 | 1 | 45 | 01/26/60 | 0 | 25 | N | 285 | 320 | |
| 275 | (C-36-11) 18bca-1 | 1958 | 5513 | 457 | 1 | 21 | 02/15/58 | 34 | 74 | N | -- | -- | |
| 276 | (C-36-11) 18ada-1 | 1944 | 5532 | 245 | 1 | 38 | 04/22/44 | 0 | 74 | N | 80 | 245 | |
| 277 | (C-36-11) 22cca-1 | 1978 | 5650 | 200 | Y | 112 | 07/06/78 | -- | -- | N | 125 | 197 | |
| 278 | (C-36-11) 28aaa-1 | 1973 | 6047 | 126 | Y | 47 | 09/24/73 | -- | -- | N | -- | -- | |
| 279 | (C-36-11) 30acc-1 | 1996 | 5618 | 610 | Y | 176 | ??/??/96 | -- | -- | N | 220 | 600MI | |
| 280 | (C-36-11) 32dba-1 | 1998 | 5795 | 400 | Y | 290 | 04/21/98 | -- | -- | N | 240 | 400MI | |
| 281 | (C-36-12) 1aaa-3 | 1946 | 5518 | 274 | 1 | 21 | 06/14/46 | 20 | 48 | N | 212 | 228MI | |
| 282 | (C-36-12) 1dcc-1 | 1993 | 5505 | 161 | 1 | 14 | 10/29/93 | 0 | 125 | N | 141 | 161 | |
| 283 | (C-36-12) 2dca-1 | 1985 | 5493 | 820 | 1 | 42 | 08/23/85 | 107 | 128 | N | 355 | 618MI | |
| 284 | (C-36-12) 2dda-1 | 1940 | 5495 | 55 | 1 | 25 | 04/23/40 | 0 | 25 | N | 0 | 55 | |
| 285 | (C-36-12) 2dcb-1 | 1983 | 5493 | 457 | 1 | 33 | 04/04/83 | 18 | 82 | N | 125 | 450 | |
| 286 | (C-36-12) 3dbb-1 | 1985 | 5476 | 517 | 1 | 55 | 11/07/85 | 4 | 62 | N | 357 | 517 | |
| 287 | (C-36-12) 3cdc-1 | 1996 | 5472 | 538 | 1 | 32 | 10/04/96 | 0 | 147 | N | 238 | 538 | |
| 288 | (C-36-12) 3abb-1 | 1975 | 5480 | 132 | 1 | 37 | 09/19/75 | 0 | 37 | N | 95 | 132MI | |
| 290 | (C-36-12) 9abd-1 | 1966 | 5475 | 250 | 1 | 15 | 07/26/66 | 0 | 60 | N | 65 | 230MI | |
| 291 | (C-36-12) 10aaa-1 | 1951 | 5478 | 245 | 1 | 1 | 09/11/51 | 0 | 103 | N | -- | -- | |
| 292 | (C-36-12) 11bda-1 | 1968 | 5485 | 300 | 1 | 31 | 03/28/68 | 0 | 25 | N | 275 | 285 | |
| 293 | (C-36-12) 11abd-1 | 1972 | 5487 | 211 | Y | 16 | 09/19/72 | -- | -- | N | 124 | 211 | |
| 294 | (C-36-12) 11acb-1 | 1996 | 5487 | 304 | 1 | 30 | 11/28/96 | 0 | 40 | N | 264 | 304 | |
| 295 | (C-36-12) 11daa-1 | 1993 | 5492 | 336 | 1 | 40 | 07/27/93 | 15 | 250 | N | 270 | 336 | |
| 296 | (C-36-12) 12ccc-1 | 1945 | 5505 | 342 | 1 | 13 | 07/01/45 | 60 | 85 | N | 323 | 333 | |
| 297 | (C-36-12) 12ccc-1 | 1994 | 5493 | 355 | 1 | 70 | 10/10/94 | 0 | 65 | N | 295 | 330 | |
| 298 | (C-36-12) 12ccb-1 | 1979 | 5493 | 360 | 1 | 38 | 11/20/79 | 6 | 340 | N | 340 | 360 | |
| 299 | (C-36-12) 12ddb-1 | 1951 | 5511 | 262 | 1 | 34 | 10/04/51 | 0 | 80 | N | -- | -- | |
| 300 | (C-36-12) 12aaa-1 | 1942 | 5517 | 83 | 1 | 12 | 03/28/42 | 20 | 70 | N | 60 | 83 | |
| 301 | (C-36-12) 14add-1 | 1970 | 5491 | 190 | 1 | 32 | 06/02/70 | 0 | 23 | N | 146 | 184MI | |
| 302 | (C-36-12) 16bba-1 | 1957 | 5460 | 85 | N | +F | 04/05/57 | 0 | 20 | N | -- | -- | flowing well |
| 303 | (C-36-12) 16ccb-1 | 1941 | 5470 | 154 | N | +F | 02/26/41 | 0 | 28 | N | -- | -- | flowing well |
| 304 | (C-36-12) 20adc-1 | 1996 | 5478 | 1020 | 1 | 45 | 10/08/96 | 3 | 38 | N | 162 | 802 | |

***Table A1.*** *continued*

| Site Number | Local Well number | Year well drilled | Elev-ation (ft) | Well depth (ft) | Re-charge area | Water level (ft) | Water level date | Top of confining layer (ft) | Bottom of confining layer (ft) | Depth to bedrock (ft) | Top of perfor-ations (ft) | Bottom of perfor-ations (ft) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 305 | (C-36-12) 20cac-1 | 1951 | 5580 | 477 | 1 | 35 | 12/05/51 | 12 | 35 | N | 196 | 477 | |
| 306 | (C-36-12) 23ccb-1 | 1967 | 5473 | 228 | 1 | 19 | 03/07/67 | 16 | 37 | N | 55 | 203MI | |
| 307 | (C-36-12) 24cbb-1 | 1994 | 5491 | 400 | 1 | 60 | 12/07/94 | 0 | 70 | N | 360 | 380 | |
| 308 | (C-36-12) 24aad-1 | 1950 | 5512 | 237 | 1 | 30 | 11/10/50 | 0 | 27 | N | 62 | 237MI | |
| 309 | (C-36-12) 25bdd-1 | 1956 | 5545 | 300 | 1 | 52 | 11/18/56 | 11 | 43 | N | 90 | 300 | |
| 310 | (C-36-12) 25cda-1 | 1993 | 5550 | 220 | 1 | 72 | 08/10/93 | 0 | 45 | N | -- | -- | |
| 311 | (C-36-12) 28bab-1 | 1945 | 5440 | 80 | 1 | 38 | 07/06/45 | 0 | 26 | N | 34 | 45 | |
| 312 | (C-36-12) 29bbc-1 | 1995 | 5570 | 505 | Y | 145 | 09/29/95 | -- | -- | N | 451 | 502MI | |
| 313 | (C-36-12) 29abb-1 | 1998 | 5510 | 1006 | Y | 89 | 09/15/98 | -- | -- | N | 162 | 1006MI | |
| 314 | (C-36-12) 29aaa-1 | 1995 | 5462 | 413 | 1 | 25 | 08/04/95 | 0 | 40 | N | -- | -- | |
| 315 | (C-36-12) 29aab-1 | 1990 | 5478 | 205 | 1 | 65 | 08/25/90 | 0 | 60 | N | 165 | 205 | |
| 316 | (C-36-12) 29abc-1 | 1987 | 5500 | 340 | 1 | 46 | 11/30/87 | 10 | 40 | N | 260 | 314MI | |
| 317 | (C-36-12) 29abb-1 | 1990 | 5510 | 215 | 1 | 70 | 08/28/90 | 0 | 24 | N | 175 | 215 | |
| 318 | (C-36-12) 29ada-1 | 1997 | 5463 | 300 | 1 | 30 | 06/13/97 | 50 | 85 | N | 260 | 300 | |
| 319 | (C-36-12) 29dbb-1 | 1993 | 5495 | 340 | 1 | 68 | 06/09/93 | 68 | 285 | N | -- | -- | |
| 320 | (C-36-12) 30bcc-1 | 1981 | 5661 | 323 | Y | 205 | 03/31/81 | -- | -- | N | 301 | 312 | |
| 321 | (C-36-12) 30bcc-1 | 1995 | 5675 | 223 | Y | 223 | 07/14/95 | -- | -- | N | 260 | 275 | |
| 322 | (C-36-12) 30bca-1 | 1980 | 5670 | 290 | 1 | 205 | 01/22/80 | 35 | 50 | N | 255 | 265 | |
| 323 | (C-36-12) 30aca-1 | 1983 | 5595 | 240 | Y | 143 | 04/11/83 | -- | -- | N | 226 | 231 | |
| 324 | (C-36-12) 30bcb-1 | 1986 | 5560 | 220 | Y | 108 | 09/26/86 | -- | -- | N | 188 | 212 | |
| 325 | (C-36-12) 30add-1 | 1984 | 5570 | 206 | 1 | 140 | 12/17/84 | 27 | 75 | N | 183 | 203 | |
| 326 | (C-36-12) 30dcb-1 | 1974 | 5595 | 300 | Y | 128 | 11/08/74 | -- | -- | N | 244 | 279MI | |
| 327 | (C-36-12) 30bda-1 | 1974 | 5624 | 294 | Y | 172 | 10/10/74 | -- | -- | N | 258 | 268 | |
| 328 | (C-36-12) 30cdb-1 | 1974 | 5645 | 285 | 1 | 180 | 08/14/74 | 20 | 60 | N | 262 | 272 | |
| 329 | (C-36-12) 30cac-1 | 1974 | 5617 | 195 | Y | 150 | 07/07/74 | -- | -- | N | 160 | 170 | |
| 330 | (C-36-12) 30bcd-1 | 1978 | 5663 | 290 | Y | 202 | 01/20/78 | -- | -- | N | 246 | 280 | |
| 331 | (C-36-12) 30bdb-1 | 1978 | 5642 | 276 | Y | 182 | 03/08/78 | -- | -- | N | 215 | 243 | |
| 332 | (C-36-12) 30bdb-1 | 1977 | 5660 | 300 | 1 | 193 | 10/30/77 | 65 | 90 | N | 235 | 241 | |
| 333 | (C-36-12) 30bcb-1 | 1977 | 5680 | 280 | Y | 199 | 12/22/77 | -- | -- | N | 259 | 276 | |
| 334 | (C-36-12) 30ccb-1 | 1977 | 5644 | 301 | Y | 212 | 11/23/77 | -- | -- | N | 150 | 188 | |
| 335 | (C-36-12) 31acb-1 | 1992 | 5580 | 430 | 1 | 154 | 12/21/92 | 3 | 50 | N | 310 | 430MI | |
| 336 | (C-36-12) 31cbb-1 | 1996 | 5680 | 255 | Y | 210 | 02/20/96 | -- | -- | N | 195 | 200 | |
| 337 | (C-36-12) 31bac-1 | 1992 | 5630 | 305 | 1 | 160 | 03/30/92 | 23 | 83 | N | 265 | 305 | |
| 338 | (C-36-12) 31cdc-1 | 1992 | 5596 | 360 | 1 | 180 | 11/24/92 | 65 | 143 | N | 240 | 360MI | |
| 339 | (C-36-12) 31bbd-1 | 1987 | 5650 | 250 | 1 | 186 | 09/11/87 | 126 | 170 | N | 200 | 227MI | |
| 340 | (C-36-12) 31ccd-1 | 1993 | 5609 | 370 | 1 | 131 | 08/13/93 | 8 | 54 | N | 260 | 370MI | |
| 341 | (C-36-12) 31bbb-1 | 1990 | 5675 | 309 | Y | 235 | 08/05/90 | -- | -- | N | 275 | 285 | |
| 342 | (C-36-12) 31dcd-1 | 1964 | 5555 | 305 | Y | 27 | 05/15/64 | -- | -- | N | 70 | 286 | |
| 343 | (C-36-12) 32dcd-1 | 1990 | 5498 | 301 | Y | 247 | 12/14/90 | -- | -- | N | 250 | 300 | |
| 344 | (C-36-12) 32ccc-1 | 1956 | 5529 | 336 | 1 | 53 | 11/30/56 | 0 | 48 | N | 75 | 175 | |
| 345 | (C-36-12) 32dcc-1 | 1959 | 5498 | 204 | 1 | 24 | 05/21/59 | 97 | 120 | N | 40 | 195MI | |
| 346 | (C-36-12) 32dcc-1 | 1960 | 5496 | 276 | 1 | 38 | 08/16/60 | 56 | 126 | N | 55 | 230MI | |

***Table A1.*** *continued*

| Site Number | Local Well number | Year well drilled | Elev-ation (ft) | Well depth (ft) | Re-charge area | Water level (ft) | Water level date | Top of confining layer (ft) | Bottom of confining layer (ft) | Depth to bedrock (ft) | Top of perfor-ations (ft) | Bottom of perfor-ations (ft) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 347 | (C-36-12) 33acb-1 | 1990 | 5445 | 150 | N | +F | 09/10/90 | 74 | 118 | N | 110 | 150 | flowing well |
| 348 | (C-36-12) 34dbc-1 | 1994 | 5455 | 550 | 1 | 20 | 03/28/94 | 0 | 25 | N | 345 | 550MI | |
| 349 | (C-36-12) 35ccb-1 | 1994 | 5471 | 545 | 1 | 130 | 06/22/94 | 36 | 120 | N | 438 | 545MI | |
| 350 | (C-36-12) 35dcb-1 | 1992 | 5510 | 560 | 1 | 45 | 04/01/92 | 0 | 56 | N | -- | -- | |
| 351 | (C-36-12) 35dcb-1 | 1989 | 5510 | 350 | 1 | 94 | 09/08/89 | 5 | 57 | N | 330 | 520 | |
| 352 | (C-36-12) 36add-1 | 1957 | 5535 | 288 | 1 | 50 | 12/12/57 | 0 | 43 | N | 222 | 284MI | |
| 354 | (C-36-13) 25ddd-1 | 1997 | 5705 | 402 | Y | 210 | 07/01/97 | -- | -- | N | 362 | 402 | |
| 355 | (C-36-13) 25cad-1 | 1994 | 5710 | 310 | Y | 270 | 08/01/94 | -- | -- | N | -- | -- | |
| 356 | (C-36-13) 27ccd-1 | 1990 | 6005 | 405 | Y | 80 | 08/23/90 | -- | -- | N | 285 | 405 | |
| 357 | (C-37-12) 1bba-1 | 1993 | 5535 | 500 | Y | 82 | 01/20/93 | -- | -- | N | 300 | 500 | |
| 358 | (C-37-12) 1baa-1 | 1975 | 5550 | 243 | Y | 81 | 09/17/75 | -- | -- | N | 223 | 243 | |
| 359 | (C-37-12) 1bbc-1 | 1961 | 5522 | 260 | 1 | 14 | 06/10/61 | 45 | 111 | N | -- | -- | |
| 360 | (C-37-12) 2cba-1 | 1995 | 5474 | 423 | 1 | 30 | 02/12/96 | 0 | 60 | N | 360 | 416MI | |
| 361 | (C-37-12) 2dda-1 | 1975 | 5500 | 280 | Y | 77 | 09/19/75 | -- | -- | N | 272 | 280 | |
| 362 | (C-37-12) 2dad-1 | 1986 | 5500 | 280 | Y | 58 | 04/19/86 | -- | -- | N | 85 | 280MI | |
| 363 | (C-37-12) 3ddd-1 | 1970 | 5496 | 275 | 1 | 24 | 09/01/70 | 0 | 25 | N | 177 | 265MI | |
| 364 | (C-37-12) 3bdd-1 | 1991 | 5455 | 356 | 1 | 10 | 03/29/91 | 0 | 67 | N | 336 | 356 | |
| 365 | (C-37-12) 4cdd-1 | 1991 | 5460 | 213 | 1 | 28 | 11/03/91 | 20 | 50 | N | 238 | 268MI | |
| 366 | (C-37-12) 4cac-1 | 1992 | 5468 | 285 | 1 | 20 | 09/20/92 | 0 | 82 | N | -- | -- | |
| 367 | (C-37-12) 4adc-1 | 1994 | 5445 | 308 | N | 3 | 06/18/94 | 7 | 125 | N | 218 | 298 | |
| 368 | (C-37-12) 4bdb-1 | 1993 | 5458 | 200 | N | 15 | 11/24/93 | 30 | 100 | N | 160 | 200 | |
| 369 | (C-37-12) 5acb-1 | 1993 | 5505 | 458 | Y | 60 | 05/15/93 | -- | -- | N | 158 | 458 | |
| 370 | (C-37-12) 5bbb-1 | 1965 | 5533 | 300 | Y | 90 | 07/16/65 | -- | -- | N | 90 | 300 | |
| 371 | (C-37-12) 5bbc-1 | 1960 | 5541 | 252 | 1 | 70 | 05/15/60 | 0 | 20 | N | 72 | 187MI | |
| 372 | (C-37-12) 5aac-1 | 1959 | 5504 | 216 | Y | 36 | 06/24/59 | -- | -- | N | 55 | 205MI | |
| 373 | (C-37-12) 9acc-1 | 1959 | 5490 | 186 | 1 | 16 | 07/18/59 | 0 | 25 | N | 75 | 180 | |
| 374 | (C-37-12) 9bbb-2 | 1943 | 5486 | 214 | N | 3 | 06/06/43 | 128 | 176 | N | -- | -- | |
| 375 | (C-37-12) 11aa-1 | 1953 | 5510 | 365 | 1 | 25 | 09/19/53 | 8 | 45 | N | 25 | 365 | |
| 376 | (C-37-12) 11aaa-1 | 1995 | 5500 | 480 | 1 | 30 | 06/12/95 | 0 | 30 | N | 120 | 480MI | |
| 377 | (C-37-12) 14cbc-1 | 1955 | 5492 | 236 | 1 | 42 | 10/06/55 | 15 | 41 | N | 50 | 216 | |
| 378 | (C-37-12) 14adc-1 | 1961 | 5510 | 237 | 1 | 60 | 07/15/61 | 0 | 80 | N | 75 | 237 | |
| 379 | (C-37-12) 14aaa-1 | 1946 | 5515 | 160 | 1 | 13 | 10/31/46 | 0 | 50 | N | 50 | 150MI | |
| 380 | (C-37-12) 14dad-1 | 1946 | 5529 | 206 | 1 | 37 | 6/27/46 | 0 | 48 | N | -- | -- | |
| 381 | (C-37-12) 15cdc-1 | 1965 | 5515 | 355 | Y | 67 | 07/06/65 | -- | -- | N | 70 | 350MI | |
| 382 | (C-37-12) 21cac-1 | 1962 | 5650 | 285 | 1 | 225 | 04/17/62 | 70 | 118 | N | 241 | 272 | |
| 383 | (C-37-12) 22dcb-1 | 1995 | 5505 | 225 | 1 | 41 | 11/11/95 | 18 | 65 | N | 141 | 220 | |
| 384 | (C-37-12) 24bbc-1 | 1965 | 5580 | 177 | Y | 144 | ??/??/65 | -- | -- | N | 155 | 170 | |
| 385 | (C-37-12) 23abd-1 | 1988 | 5533 | 547 | 1 | 92 | 12/27/88 | 39 | 79 | N | -- | -- | |
| 386 | (C-37-12) 26bad-1 | 1992 | 5505 | 435 | 1 | 42 | 04/19/92 | 0 | 45 | N | 235 | 435 | |
| 388 | (C-37-12) 26aaa-1 | 1993 | 5637 | 289 | 1 | 162 | 07/14/93 | 80 | 140 | N | 220 | 289 | |
| 390 | (C-37-12) 26aaa-1 | 1995 | 5640 | 390 | 1 | 88 | 08/01/95 | 0 | 113 | N | 270 | 390MI | |

# APPENDIX B
WATER-QUALITY DATA

***Table B1.*** *Water-quality data for Cedar Valley, Iron County, Utah.*

| WELL LOCATION | DATE SAMPLED | Source* | pH, water, whole field (standard units) | Specific conductance (µS/cm) | Water temperature, (deg. C) | Hardness, total (mg/L as $CaCO_3$) | Nitrogen, ammonia+ organic, dissolved (mg/L as N) |
|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | 05-23-1974 | USGS | - | - | - | - | - |
| (C-34-11)9ccd-1 | 09-10-1974 | USGS | - | - | - | - | - |
| (C-34-11)14aad-2 | 07-26-1999 | USGS | 8.7 | 930 | 14.0 | 290 | - |
| (C-34-11)21dcd-1 | 07-22-1999 | USGS | 7.6 | 800 | 15.5 | 320 | - |
| (C-34-11)23bdd-1 | 06-13-1974 | USGS | - | - | - | - | - |
| (C-34-11)36dcc-2 | 06-13-1977 | USGS | - | - | - | - | - |
| (C-35-10)6bad-1 | 10-11-1977 | USGS | - | - | - | - | - |
| (C-35-10)18abc-1 | 07-19-2000 | USGS | 7.7 | 465 | 15.5 | 200 | - |
| (C-35-10)18bad-1 | 10-11-1977 | USGS | - | - | - | - | - |
| (C-35-11)8cdc-1 | 10-11-1977 | USGS | - | - | - | - | - |
| (C-35-11)8ddc-1 | 09-11-1974 | USGS | - | - | - | - | - |
| (C-35-11)9dba-1 | 07-10-1998 | USGS | 7.2 | 630 | 15.5 | 320 | - |
| (C-35-11)11ccc-1 | 07-25-2000 | USGS | 7.8 | 950 | 15.0 | 430 | 0.10 E |
| (C-35-11)11ccc-3 | 05-23-1974 | USGS | - | - | - | - | - |
| (C-35-11)12add-1 | 07-22-1999 | USGS | 7.6 | 455 | 17.5 | 210 | - |
| (C-35-11)12ccc-2 | 07-19-2000 | USGS | 7.6 | 740 | 15.0 | 300 | <10 |
| (C-35-11)13dad-1 | 10-11-1977 | USGS | - | - | - | - | - |
| (C-35-11)14bca-1 | 07-19-2000 | USGS | 7.4 | 1,920 | - | 860 | 0.19 |
| (C-35-11)16aab-1 | 09-01-1999 | USGS | 7.4 | 1,070 | 16.0 | 590 | - |
| (C-35-11)25bcc-1 | 07-28-1999 | USGS | 7.8 | 990 | 15.0 | 330 | - |
| (C-35-11)26acd-1 | 06-22-2000 | USGS | 7.3 | 1,020 | 14.0 | 460 | 0.10 E |
| (C-35-11)28aac-2 | 08-26-1999 | USGS | 7.1 | 1,270 | 11.5 | 690 | - |
| (C-35-11)29add-1 | 06-12-2000 | USGS | 7.5 | 1,640 | 16.0 | 980 | - |
| (C-35-11)29cab-1 | 10-11-1977 | USGS | - | - | - | - | - |
| (C-35-11)29dbd-2 | 07-27-2000 | USGS | 6.9 | 2,160 | 10.5 | 1300 | 0.14 |
| (C-35-11)31acd-2 | 08-15-1979 | USGS | 7.7 | 630 | 13.0 | 330 | - |
| (C-35-11)31dbd-1 | 06-12-2000 | USGS | 8.2 | 870 | 14.5 | 440 | - |
| (C-35-11)34dbb-1 | 09-01-1999 | USGS | 7.3 | 1,190 | 14.0 | 620 | - |
| (C-35-12)26bca-1 | 07-21-1999 | USGS | 7.2 | 1,050 | 12.5 | 520 | - |
| (C-35-12)27bcd-1 | 10-02-1974 | USGS | - | - | - | - | - |
| (C-35-12)36ddd-1 | 08-26-1999 | USGS | 7.9 | 540 | 14.0 | 260 | - |
| (C-36-11)5aca-1 | 08-26-1999 | USGS | 7.0 | 1,780 | 11.5 | 1,100 | - |
| (C-36-11)5dab-1 | 09-01-1999 | USGS | 7.3 | 1,090 | 12.5 | 590 | - |
| (C-36-11)7aaa-2 | 09-01-1999 | USGS | 7.2 | 1,410 | 13.5 | 800 | - |
| (C-36-11)7adc-1 | 10-11-1977 | USGS | - | - | - | - | - |
| (C-36-11)11bac-1 | 07-25-2000 | USGS | 7.4 | 2,190 | 16.5 | 1,300 | - |
| (C-36-11)18bdd-1 | 07-22-1999 | USGS | 7.5 | 1,440 | 16.5 | 700 | - |
| (C-36-11)31abc-1 | 07-28-2000 | USGS | 7.5 | 1,140 | - | 550 | <0.10 |
| (C-36-12)2dbc-1 | 07-21-1999 | USGS | 7.5 | 600 | 19.5 | 280 | - |
| (C-36-12)3aad-2 | 07-21-1999 | USGS | 7.8 L | 530 | 16.0 | 300 | - |
| (C-36-12)3acc-1 | 10-11-1977 | USGS | - | - | - | - | - |
| (C-36-12)9aac-1 | 07-21-1999 | USGS | 7.6 | 540 | - | 230 | - |
| (C-36-12)11abd-1 | 09-11-1974 | USGS | - | - | - | - | - |
| (C-36-12)21cbb-1 | 06-08-1988 | USGS | 8.0 | 340 | 14.0 | 170 | - |
| (C-36-12)25bdd-1 | 05-22-1974 | USGS | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | DATE SAMPLED | Source* | pH, water, whole field (standard units) | Specific conductance (µS/cm) | Water temperature, (deg. C) | Hardness, total (mg/L as $CaCO_3$) | Nitrogen, ammonia+ organic, dissolved (mg/L as N) |
|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | 07-25-2000 | USGS | 7.1 | 880 | 14.5 | 450 | - |
| (C-37-12)4bbc-1 | 10-11-1977 | USGS | - | - | - | - | - |
| (C-37-12)9acc-1 | 07-13-1999 | USGS | 7.9 | 375 | 16.5 | 150 | - |
| (C-37-12)11aaa-1 | 06-14-1974 | USGS | - | - | - | - | - |
| (C-37-12)23abd-1 | 07-13-1999 | USGS | 7.4 | 640 | 17.5 | 270 | - |
| (C-37-12)23acb-1 | 07-19-1990 | USGS | 7.7 | 810 | 15.5 | 330 | - |
| (C-36-12)24ada-1 | 09-11-1974 | USGS | - | - | - | - | - |
| (C-35-11)3dcd | 05-06-1998 | UDDW | - | - | - | - | - |
| (C-36-12)29abb-1 | 10-05-1998 | UDDW | - | - | - | - | - |
| (C-36-11)32ccb-1 | 10-05-1998 | UDDW | - | - | - | - | - |
| (C-35-11)24dba-1 | 10-05-1998 | UDDW | - | - | - | - | - |
| (C-35-11)24dba-2 | 08-26-1997 | UDDW | - | - | - | - | - |
| (C-36-12)17ddd | 10-05-1998 | UDDW | - | - | - | - | - |
| (C-36-12)32ccb-2 | 11-20-1995 | UDDW | - | - | - | - | - |
| (C-36-12)20acd | 12-09-1996 | UDDW | 8.2 | 309 | - | 130.6 | 0.1 |
| (C-36-11)30acc-1 | 11-03-1999 | UDDW | - | - | - | - | - |
| (C-36-11)30acc-2 | 06-11-1996 | UDDW | 7.8 | 940 | - | 418.4 | - |
| (C-35-11)10cdc | 04-28-1998 | UDDW | - | - | - | - | - |
| (C-35-10)18bda | 07-13-2000 | UDDW | - | - | - | - | - |
| (C-35-10)7ccc | 07-13-2000 | UDDW | - | - | - | - | - |
| (C-35-10)7caa | 07-13-2000 | UDDW | - | - | - | - | - |
| (C-36-12)15dbd | 04-07-1999 | UDDW | - | - | - | - | - |
| (C-36-12)24ada-2 | 03-03-1999 | UDDW | - | - | - | - | - |
| (C-35-11)9ccc | 06-11-1990 | UDDW | 8.0 | 565 | - | 272.1 | <0.1 |
| (C-36-11)19ddd | 11-16-2000 | UDDW | - | - | - | - | - |
| (C-36-12)3acc-1 | 04-25-1995 | UDDW | 8.3 | - | - | - | - |
| (C-35-11)9acd | 02-09-1999 | UDDW | - | - | - | - | - |
| (C-35-11)17dbc | 05-08-1998 | UDDW | - | - | - | - | - |
| (C-37-12)1bba-1 | 02-15-1994 | UDDW | - | - | - | - | <0.1 |
| (C-37-12)1bba-2 | 02-16-1999 | UDDW | - | 758 | - | 305.0 | - |
| (C-35-11)1cdc | 03-23-1996 | UDDW | - | 446 | - | 172.0 | - |
| (C-36-12)24cca | 10-11-1999 | UDDW | 7.9 | 959 | - | 426.2 | 2.0 |
| (C-36-12)3cdc | 03-20-1997 | UDDW | - | 531 | - | 219.0 | 0.7 |
| (C-36-11)7aba | 11-06-2000 | UDDW | - | - | - | - | - |
| (C-33-10)31ada-1 | 06-12-2000 | USGS | 7.8 | 760 | 16.0 | 230 | 0.23 |
| (C-33-11)30bca-1 | 06-25-1974 | USGS | 7.5 | 1,860 | 13.5 | 660 | - |
| (C-33-11)31aad-1 | 07-26-1999 | USGS | 8.1 | 1,200 | 15.5 | 190 | - |
| (C-34-11)36dcc-3 | 08-24-1999 | USGS | 7.4 | 590 | 21.0 | 240 | 0.10 |
| (C-35-11)19dbb-1 | 07-28-1999 | USGS | 8.1 | 770 | 17.5 | 330 | 0.11 |
| (C-35-11)27dbb-1 | 06-31-1999 | USGS | 7.1 | 1,020 | 11.5 | 530 | 0.12 |
| (C-35-11)30caa-1 | 08-23-1999 | USGS | 7.7 | 540 | 14.0 | 270 | - |
| (C-35-11)33aac-1 | 07-14-1998 | USGS | 7.5 | 1,120 | 12.0 | 670 | - |
| (C-35-11)33abd-1 | 08-25-1999 | USGS | 7.1 | 1,270 | 11.5 | 720 | 0.47 |
| (C-35-11)33ccd-1 | 08-25-1999 | USGS | 7.2 | 1,290 | 12.5 | 710 | 0.32 |
| (C-35-12)36caa-1 | 08-23-1999 | USGS | 7.5 | 650 | 16.5 | 290 | 0.17 |
| (C-36-11)7cab-1 | 08-23-1999 | USGS | 7.8 | 1,060 | 15.5 | 590 | 0.25 |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | DATE SAMPLED | Source* | pH, water, whole field (standard units) | Specific conduc-tance (µS/cm) | Water tempera-ture, (deg. C) | Hard-ness, total (mg/L as $CaCO_3$) | Nitrogen, ammonia+ organic, dissolved (mg/L as N) |
|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | 08-23-1999 | USGS | 7.7 | 550 | 14.5 | 290 | 0.15 |
| (C-37-12)11dac-1 | 08-23-1999 | USGS | 7.6 | 640 | 18.5 | 260 | 0.21 |
| (C-37-12)34abb-1 | 06-13-2000 | USGS | 7.1 | 810 | 11.0 | 410 | - |
| (C-35-11)13ccb | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)13cdb | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)13ddb | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)35bdd | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)26dca | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)26acd | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)27aab | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)22dcd | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)22ddb | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)22ada | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)23cab | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)23bdd-1 | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)23bdd-2 | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)23acd | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)23abb | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)24ccd | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)24bdd | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)26bbb | 1979-81 | UGS | - | - | - | - | - |
| (C-35-11)22dad | 1979-81 | UGS | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Nitrogen, NO2+ NO3 dissolved (mg/L as N) | Calcium, dissolved (mg/L as Ca) | Magne-sium, dissolved (mg/L as Mg) | Potas-sium, dissolved (mg/L as K) | Sodium, dissolved (mg/L as Na) | Alkalinity, water, dissolved, (mg/L as $CaCO_3$) | Bicarbo-nate, water, dissolved, (mg/L as $HCO_3$) |
|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | 2.6 | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | 0.22 | - | - | - | - | - | - |
| (C-34-11)14aad-2 | 0.887 | 44 | 43 | 6.8 | 80 | 212 | 259 |
| (C-34-11)21dcd-1 | 0.15 | 56 | 43 | 4.2 | 49 | 146 | 178 |
| (C-34-11)23bdd-1 | 1.1 | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | 0.68 | - | - | - | - | - | - |
| (C-35-10)6bad-1 | 0.71 | - | - | - | - | - | - |
| (C-35-10)18abc-1 | 0.93 | 40 | 23 | 4.1 | 17 | 186 | 227 |
| (C-35-10)18bad-1 | 1.8 | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | 0.28 | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | 0.58 | - | - | - | - | - | - |
| (C-35-11)9dba-1 | 0.98 | 62 | 40 | 2.2 | 14 | - | - |
| (C-35-11)11ccc-1 | 10.4 | 83 | 55 | 4.3 | 29 | 161 | 197 |
| (C-35-11)11ccc-3 | 0.40 | - | - | - | - | - | - |
| (C-35-11)12add-1 | 0.83 | 44 | 23 | 5.3 | 17 | 191 | 233 |
| (C-35-11)12ccc-2 | 10.9 | 58 | 37 | 5.4 | 18 | 167 | 206 |
| (C-35-11)13dad-1 | 1.4 | - | - | - | - | - | - |
| (C-35-11)14bca-1 | 19.5 | 180 | 102 | 5.0 | 66 | 210 | 256 |
| (C-35-11)16aab-1 | 3.28 | 120 | 69 | 2.8 | 18 | 266 | 325 |
| (C-35-11)25bcc-1 | 7.84 | 73 | 35 | 4.2 | 63 | 152 | 185 |
| (C-35-11)26acd-1 | 6.59 | 92 | 56 | 4.2 | 34 | 313 | 382 |
| (C-35-11)28aac-2 | 5.18 | 150 | 77 | 3.4 | 21 | 349 | 426 |
| (C-35-11)29add-1 | 6.81 | 200 | 116 | 4.7 | 19 | 178 | 217 |
| (C-35-11)29cab-1 | 6.5 | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | 2.45 | 300 | 146 | 5.7 | 31 | 401 | 500 |
| (C-35-11)31acd-2 | 0.97 | 66 | 39 | 1.9 | 9.1 | 160 | - |
| (C-35-11)31dbd-1 | 2.17 | 87 | 54 | 2.3 | 10 | 137 | 168 |
| (C-35-11)34dbb-1 | 8.98 | 130 | 76 | 3.1 | 13 | 312 | 381 |
| (C-35-12)26bca-1 | 0.34 | 99 | 65 | 2.8 | 41 | 170 L | - |
| (C-35-12)27bcd-1 | 0.26 | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | 0.25 | 50 | 33 | 2.2 | 15 | 162 | 197 |
| (C-36-11)5aca-1 | 5.46 | 230 | 116 | 4.0 | 28 | 320 | 390 |
| (C-36-11)5dab-1 | 3.52 | 120 | 69 | 3.5 | 23 | 310 | 478 |
| (C-36-11)7aaa-2 | 3.95 | 160 | 97 | 3.6 | 28 | 312 | 381 |
| (C-36-11)7adc-1 | 6.5 | - | - | - | - | - | - |
| (C-36-11)11bac-1 | 6.51 | 290 | 147 | 4.2 | 36 | 236 | 288 |
| (C-36-11)18bdd-1 | 4.05 | 150 | 83 | 3.6 | 66 | 182 | 222 |
| (C-36-11)31abc-1 | 7.5 | 140 | 49 | 2.6 | 16 | 202 | 247 |
| (C-36-12)2dbc-1 | 0.430 | 56 | 34 | 2.6 | 20 | 140 | - |
| (C-36-12)3aad-2 | 0.61 | 62 | 36 | 2.6 | 23 | 160 L | - |
| (C-36-12)3acc-1 | 0.27 | - | - | - | - | - | - |
| (C-36-12)9aac-1 | 0.39 | 53 | 25 | 3.0 | 19 | 130 L | - |
| (C-36-12)11abd-1 | 0.03 | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | 0.27 | 43 | 14 | 6.1 | 13 | 125 L | - |
| (C-36-12)25bdd-1 | 1.6 | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Nitrogen, NO2+ NO3 dissolved (mg/L as N) | Calcium, dissolved (mg/L as Ca) | Magne-sium, dissolved (mg/L as Mg) | Potas-sium, dissolved (mg/L as K) | Sodium, dissolved (mg/L as Na) | Alkalinity, water, dissolved, (mg/L as $CaCO_3$) | Bicarbo-nate, water, dissolved, (mg/L as $HCO_3$) |
|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | 1.98 | 110 | 42 | 1.9 | 15 | 206 L | - |
| (C-37-12)4bbc-1 | 0.96 | - | - | - | - | - | - |
| (C-37-12)9acc-1 | 1.06 | 51 | 6.4 | 3.4 | 14 | 130 L | - |
| (C-37-12)11aaa-1 | 0.90 | - | - | - | - | - | - |
| (C-37-12)23abd-1 | 2.96 | 62 | 27 | 1.4 | 35 | 160 L | - |
| (C-37-12)23acb-1 | 1.8 | 77 | 34 | 1.9 | 38 | 149 L | - |
| (C-36-12)24ada-1 | 0.3 | - | - | - | - | - | - |
| (C-35-11)3dcd | 0.49 | - | - | - | 14.0 | - | - |
| (C-36-12)29abb-1 | - | - | - | - | 11.0 | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | 9.0 | - | - |
| (C-35-11)24dba-1 | - | - | - | - | 17.0 | - | - |
| (C-35-11)24dba-2 | 6.15 | - | - | - | - | - | - |
| (C-36-12)17ddd | 2 | - | - | - | 15.0 | - | - |
| (C-36-12)32ccb-2 | 0.42 | - | - | - | 10.0 | - | - |
| (C-36-12)20acd | 0.27 | 33.0 | 11.0 | 1.0 | 11.0 | 118.0 | 144.0 |
| (C-36-11)30acc-1 | 1.04 | - | - | - | 23.0 | - | - |
| (C-36-11)30acc-2 | 1.0 | 106.0 | 37 | 4.0 | 24.0 | 135.0 | 165.0 |
| (C-35-11)10cdc | 0.33 | - | - | - | 13.0 | - | - |
| (C-35-10)18bda | 1.1 | - | - | - | 18.0 | - | - |
| (C-35-10)7ccc | 1.1 | - | - | - | 17.0 | - | - |
| (C-35-10)7caa | 5 | - | - | - | 21.0 | - | - |
| (C-36-12)15dbd | 0.1 | - | - | - | | - | - |
| (C-36-12)24ada-2 | 1.04 | - | - | - | 15.0 | - | - |
| (C-35-11)9ccc | 0.36 | 53.0 | 34 | 2.0 | 12.0 | 157 | 192.0 |
| (C-36-11)19ddd | 3.8 | - | - | - | 9.0 | - | - |
| (C-36-12)3acc-1 | 0.27 | - | - | - | 34.0 | - | - |
| (C-35-11)9acd | 0.95 | - | - | - | 15.0 | - | - |
| (C-35-11)17dbc | 0.18 | - | - | - | - | - | - |
| (C-37-12)1bba-1 | 2.88 | - | - | - | 18.0 | - | - |
| (C-37-12)1bba-2 | - | 68.0 | - | 2.0 | 18.0 | 189.0 | 230.0 |
| (C-35-11)1cdc | 0.7 | 36.0 | - | 5.0 | 18.0 | 185.0 | 225.0 |
| (C-36-12)24cca | 0.38 | 106.0 | 39 | 3.0 | 24.0 | 141.0 | 172.0 |
| (C-36-12)3cdc | 0.43 | 52.0 | 30.0 | 3.0 | 21.0 | 133.0 | 163.0 |
| (C-36-11)7aba | 3 | - | - | - | 264.0 | - | - |
| (C-33-10)31ada-1 | 13.3 | 53 | 25 | 7.1 | 54 | 133 | 163 |
| (C-33-11)30bca-1 | .030 | 120 | 87 | 12 | 170 | 278 | - |
| (C-33-11)31aad-1 | 0.040 | 25 | 31 | 7.7 | 180 | 197 | 241 |
| (C-34-11)36dcc-3 | 0.521 | 46 | 30 | 4.8 | 31 | 187 | 228 |
| (C-35-11)19dbb-1 | 0.050 | 63 | 43 | 3.1 | 30 | 111 | 135 |
| (C-35-11)27dbb-1 | 3.03 | 120 | 54 | 2.7 | 17 | 423 | 516 |
| (C-35-11)30caa-1 | 0.756 | 50 | 34 | 2.1 | 14 | 143 | 174 |
| (C-35-11)33aac-1 | 6.50 | 160 | 66 | 3.0 | 15 | 254 L | - |
| (C-35-11)33abd-1 | 5.03 | 170 | 70 | 3.2 | 17 | 332 | 405 |
| (C-35-11)33ccd-1 | 4.83 | 150 | 82 | 3.1 | 20 | 230 | 281 |
| (C-35-12)36caa-1 | 0.277 | 54 | 39 | 2.9 | 23 | 133 | 162 |
| (C-36-11)7cab-1 | 4.41 | 120 | 73 | 3.4 | 16 | 140 | 171 |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Nitrogen, NO2+ NO3 dissolved (mg/L as N) | Calcium, dissolved (mg/L as Ca) | Magne-sium, dissolved (mg/L as Mg) | Potas-sium, dissolved (mg/L as K) | Sodium, dissolved (mg/L as Na) | Alkalinity, water, dissolved, (mg/L as $CaCO_3$) | Bicarbo-nate, water, dissolved, (mg/L as $HCO_3$) |
|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | 1.49 | 56 | 37 | 2.1 | 8.9 | 143 | 174 |
| (C-37-12)11dac-1 | 1.06 | 55 | .31 | 5.4 | 34 | 129 | 157 |
| (C-37-12)34abb-1 | 1.10 | 100 | 35 | 2.0 | 15 | 311 | 379 |
| (C-35-11)13ccb | 12.6 | - | - | - | - | - | - |
| (C-35-11)13cdb | 17.4 | - | - | - | - | - | - |
| (C-35-11)13ddb | 13.4 | - | - | - | - | - | - |
| (C-35-11)35bdd | 32.9 | - | - | - | - | - | - |
| (C-35-11)26dca | 10.65 | - | - | - | - | - | - |
| (C-35-11)26acd | 10.42 | - | - | - | - | - | - |
| (C-35-11)27aab | 23.96 | - | - | - | - | - | - |
| (C-35-11)22dcd | 57.4 | - | - | - | - | - | - |
| (C-35-11)22ddb | 21.2 | - | - | - | - | - | - |
| (C-35-11)22ada | 11.6 | - | - | - | - | - | - |
| (C-35-11)23cab | 37.32 | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | 31.7 | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | 14.21 | - | - | - | - | - | - |
| (C-35-11)23acd | 34.6 | - | - | - | - | - | - |
| (C-35-11)23abb | 17.6 | - | - | - | - | - | - |
| (C-35-11)24ccd | 22.2 | - | - | - | - | - | - |
| (C-35-11)24bdd | 12.2 | - | - | - | - | - | - |
| (C-35-11)26bbb | 11.4 | - | - | - | - | - | - |
| (C-35-11)22dad | 13.12 | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Chloride, dissoved (mg/L as Cl) | Fluoride, dissolved (mg/L as F) | Hydroxide (mg/L) | Silica, dissolved (mg/L as $SiO_2$) | Sulfate, dissolved (mg/L as $SiO_4$) | Phosphorous, dissolved (mg/L as P) | Solids, sum of constituents dissolved (mg/L) |
|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | 490 |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | 483 |
| (C-34-11)14aad-2 | 100 | 0.55 | - | 37 | 120 | 0.034 E | 567 |
| (C-34-11)21dcd-1 | 16 | 0.38 | - | 23 | 250 | <0.050 | 525 |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | 929 |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | 342 |
| (C-35-10)6bad-1 | - | - | - | - | - | - | 276 |
| (C-35-10)18abc-1 | 14 | 0.39 | - | 42 | 28 | 0.036 E | 285 |
| (C-35-10)18bad-1 | - | - | - | - | - | - | 284 |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | 454 |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | 380 |
| (C-35-11)9dba-1 | 9.0 | 0.29 | - | 23 | 170 | <0.010 | 428 |
| (C-35-11)11ccc-1 | 37 | 0.23 | - | 35 | 260 | <0.050 | 644 |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | 548 |
| (C-35-11)12add-1 | 13 | 0.23 | - | 48 | 35 | <0.050 | 303 |
| (C-35-11)12ccc-2 | 46 | 0.35 | - | 45 | 74 | <0.50 | 434 |
| (C-35-11)13dad-1 | - | - | - | - | - | - | 869 |
| (C-35-11)14bca-1 | 130 | 0.38 | - | 35 | 550 | <0.050 | 1280 |
| (C-35-11)16aab-1 | 24 | 0.22 | - | 23 | 330 | <0.050 | 761 |
| (C-35-11)25bcc-1 | 43 | 0.25 | - | 27 | 250 | 0.034 | 616 |
| (C-35-11)26acd-1 | 27 | 0.21 | - | 32 | 180 | <0.050 | 643 |
| (C-35-11)28aac-2 | 25 | 0.19 | - | 23 | 320 | <0.050 | 855 |
| (C-35-11)29add-1 | 27 | 0.17 | - | 22 | 770 | <0.050 | 1300 |
| (C-35-11)29cab-1 | - | - | - | - | - | - | 1460 |
| (C-35-11)29dbd-2 | 35 | 0.21 | - | 21 | 1,000 | <0.050 | 1790 |
| (C-35-11)31acd-2 | 10 | 0.30 | - | 21 | 170 | 0.010 | 418 |
| (C-35-11)31dbd-1 | 16 | 0.23 | - | 22 | 290 | <0.050 | 578 |
| (C-35-11)34dbb-1 | 120 | 0.21 | - | 22 | 150 | <0.050 | 735 |
| (C-35-12)26bca-1 | 34 | 0.47 | - | 22 | 360 | <0.050 | 730 |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | 492 |
| (C-35-12)36ddd-1 | 6.6 | 0.31 | - | 23 | 120 | <0.050 | 343 |
| (C-36-11)5aca-1 | 36 | 0.21 | - | 22 | 700 | <0.050 | 1,350 |
| (C-36-11)5dab-1 | 23 | 0.25 | - | 21 | 290 | <0.050 | 797 |
| (C-36-11)7aaa-2 | 36 | 0.22 | - | 26 | 490 | <0.050 | 1040 |
| (C-36-11)7adc-1 | - | - | - | - | - | - | 990 |
| (C-36-11)11bac-1 | 29 | 0.23 | - | 23 | 1,100 | <0.050 | 1820 |
| (C-36-11)18bdd-1 | 61 | 0.25 | - | 33 | 530 | <0.050 | 1050 |
| (C-36-11)31abc-1 | 22 | 0.15 | - | 24 | 350 | <0.050 | 758 |
| (C-36-12)2dbc-1 | 8.4 | 0.32 | - | 24 | 160 | <0.050 | 396 |
| (C-36-12)3aad-2 | 11 | 0.30 | - | 24 | 180 | <0.050 | 438 |
| (C-36-12)3acc-1 | - | - | - | - | - | - | 384 |
| (C-36-12)9aac-1 | 10 | 0.15 | - | 33 | 130 | <0.050 | 352 |
| (C-36-12)11abd-1 | - | - | - | - | - | - | 398 |
| (C-36-12)21cbb-1 | 11 | 0.30 | - | 45 | 59 | 0.020 | 268 |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | 492 |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Chloride, dissoved (mg/L as Cl) | Fluoride, dissolved (mg/L as F) | Hydroxide (mg/L) | Silica, dissolved (mg/L as $SiO_2$) | Sulfate, dissolved (mg/L as $SiO_4$) | Phosphorous, dissolved (mg/L as P) | Solids, sum of constituents dissolved (mg/L) |
|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | 7.2 | 0.11 | - | 20 | 180 | <0.050 | 570 |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | 184 |
| (C-37-12)9acc-1 | 26 | 0.20 | - | 52 | 11 | <0.050 | 248 |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | 408 |
| (C-37-12)23abd-1 | 36 | 0.10 | - | 19 | 110 | - | 400 |
| (C-37-12)23acb-1 | 49 | <0.10 | - | 19 | 190 | 0.010 | 506 |
| (C-36-12)24ada-1 | - | - | - | - | - | - | 711 |
| (C-35-11)3dcd | - | 0.26 | - | - | 151.0 | - | 416 |
| (C-36-12)29abb-1 | - | 0.20 | - | - | 18.0 | - | 236 |
| (C-36-11)32ccb-1 | - | <0.10 | - | - | <5.0 | - | 184 |
| (C-35-11)24dba-1 | - | 0.30 | - | - | 30 | - | 320 |
| (C-35-11)24dba-2 | - | 0.26 | - | - | 67 | - | 388 |
| (C-36-12)17ddd | - | 0.20 | - | - | 62 | - | 296 |
| (C-36-12)32ccb-2 | - | 0.11 | - | - | <10 | - | 136 |
| (C-36-12)20acd | 11.0 | 0.24 | 0.00 | 37.0 | 23 | <0.01 | 210 |
| (C-36-11)30acc-1 | - | 0.31 | - | - | 339.0 | - | 670 |
| (C-36-11)30acc-2 | 11.0 | 0.38 | 0.00 | 29.0 | 289.0 | 0.05 | 610 |
| (C-35-11)10cdc | - | 0.25 | - | - | 178.0 | - | 432 |
| (C-35-10)18bda | - | 0.30 | - | - | 30.0 | - | 256 |
| (C-35-10)7ccc | - | 0.20 | - | - | 29.0 | - | 272 |
| (C-35-10)7caa | - | 0.20 | - | - | 63.0 | - | 424 |
| (C-36-12)15dbd | - | 0.64 | - | - | 1420.0 | - | 2190 |
| (C-36-12)24ada-2 | - | 0.32 | - | - | 295.0 | - | 605 |
| (C-35-11)9ccc | 9.0 | 0.26 | 0.00 | 25.0 | 130.0 | <0.01 | 362 |
| (C-36-11)19ddd | - | 0.24 | - | - | 482.0 | - | 1030 |
| (C-36-12)3acc-1 | 8.0 | 0.04 | - | - | 108.0 | - | 276 |
| (C-35-11)9acd | - | 0.30 | - | - | 165.0 | - | 410 |
| (C-35-11)17dbc | - | - | - | - | - | - | 406 |
| (C-37-12)1bba-1 | - | 0.17 | - | - | 185.0 | - | 560 |
| (C-37-12)1bba-2 | 7.0 | 0.24 | - | 27.0 | 155.0 | <0.03 | 435 |
| (C-35-11)1cdc | 11.0 | 0.32 | 0.03 | - | 34.0 | <0.05 | 300 |
| (C-36-12)24cca | 13.0 | 0.34 | 0.00 | 30.0 | 295.0 | <0.01 | 435 |
| (C-36-12)3cdc | 7.0 | 0.30 | <1.00 | 28.0 | 136.0 | 0.01 | 308 |
| (C-36-11)7aba | - | 0.29 | - | - | 508.0 | - | 925 |
| (C-33-10)31ada-1 | 92 | 0.37 | - | 45 | 53 | <0.50 | 468 |
| (C-33-11)30bca-1 | 130 | 0.70 | - | 43 | 520 | - | 1,250 |
| (C-33-11)31aad-1 | 91 | 1.1 | - | 61 | 280 | 0.051 | 795 |
| (C-34-11)36dcc-3 | 37 | 0.40 | - | 41 | 67 | - | 369 |
| (C-35-11)19dbb-1 | 15 | 0.29 | - | 21 | 270 | - | 512 |
| (C-35-11)27dbb-1 | 11 | 0.20 | - | 23 | 130 | - | 614 |
| (C-35-11)30caa-1 | 11 | 0.28 | - | 23 | 130 | <0.050 | 346 |
| (C-35-11)33aac-1 | 15 | 0.20 | - | 16 | 390 | 0.020 | 846 |
| (C-35-11)33abd-1 | 21 | 0.16 | - | 20 | 360 | - | 860 |
| (C-35-11)33ccd-1 | 13 | 0.23 | - | 20 | 480 | - | 903 |
| (C-35-12)36caa-1 | 12 | 0.29 | - | 29 | 190 | - | 427 |
| (C-36-11)7cab-1 | 25 | 0.27 | - | 25 | 410 | - | 754 |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Boron, dissolved (µg/L as B) | Bromide, dissolved (mg/L as Br) | Iron, dissolved (µg/L as Fe) | Manganese, dissolved (µg/L as Mn) | Carbon Dioxide (mg/L) | Carbon-ate (mg/L) | Carbon-ate Solids (mg/L) | Turbidity (mg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | 130 | 0.18 | <10 | <3.0 | - | - | - | - |
| (C-34-11)21dcd-1 | 126 | 0.050 | 22 | 2.9 E | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | 62 | 0.052 | <10 | <2.2 | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | 48 | - | <10 | <4.0 | - | - | - | - |
| (C-35-11)11ccc-1 | 60 | 0.16 | <10 | <2.2 | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | 52 | 0.080 | <10 | <3.0 | - | - | - | - |
| (C-35-11)12ccc-2 | 73 | 0.22 | <10 | <2.2 | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | 141 | 0.52 | <10 | <2.2 | - | - | - | - |
| (C-35-11)16aab-1 | 67 | 0.072 | <10 | <3.0 | - | - | - | - |
| (C-35-11)25bcc-1 | 76 | 0.13 | <10 | 111 | - | - | - | - |
| (C-35-11)26acd-1 | 139 | 0.13 | <10 | <2.2 | - | - | - | - |
| (C-35-11)28aac-2 | 71 | 0.061 | <10 | <3.0 | - | - | - | - |
| (C-35-11)29add-1 | 36 | 0.082 | <10 | <2.2 | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | 93 | 0.087 | <30 | <2.2 | - | - | - | - |
| (C-35-11)31acd-2 | 30 | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | 31 | 0.075 | <10 | <2.2 | - | - | - | - |
| (C-35-11)34dbb-1 | 99 | 0.11 | <10 | <3.0 | - | - | - | - |
| (C-35-12)26bca-1 | 119 | 0.14 | 8.9 E | 2.0 E | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | 52 | 0.022 | <10 | 8.8 | - | - | - | - |
| (C-36-11)5aca-1 | 95 | 0.11 | <10 | <3.0 | - | - | - | - |
| (C-36-11)5dab-1 | 109 | 0.067 | 8.5 E | <3.0 | - | - | - | - |
| (C-36-11)7aaa-2 | 100 | 0.095 | <10 | <3.0 | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | 270 | 0.10 | <30 | <2.2 | - | - | - | - |
| (C-36-11)18bdd-1 | 176 | 0.23 | <10 | <3.0 | - | - | - | - |
| (C-36-11)31abc-1 | 75 | 0.13 | <10 | 1.4 E | - | - | - | - |
| (C-36-12)2dbc-1 | 81 | 0.039 | <10 | <3.0 | - | - | - | - |
| (C-36-12)3aad-2 | 92 | 0.041 | <10 | <3.0 | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | 67 | 0.054 | <10 | <3.0 | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | 40 | - | 22 | 7.0 | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Chloride, dissoved (mg/L as Cl) | Fluoride, dissolved (mg/L as F) | Hydroxide (mg/L) | Silica, dissolved (mg/L as $SiO_2$) | Sulfate, dissolved (mg/L as $SiO_4$) | Phosphorous, dissolved (mg/L as P) | Solids, sum of constituents dissolved (mg/L) |
|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | 14 | .34 | - | 24 | 130 | - | 362 |
| (C-37-12)11dac-1 | 31 | 0.18 | - | 48 | 150 | - | 433 |
| (C-37-12)34abb-1 | 7.3 | 0.19 | - | 18 | 120 | <0.050 | 497 |
| (C-35-11)13ccb | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Boron, dissolved (µg/L as B) | Bromide, dissolved (mg/L as Br) | Iron, dissolved (µg/L as Fe) | Manganese, dissolved (µg/L as Mn) | Carbon Dioxide (mg/L) | Carbon-ate (mg/L) | Carbon-ate Solids (mg/L) | Turbidity (mg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | 86 | 0.064 | <10 | <2.2 | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | 48 | - | <10 | <3.0 | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | 92 | - | <10 | <3.0 | - | - | - | - |
| (C-37-12)23acb-1 | 100 | - | 12 | 1.0 | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | - | - | - | - | - | - | - | <0.5 |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - | <0.5 |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - | 0.6 |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - | 0.9 |
| (C-35-11)24dba-2 | - | - | - | - | - | - | - | 0.6 |
| (C-36-12)17ddd | - | - | - | - | - | - | - | 1.6 |
| (C-36-12)32ccb-2 | - | - | - | - | - | - | - | 0.2 |
| (C-36-12)20acd | - | - | 0.11 | 6.5 | 2.0 | 0 | 71.0 | 0.5 |
| (C-36-11)30acc-1 | - | - | - | - | - | - | - | <0.5 |
| (C-36-11)30acc-2 | - | - | 2.50 | 48.0 | 4.0 | 0 | 81.0 | 19.3 |
| (C-35-11)10cdc | - | - | - | - | - | - | - | <0.5 |
| (C-35-10)18bda | - | - | - | - | - | - | - | <0.5 |
| (C-35-10)7ccc | - | - | - | - | - | - | - | <0.5 |
| (C-35-10)7caa | - | - | - | - | - | - | - | <0.5 |
| (C-36-12)15dbd | - | - | - | - | - | - | - | <0.5 |
| (C-36-12)24ada-2 | - | - | - | - | - | - | - | <0.5 |
| (C-35-11)9ccc | - | - | <0.02 | <5.0 | 2.0 | 0 | 94.0 | 0.2 |
| (C-36-11)19ddd | - | - | - | - | - | - | - | <0.5 |
| (C-36-12)3acc-1 | - | - | - | 0.5 | - | - | - | 275.0 |
| (C-35-11)9acd | - | - | - | - | - | - | - | <0.5 |
| (C-35-11)17dbc | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | - | - | - | - | - | - | - | 0.3 |
| (C-37-12)1bba-2 | - | - | - | - | 9.0 | - | 113.0 | <0.5 |
| (C-35-11)1cdc | - | - | 0.54 | 29.0 | 2.0 | 3.0 | - | 22.0 |
| (C-36-12)24cca | - | - | 0.10 | 26.0 | 4.0 | 0 | 85.0 | 1.3 |
| (C-36-12)3cdc | - | - | 0.23 | <10.0 | 119.0 | <1.0 | | 2.2 |
| (C-36-11)7aba | - | - | - | - | - | - | - | <0.5 |
| (C-33-10)31ada-1 | 102 | 0.36 | <10 | <2.2 | - | - | - | - |
| (C-33-11)30bca-1 | 340 | - | 80 | 480 | - | - | - | - |
| (C-33-11)31aad-1 | 319 | 0.031 | 130 | 20 | - | - | - | - |
| (C-34-11)36dcc-3 | 62 | 0.057 | <10 | <3.0 | - | - | - | - |
| (C-35-11)19dbb-1 | 102 | 0.024 | 5.8 E | 5.5 | - | - | - | - |
| (C-35-11)27dbb-1 | 123 | 0.036 | <10 | <3.0 | - | - | - | - |
| (C-35-11)30caa-1 | 37 | 0.041 | 7.5 E | <3.0 | - | - | - | - |
| (C-35-11)33aac-1 | 50 | - | <3.0 | <1.0 | - | - | - | - |
| (C-35-11)33abd-1 | 60 | 0.044 | <10 | <3.0 | - | - | - | - |
| (C-35-11)33ccd-1 | 118 | 0.055 | 7.5 E | <3.0 | - | - | - | - |
| (C-35-12)36caa-1 | 83 | 0.20 | <10 | <3.0 | - | - | - | - |
| (C-36-11)7cab-1 | 30 | 0.093 | 9.0 E | <3.0 | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Boron, dissolved (µg/L as B) | Bromide, dissolved (mg/L as Br) | Iron, dissolved (µg/L as Fe) | Manganese, dissolved (µg/L as Mn) | Carbon Dioxide (mg/L) | Carbon-ate (mg/L) | Carbon-ate Solids (mg/L) | Turbidity (mg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | 28 | 0.060 | <10 | <3.0 | - | - | - | - |
| (C-37-12)11dac-1 | 114 | 0.17 | 10 | 1.6 E | - | - | - | - |
| (C-37-12)34abb-1 | 57 | 0.043 | <10 | <2.2 | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Arsenic (µg/L) | Barium (mg/L) | Cad-mium (µg/L) | Chrom-ium (µg/L) | Copper (µg/L) | Lead (µg/L) | Mercury (µg/L) | Nickel (µg/L) | Selen-ium (µg/L) |
|---|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - | - |

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***Table B1.*** *continued*

| WELL LOCATION | Arsenic (µg/L) | Barium (mg/L) | Cad-mium (µg/L) | Chrom-ium (µg/L) | Copper (µg/L) | Lead (µg/L) | Mercury (µg/L) | Nickel (µg/L) | Selen-ium (µg/L) |
|---|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | <5.0 | <0.10 | <1 | <7.0 | <50.0 | <5.0 | <0.2 | <10.0 | <2.0 |
| (C-36-12)29abb-1 | 6.0 | 0.06 | <1 | <5.0 | - | <5.0 | 0.5 | <10.0 | 5.0 |
| (C-36-11)32ccb-1 | <5.0 | 0.02 | <1 | <5.0 | - | - | 0.4 | <10.0 | 3.0 |
| (C-35-11)24dba-1 | 6.0 | 0.07 | - | <5.0 | - | - | 0.4 | <10.0 | <2.0 |
| (C-35-11)24dba-2 | - | - | <1 | - | - | - | - | - | - |
| (C-36-12)17ddd | 5.0 | 0.07 | <1 | <5.0 | - | - | 0.5 | <10.0 | 3.0 |
| (C-36-12)32ccb-2 | <5.0 | <0.10 | <1 | <10.0 | <50.0 | <5.0 | <0.2 | <10.0 | <2.0 |
| (C-36-12)20acd | <5.0 | 0.05 | <1 | <5.0 | <12.0 | <3.0 | <0.2 | <10.0 | <1.0 |
| (C-36-11)30acc-1 | <5.0 | <0.10 | <1 | <7.0 | <50.0 | <5.0 | <0.2 | <10.0 | <2.0 |
| (C-36-11)30acc-2 | <5.0 | 0.03 | <1 | <5.0 | <12.0 | <3.0 | <0.2 | <10.0 | 1.3 |
| (C-35-11)10cdc | <5.0 | <0.10 | <1 | <7.0 | <50.0 | <5.0 | <0.2 | <10.0 | <2.0 |
| (C-35-10)18bda | 3.7 | 0.08 | <1 | <5.0 | - | - | <0.2 | <10.0 | 1.1 |
| (C-35-10)7ccc | 3.5 | 0.08 | <1 | <5.0 | - | - | <0.2 | <10.0 | 0.9 |
| (C-35-10)7caa | 4.7 | 0.16 | <1 | <5.0 | - | - | <0.2 | <10.0 | 3.6 |
| (C-36-12)15dbd | 7.8 | <0.10 | <1 | <7.0 | <50.0 | <5.0 | <0.2 | <10.0 | <2.0 |
| (C-36-12)24ada-2 | <5.0 | <0.10 | <1 | <7.0 | <50.0 | <5.0 | <0.2 | <10.0 | <2.0 |
| (C-35-11)9ccc | <5.0 | 0.02 | <1 | <5.0 | <20.0 | <5.0 | <0.2 | - | <1.0 |
| (C-36-11)19ddd | <5.0 | <0.10 | <1 | <7.0 | <50.0 | <5.0 | <0.2 | 22.0 | <2.0 |
| (C-36-12)3acc-1 | - | - | 0.02 | 1.0 | 1.0 | - | - | - | - |
| (C-35-11)9acd | <5.0 | <0.10 | <1 | <7.0 | <50.0 | <5.0 | <0.2 | <10.0 | <2.0 |
| (C-35-11)17dbc | - | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | 3.0 | <0.10 | <2 | <10.0 | 10.0 | <1.0 | <1.0 | <10.0 | 2.0 |
| (C-37-12)1bba-2 | <5.0 | <0.10 | <1 | <7.0 | <50.0 | <5.0 | <0.2 | <10.0 | <2.0 |
| (C-35-11)1cdc | 5.8 | 0.10 | <1 | 4.9 | 14.0 | 2.4 | <0.2 | <5.0 | <5.0 |
| (C-36-12)24cca | <5.0 | 0.01 | <1 | <5.0 | <12.0 | <3.0 | <0.2 | <10.0 | 1.7 |
| (C-36-12)3cdc | <5.0 | 0.05 | <1 | <5.0 | <10.0 | <5.0 | <0.2 | <10.0 | <2.0 |
| (C-36-11)7aba | <5.0 | <0.10 | <1 | <7.0 | <50.0 | <5.0 | <0.2 | <10.0 | <2.0 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Arsenic (µg/L) | Barium (mg/L) | Cad-mium (µg/L) | Chrom-ium (µg/L) | Copper (µg/L) | Lead (µg/L) | Mercury (µg/L) | Nickel (µg/L) | Selen-ium (µg/L) |
|---|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Silver (µg/L) | Uranium (µg/L) | Zinc (µg/L) | Anti-mony (µg/L) | Berylium (µg/L) | Thallium (µg/L) | Cyanide (µg/L) | Vinyl Chloride (µg/L) | Benzene (µg/L) |
|---|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Silver (µg/L) | Uranium (µg/L) | Zinc (µg/L) | Anti-mony (µg/L) | Berylium (µg/L) | Thallium (µg/L) | Cyanide (µg/L) | Vinyl Chloride (µg/L) | Benzene (µg/L) |
|---|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | - | - | - | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-36-12)29abb-1 | - | - | - | <2.0 | <1.0 | <1.0 | <2.0 | - | - |
| (C-36-11)32ccb-1 | - | - | - | <2.0 | <1.0 | <1.0 | <2.0 | - | - |
| (C-35-11)24dba-1 | - | - | - | <2.0 | - | - | <50.0 | - | - |
| (C-35-11)24dba-2 | - | - | - | - | <1.0 | <1.0 | <2.0 | <0.5 | <0.5 |
| (C-36-12)17ddd | - | - | - | <2.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-36-12)32ccb-2 | - | - | - | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-36-12)20acd | <2.0 | - | 32.0 | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-36-11)30acc-1 | - | - | - | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-36-11)30acc-2 | <2.0 | - | <30.0 | <3.0 | <1.0 | <1.0 | <50.0 | - | - |
| (C-35-11)10cdc | - | - | - | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-35-10)18bda | - | - | - | <0.5 | <1.0 | <0.5 | <2.0 | <0.5 | <0.5 |
| (C-35-10)7ccc | - | - | - | <0.5 | <1.0 | <0.5 | <2.0 | <0.5 | <0.5 |
| (C-35-10)7caa | - | - | - | <0.5 | <1.0 | <0.5 | <2.0 | <0.5 | <0.5 |
| (C-36-12)15dbd | - | - | - | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-36-12)24ada-2 | - | - | - | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-35-11)9ccc | <2.0 | - | 37.0 | - | - | - | - | <0.5 | <0.1 |
| (C-36-11)19ddd | - | - | - | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-36-12)3acc-1 | - | - | 5.0 | - | - | - | - | <0.5 | <0.5 |
| (C-35-11)9acd | - | - | - | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-35-11)17dbc | - | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-37-12)1bba-1 | - | - | - | <1.0 | <1.0 | <1.0 | <20.0 | <0.5 | <0.5 |
| (C-37-12)1bba-2 | - | - | 210.0 | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-35-11)1cdc | <5.0 | - | 23.0 | <1.0 | <1.0 | <1.0 | <25.0 | <0.5 | <0.5 |
| (C-36-12)24cca | <2.0 | - | 1300.0 | <3.0 | <1.0 | <1.0 | <50.0 | - | - |
| (C-36-12)3cdc | <0.5 | - | <10.0 | <2.0 | <1.0 | <1.0 | <10.0 | <0.5 | <0.5 |
| (C-36-11)7aba | - | - | - | <3.0 | <1.0 | <1.0 | <50.0 | <0.5 | <0.5 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Silver (µg/L) | Uranium (µg/L) | Zinc (µg/L) | Anti-mony (µg/L) | Berylium (µg/L) | Thallium (µg/L) | Cyanide (µg/L) | Vinyl Chloride (µg/L) | Benzene (µg/L) |
|---|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Carbon Tetra-chloride (µg/L) | 1,2-Di-chloro-ethane (µg/L) | Tri-chloro-ethane (µg/L) | Para-Di-chloro-benzene (µg/L) | 1,1-Di-chloro-ethylene (µg/L) | 1,1,1-Tri-chloro-ethane (µg/L) | CIS-1,2-Dichloro-ethylene (µg/L) | 1,2-Di-chloro-propane (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Carbon Tetra-chloride (µg/L) | 1,2-Di-chloro-ethane (µg/L) | Tri-chloro-ethane (µg/L) | Para-Di-chloro-benzene (µg/L) | 1,1-Di-chloro-ethylene (µg/L) | 1,1,1-Tri-chloro-ethane (µg/L) | CIS-1,2-Dichloro-ethylene (µg/L) | 1,2-Di-chloro-propane (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)17ddd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)32ccb-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)20acd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)30acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)10cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-10)18bda | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-10)7ccc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-10)7caa | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)15dbd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24ada-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)9ccc | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <0.5 | <0.1 | <0.5 |
| (C-36-11)19ddd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)3acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)9acd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)17dbc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-37-12)1bba-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-37-12)1bba-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)1cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24cca | - | - | - | - | - | - | - | - |
| (C-36-12)3cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)7aba | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Carbon Tetra-chloride (µg/L) | 1,2-Di-chloro-ethane (µg/L) | Tri-chloro-ethane (µg/L) | Para-Di-chloro-benzene (µg/L) | 1,1-Di-chloro-ethylene (µg/L) | 1,1,1-Tri-chloro-ethane (µg/L) | CIS-1,2-Dichloro-ethylene (µg/L) | 1,2-Di-chloro-propane (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Ethylben-zene (µg/L) | Mono-chloro-benzene (µg/L) | O-dichloro-benzene (µg/L) | Styrene (µg/L) | Tetra-chloro-ethylene (µg/L) | Toluene (µg/L) | Trans-1,2-Dichloro-ethylene (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Ethylben-zene (µg/L) | Mono-chloro-benzene (µg/L) | O-dichloro-benzene (µg/L) | Styrene (µg/L) | Tetra-chloro-ethylene (µg/L) | Toluene (µg/L) | Trans-1,2-Dichloro-ethylene (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - |
| (C-35-11)3dcd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 4.5 | <0.5 |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)17ddd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)32ccb-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)20acd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)30acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - |
| (C-35-11)10cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-10)18bda | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-10)7ccc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-10)7caa | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)15dbd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24ada-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)9ccc | <0.2 | <0.1 | <0.1 | <0.5 | <0.5 | <0.1 | <0.5 |
| (C-36-11)19ddd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)3acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)9acd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)17dbc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-37-12)1bba-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-37-12)1bba-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)1cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24cca | - | - | - | - | - | - | - |
| (C-36-12)3cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)7aba | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Ethylben-zene (µg/L) | Mono-chloro-benzene (µg/L) | O-dichloro-benzene (µg/L) | Styrene (µg/L) | Tetra-chloro-ethylene (µg/L) | Toluene (µg/L) | Trans-1,2-Dichloro-ethylene (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Xylene (Total) (µg/L) | Dichloro-methane (µg/L) | 1,2,4-Tri-chloro-benzene (µg/L) | 1,1,2-Tri-chloro-ethane (µg/L) | Alachlor (µg/L) | Aldicarb (µg/L) | Aldicarb Sulfoxide (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Xylene (Total) (µg/L) | Dichloro-methane (µg/L) | 1,2,4-Tri-chloro-benzene (µg/L) | 1,1,2-Tri-chloro-ethane (µg/L) | Alachlor (µg/L) | Aldicarb (µg/L) | Aldicarb Sulfoxide (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - |
| (C-35-11)3dcd | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.4 | <1.0 | <2.0 |
| (C-36-12)17ddd | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-36-12)32ccb-2 | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-36-12)20acd | <0.5 | <0.5 | <0.5 | <0.5 | <0.4 | <1.0 | <2.0 |
| (C-36-11)30acc-1 | 1.6 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - |
| (C-35-11)10cdc | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-35-10)18bda | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-35-10)7ccc | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-35-10)7caa | <0.5 | <0.5 | <0.5 | <0.5 | <0.4 | <1.0 | <2.0 |
| (C-36-12)15dbd | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-36-12)24ada-2 | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-35-11)9ccc | <0.2 | <0.5 | <0.2 | <0.1 | - | - | - |
| (C-36-11)19ddd | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-36-12)3acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-35-11)9acd | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-35-11)17dbc | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-37-12)1bba-1 | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-37-12)1bba-2 | <0.5 | <0.5 | <0.5 | <0.5 | - | - | - |
| (C-35-11)1cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.1 | <0.5 | <0.5 |
| (C-36-12)24cca | - | - | - | - | <0.1 | <1.0 | <0.7 |
| (C-36-12)3cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.4 | <1.0 | <2.0 |
| (C-36-11)7aba | <0.5 | <0.5 | <0.5 | <0.5 | <0.4 | <0.5 | <2.0 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Xylene (Total) (µg/L) | Dichloro-methane (µg/L) | 1,2,4-Tri-chloro-benzene (µg/L) | 1,1,2-Tri-chloro-ethane (µg/L) | Alachlor (µg/L) | Aldicarb (µg/L) | Aldicarb Sulfoxide (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Aldicarb Sulfone (µg/L) | Atrazine (µg/L) | Carbo-furan (µg/L) | Chlor-dane (µg/L) | Dibromo-chloro-propane (µg/L) | 2,4-D (µg/L) | Ethylene Di-bromide (µg/L) | Hepta-chlor (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Aldicarb Sulfone (µg/L) | Atrazine (µg/L) | Carbo-furan (µg/L) | Chlor-dane (µg/L) | Dibromo-chloro-propane (µg/L) | 2,4-D (µg/L) | Ethylene Di-bromide (µg/L) | Hepta-chlor (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | - | - | - | - | - | - | - | - |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <2.0 | <0.2 | <1.5 | <0.2 | - | <0.2 | - | <0.1 |
| (C-36-12)17ddd | - | - | - | - | - | - | - | - |
| (C-36-12)32ccb-2 | - | - | - | - | - | - | - | - |
| (C-36-12)20acd | <2.0 | <0.2 | <2.0 | <0.4 | - | <0.2 | - | <0.1 |
| (C-36-11)30acc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)10cdc | - | - | - | - | - | - | - | - |
| (C-35-10)18bda | - | - | - | - | - | - | - | - |
| (C-35-10)7ccc | - | - | - | - | - | - | - | - |
| (C-35-10)7caa | <2.0 | <0.2 | <2.0 | <0.4 | - | <0.2 | - | <0.1 |
| (C-36-12)15dbd | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-2 | - | - | - | - | - | - | - | - |
| (C-35-11)9ccc | - | - | - | - | - | - | - | - |
| (C-36-11)19ddd | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9acd | - | - | - | - | - | - | - | - |
| (C-35-11)17dbc | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-2 | - | - | - | - | - | - | - | - |
| (C-35-11)1cdc | <0.8 | <0.1 | <0.9 | <0.1 | - | <0.1 | - | <0.1 |
| (C-36-12)24cca | <0.4 | <0.1 | <0.7 | <0.1 | - | <0.2 | - | <0.1 |
| (C-36-12)3cdc | <2.0 | <0.2 | <1.5 | <0.2 | - | <0.2 | - | <0.1 |
| (C-36-11)7aba | <2.0 | <0.2 | <2.0 | <0.4 | - | <0.2 | - | <0.1 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Aldicarb Sulfone (µg/L) | Atrazine (µg/L) | Carbo-furan (µg/L) | Chlor-dane (µg/L) | Dibromo-chloro-propane (µg/L) | 2,4-D (µg/L) | Ethylene Di-bromide (µg/L) | Hepta-chlor (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Hepta-chlor Epoxide (µg/L) | Lindane (µg/L) | Methoxy-chlor (µg/L) | Polychlor-inated Bi-phenyls (µg/L) | Penta-chloro-phenol (µg/L) | Toxa-phene (µg/L) | 2,4,5-TP (µg/L) | Benzo (A) Pyrene (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - |

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***Table B1.*** *continued*

| WELL LOCATION | Hepta-chlor Epoxide (µg/L) | Lindane (µg/L) | Methoxy-chlor (µg/L) | Polychlor-inated Bi-phenyls (µg/L) | Penta-chloro-phenol (µg/L) | Toxa-phene (µg/L) | 2,4,5-TP (µg/L) | Benzo (A) Pyrene (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | - | - | - | - | - | - | - | - |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <2.2 | <0.4 | <0.1 |
| (C-36-12)17ddd | - | - | - | - | - | - | - | - |
| (C-36-12)32ccb-2 | - | - | - | - | - | - | - | - |
| (C-36-12)20acd | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <2.2 | <0.4 | <0.1 |
| (C-36-11)30acc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)10cdc | - | - | - | - | - | - | - | - |
| (C-35-10)18bda | - | - | - | - | - | - | - | - |
| (C-35-10)7ccc | - | - | - | - | - | - | - | - |
| (C-35-10)7caa | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <2.2 | <0.4 | <0.1 |
| (C-36-12)15dbd | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-2 | - | - | - | - | - | - | - | - |
| (C-35-11)9ccc | - | - | - | - | - | - | - | - |
| (C-36-11)19ddd | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9acd | - | - | - | - | - | - | - | - |
| (C-35-11)17dbc | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-2 | - | - | - | - | - | - | - | - |
| (C-35-11)1cdc | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.2 | <0.1 |
| (C-36-12)24cca | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <1.0 | <0.4 | <0.1 |
| (C-36-12)3cdc | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <2.2 | <0.4 | <0.1 |
| (C-36-11)7aba | <0.1 | <0.1 | <0.2 | <0.1 | <0.1 | <2.2 | <0.4 | <0.1 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - | - |

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***Table B1.*** *continued*

| WELL LOCATION | Hepta-chlor Epoxide (µg/L) | Lindane (µg/L) | Methoxy-chlor (µg/L) | Polychlor-inated Bi-phenyls (µg/L) | Penta-chloro-phenol (µg/L) | Toxa-phene (µg/L) | 2,4,5-TP (µg/L) | Benzo (A) Pyrene (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Dalapon (µg/L) | Di (2-Ethyl-hexyl) Adipate (µg/L) | Di (2-Ethyl-hexyl) Phthal-ate (µg/L) | Dinoseb (µg/L) | Diquat (µg/L) | Endo-thall (µg/L) | Endrin (µg/L) | Glypho-sate (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Dalapon (µg/L) | Di (2-Ethyl-hexyl) Adipate (µg/L) | Di (2-Ethyl-hexyl) Phthal-ate (µg/L) | Dinoseb (µg/L) | Diquat (µg/L) | Endo-thall (µg/L) | Endrin (µg/L) | Glypho-sate (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | - | - | - | - | - | - | - | - |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <2.2 | <1.3 | <1.3 | <0.4 | - | - | <0.1 | - |
| (C-36-12)17ddd | - | - | - | - | - | - | - | - |
| (C-36-12)32ccb-2 | - | - | - | - | - | - | - | - |
| (C-36-12)20acd | <2.2 | <1.3 | <1.3 | <0.4 | - | - | <0.1 | - |
| (C-36-11)30acc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)10cdc | - | - | - | - | - | - | - | - |
| (C-35-10)18bda | - | - | - | - | - | - | - | - |
| (C-35-10)7ccc | - | - | - | - | - | - | - | - |
| (C-35-10)7caa | <2.2 | <1.3 | <1.3 | <0.4 | - | - | <0.1 | - |
| (C-36-12)15dbd | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-2 | - | - | - | - | - | - | - | - |
| (C-35-11)9ccc | - | - | - | - | - | - | - | - |
| (C-36-11)19ddd | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9acd | - | - | - | - | - | - | - | - |
| (C-35-11)17dbc | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-2 | - | - | - | - | - | - | - | - |
| (C-35-11)1cdc | <1.0 | <0.6 | <0.1 | <0.2 | - | - | <0.1 | - |
| (C-36-12)24cca | <2.2 | <0.6 | <0.3 | <0.4 | - | - | <0.2 | - |
| (C-36-12)3cdc | <2.2 | <1.3 | <1.3 | <0.4 | - | - | <0.1 | - |
| (C-36-11)7aba | <2.2 | <1.3 | <1.3 | <0.4 | - | - | <0.1 | - |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Dalapon (µg/L) | Di (2-Ethyl-hexyl) Adipate (µg/L) | Di (2-Ethyl-hexyl) Phthal-ate (µg/L) | Dinoseb (µg/L) | Diquat (µg/L) | Endo-thall (µg/L) | Endrin (µg/L) | Glypho-sate (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Hexa-chloro-benzene (µg/L) | Hexa-chloro-penta-diene (µg/L) | Oxamyl (Vydate) (µg/L) | Picloram (µg/L) | Simazine (µg/L) | 2,3,7,8-TCDD (Dioxin) (µg/L) | Chloro-form (µg/L) | Bromo-dichloro-methane (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Hexa-chloro-benzene (µg/L) | Hexa-chloro-penta-diene (µg/L) | Oxamyl (Vydate) (µg/L) | Picloram (µg/L) | Simazine (µg/L) | 2,3,7,8-TCDD (Dioxin) (µg/L) | Chloro-form (µg/L) | Bromo-dichloro-methane (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <0.2 | <0.2 | <2.0 | <0.2 | <0.2 | - | <0.5 | <0.5 |
| (C-36-12)17ddd | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-36-12)32ccb-2 | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-36-12)20acd | <0.2 | <0.2 | <2.0 | <0.2 | <0.2 | - | <0.5 | <0.5 |
| (C-36-11)30acc-1 | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)10cdc | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-35-10)18bda | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-35-10)7ccc | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-35-10)7caa | <0.2 | <0.2 | <2.0 | <0.2 | <0.2 | - | <0.5 | <0.5 |
| (C-36-12)15dbd | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-36-12)24ada-2 | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-35-11)9ccc | - | - | - | - | - | - | <0.5 | <1.0 |
| (C-36-11)19ddd | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-36-12)3acc-1 | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-35-11)9acd | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-35-11)17dbc | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-37-12)1bba-2 | - | - | - | - | - | - | <0.5 | <0.5 |
| (C-35-11)1cdc | <0.1 | <0.1 | <2.0 | <0.1 | <0.1 | - | <0.5 | <0.5 |
| (C-36-12)24cca | <0.1 | <0.1 | <0.6 | <0.2 | <0.1 | - | - | - |
| (C-36-12)3cdc | <0.2 | <0.2 | <2.0 | <0.2 | <0.2 | - | <0.5 | <0.5 |
| (C-36-11)7aba | <0.2 | <0.2 | <2.0 | <0.2 | <0.2 | - | <0.5 | <0.5 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Hexa-chloro-benzene (µg/L) | Hexa-chloro-penta-diene (µg/L) | Oxamyl (Vydate) (µg/L) | Picloram (µg/L) | Simazine (µg/L) | 2,3,7,8-TCDD (Dioxin) (µg/L) | Chloro-form (µg/L) | Bromo-dichloro-methane (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Chloro-dibromo-methane (µg/L) | Bromo-form (µg/L) | M-dichloro-benzene (µg/L) | 1,1-dichloro-propene (µg/L) | 1,1-dichloro-ethane (µg/L) | 1,1,2.2-Tetra-chloro-ethane (µg/L) | 1,3-dichloro-propane (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Chloro-dibromo-methane (µg/L) | Bromo-form (µg/L) | M-dichloro-benzene (µg/L) | 1,1-dichloro-propene (µg/L) | 1,1-dichloro-ethane (µg/L) | 1,1,2.2-Tetra-chloro-ethane (µg/L) | 1,3-dichloro-propane (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - |
| (C-35-11)3dcd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <0.5 | <0.5 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-12)17ddd | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-12)32ccb-2 | <0.1 | <1.0 | <0.1 | <0.1 | <0.1 | <0.5 | <0.5 |
| (C-36-12)20acd | <0.5 | <0.5 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-11)30acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - |
| (C-35-11)10cdc | <0.5 | <0.5 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-35-10)18bda | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-35-10)7ccc | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-35-10)7caa | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-12)15dbd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24ada-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)9ccc | <0.2 | <1.0 | <0.1 | <0.1 | <0.1 | 0.5 | 0.5 |
| (C-36-11)19ddd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)3acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)9acd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)17dbc | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-37-12)1bba-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)1cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24cca | - | - | - | - | - | - | - |
| (C-36-12)3cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)7aba | <0.5 | <0.5 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Chloro-dibromo-methane (µg/L) | Bromo-form (µg/L) | M-dichloro-benzene (µg/L) | 1,1-dichloro-propene (µg/L) | 1,1-dichloro-ethane (µg/L) | 1,1,2.2-Tetra-chloro-ethane (µg/L) | 1,3-dichloro-propane (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Chloro-methane (µg/L) | Bromo-methane (µg/L) | 1,2,3-trichloro-propane (µg/L) | 1,1,1.2-Tetra-chloro-ethane (µg/L) | Chloro-ethane (µg/L) | 2,2-Dichloro-propane (µg/L) | O-Chloro-toluene (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Chloro-methane (µg/L) | Bromo-methane (µg/L) | 1,2,3-trichloro-propane (µg/L) | 1,1,1.2-Tetra-chloro-ethane (µg/L) | Chloro-ethane (µg/L) | 2,2-Dichloro-propane (µg/L) | O-Chloro-toluene (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - |
| (C-35-11)3dcd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-12)17ddd | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-12)32ccb-2 | <0.5 | <0.5 | <0.1 | <0.5 | <0.5 | <0.5 | <0.1 |
| (C-36-12)20acd | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-11)30acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - |
| (C-35-11)10cdc | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-35-10)18bda | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-35-10)7ccc | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-35-10)7caa | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-12)15dbd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24ada-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)9ccc | 0.5 | 0.5 | <0.1 | 0.5 | 0.5 | 0.5 | <0.1 |
| (C-36-11)19ddd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)3acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)9acd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)17dbc | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-37-12)1bba-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)1cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24cca | - | - | - | - | - | - | - |
| (C-36-12)3cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)7aba | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Chloro-methane (µg/L) | Bromo-methane (µg/L) | 1,2,3-trichloro-propane (µg/L) | 1,1,1.2-Tetra-chloro-ethane (µg/L) | Chloro-ethane (µg/L) | 2,2-Dichloro-propane (µg/L) | O-Chloro-toluene (µg/L) |
|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | P- Chloro-toluene (µg/L) | Bromo-benzene (µg/L) | 1,3-dichloro-propene (µg/L) | Aldrin (µg/L) | Buta-chlor (µg/L) | Carbaryl (µg/L) | Dicamba (µg/L) | Dieldrin (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | P- Chloro-toluene (µg/L) | Bromo-benzene (µg/L) | 1,3-dichloro-propene (µg/L) | Aldrin (µg/L) | Buta-chlor (µg/L) | Carbaryl (µg/L) | Dicamba (µg/L) | Dieldrin (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | <0.5 | <0.5 | <0.5 | - | - | - | - | - |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <1.0 | <1.0 | <1.0 | <2.0 | <0.5 | 2.0 | 1.0 | 1.0 |
| (C-36-12)17ddd | <1.0 | <1.0 | <1.0 | - | - | - | - | - |
| (C-36-12)32ccb-2 | <0.1 | <0.1 | <0.5 | - | - | - | - | - |
| (C-36-12)20acd | <1.0 | <1.0 | <1.0 | <2.0 | <0.2 | 2.0 | 1.0 | 1.0 |
| (C-36-11)30acc-1 | <0.5 | <0.5 | <0.5 | - | - | - | - | - |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)10cdc | <1.0 | <1.0 | <1.0 | - | - | - | - | - |
| (C-35-10)18bda | <1.0 | <1.0 | <1.0 | - | - | - | - | - |
| (C-35-10)7ccc | <1.0 | <1.0 | <1.0 | - | - | - | - | - |
| (C-35-10)7caa | <1.0 | <1.0 | <1.0 | <2.0 | <0.2 | <2.0 | <1.0 | <1.0 |
| (C-36-12)15dbd | <0.5 | <0.5 | <0.5 | - | - | - | - | - |
| (C-36-12)24ada-2 | <0.5 | <0.5 | <0.5 | - | - | - | - | - |
| (C-35-11)9ccc | <0.1 | <0.1 | 0.5 | - | - | - | - | - |
| (C-36-11)19ddd | <0.5 | <0.5 | <0.5 | - | - | - | - | - |
| (C-36-12)3acc-1 | <0.5 | <0.5 | <0.5 | - | - | - | - | - |
| (C-35-11)9acd | <0.5 | <0.5 | <0.5 | - | - | - | - | - |
| (C-35-11)17dbc | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | <0.5 | <0.5 | <0.5 | - | - | - | - | - |
| (C-37-12)1bba-2 | <0.5 | <0.5 | <0.5 | - | - | - | - | - |
| (C-35-11)1cdc | <0.5 | <0.5 | <0.5 | <0.1 | <0.1 | <2.0 | <0.1 | <0.2 |
| (C-36-12)24cca | - | - | - | <0.1 | <0.1 | <0.2 | <0.4 | <0.1 |
| (C-36-12)3cdc | <0.5 | <0.5 | <0.5 | <2.0 | <0.5 | <2.0 | <1.0 | <1.0 |
| (C-36-11)7aba | <1.0 | <1.0 | <1.0 | <2.0 | <0.5 | <2.0 | <1.0 | <1.0 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | P- Chloro-toluene (µg/L) | Bromo-benzene (µg/L) | 1,3-dichloro-propene (µg/L) | Aldrin (µg/L) | Buta-chlor (µg/L) | Carbaryl (µg/L) | Dicamba (µg/L) | Dieldrin (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | 3-Hydroxy-carbo- furan (µg/L) | Meth-omyl (µg/L) | Metho-lachlor (µg/L) | Metri-busin (µg/L) | Propa-chlor (µg/L) | 1,2,4-Tri-methyl-benzene (µg/L) | 1,2,3-Tri-chloro-benzene (µg/L) | N-Propyl-benzene (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | 3-Hydroxy-carbo- furan (µg/L) | Meth-omyl (µg/L) | Metho-lachlor (µg/L) | Metri-busin (µg/L) | Propa-chlor (µg/L) | 1,2,4-Tri-methyl-benzene (µg/L) | 1,2,3-Tri-chloro-benzene (µg/L) | N-Propyl-benzene (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | - | - | - | - | - | <0.5 | <0.5 | <0.5 |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | 2.0 | 0.5 | 0.5 | 0.5 | 0.5 | <1.0 | <1.0 | <1.0 |
| (C-36-12)17ddd | - | - | - | - | - | <1.0 | <1.0 | <1.0 |
| (C-36-12)32ccb-2 | - | - | - | - | - | <0.1 | <0.1 | <0.1 |
| (C-36-12)20acd | 2.0 | <0.5 | <0.5 | <0.5 | <0.5 | <1.0 | <1.0 | <1.0 |
| (C-36-11)30acc-1 | - | - | - | - | - | <0.5 | <0.5 | <0.5 |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)10cdc | - | - | - | - | - | <1.0 | <1.0 | <1.0 |
| (C-35-10)18bda | - | - | - | - | - | <1.0 | <1.0 | <1.0 |
| (C-35-10)7ccc | - | - | - | - | - | <1.0 | <1.0 | <1.0 |
| (C-35-10)7caa | <2.0 | <0.5 | <0.5 | <0.5 | <0.5 | <1.0 | <1.0 | <1.0 |
| (C-36-12)15dbd | - | - | - | - | - | <0.5 | <0.5 | <0.5 |
| (C-36-12)24ada-2 | - | - | - | - | - | <0.5 | <0.5 | <0.5 |
| (C-35-11)9ccc | - | - | - | - | - | <0.1 | <0.1 | <0.1 |
| (C-36-11)19ddd | - | - | - | - | - | <0.5 | <0.5 | <0.5 |
| (C-36-12)3acc-1 | - | - | - | - | - | <0.5 | <0.5 | <0.5 |
| (C-35-11)9acd | - | - | - | - | - | <0.5 | <0.5 | <0.5 |
| (C-35-11)17dbc | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | - | - | - | - | - | <0.5 | <0.5 | <0.5 |
| (C-37-12)1bba-2 | - | - | - | - | - | <0.5 | <0.5 | <0.5 |
| (C-35-11)1cdc | <2.0 | <1.0 | <0.1 | <0.1 | <0.1 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24cca | <0.5 | <0.3 | <0.1 | <0.1 | <0.1 | - | - | - |
| (C-36-12)3cdc | <2.0 | <0.5 | <0.5 | <0.5 | <0.5 | <1.0 | <1.0 | <1.0 |
| (C-36-11)7aba | <2.0 | <0.5 | <0.5 | <0.5 | <0.5 | <1.0 | <1.0 | <1.0 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | 3-Hydroxy-carbo- furan (µg/L) | Meth-omyl (µg/L) | Metho-lachlor (µg/L) | Metri-busin (µg/L) | Propa-chlor (µg/L) | 1,2,4-Tri-methyl-benzene (µg/L) | 1,2,3-Tri-chloro-benzene (µg/L) | N-Propyl-benzene (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | N-Butyl-benzene (µg/L) | Naptha-lene (µg/L) | Hexa-chloro-buta-diene (µg/L) | 1,3,5-Tri-methyl-benzene (µg/L) | P-Iso-propyl-toluene (µg/L) | Iso-propyl-benzene (µg/L) | Tert-Butyl-benzene (µg/L) | Sec-Butyl-benzene (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | N-Butyl-benzene (µg/L) | Naptha-lene (µg/L) | Hexa-chloro-buta-diene (µg/L) | 1,3,5-Tri-methyl-benzene (µg/L) | P-Iso-propyl-toluene (µg/L) | Iso-propyl-benzene (µg/L) | Tert-Butyl-benzene (µg/L) | Sec-Butyl-benzene (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - | - |
| (C-35-11)3dcd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)29abb-1 | - | - | - | - | - | - | - | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-12)17ddd | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-12)32ccb-2 | <0.1 | <0.5 | <0.2 | <0.1 | <0.5 | <0.1 | <0.5 | <0.1 |
| (C-36-12)20acd | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-11)30acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-11)30acc-2 | - | - | - | - | - | - | - | - |
| (C-35-11)10cdc | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-35-10)18bda | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-35-10)7ccc | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-35-10)7caa | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-12)15dbd | <0.5 | <0.5 | <0.5 | <0.5 | <2.0 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24ada-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)9ccc | <0.2 | <0.5 | <0.2 | <0.1 | <0.5 | <0.1 | <0.5 | <0.2 |
| (C-36-11)19ddd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)3acc-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)9acd | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)17dbc | - | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-37-12)1bba-2 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-35-11)1cdc | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| (C-36-12)24cca | - | - | - | - | - | - | - | - |
| (C-36-12)3cdc | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-36-11)7aba | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | N-Butyl-benzene (µg/L) | Naptha-lene (µg/L) | Hexa-chloro-buta-diene (µg/L) | 1,3,5-Tri-methyl-benzene (µg/L) | P-Iso-propyl-toluene (µg/L) | Iso-propyl-benzene (µg/L) | Tert-Butyl-benzene (µg/L) | Sec-Butyl-benzene (µg/L) |
|---|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Fluoro-trichloro-methane (µg/L) | Dichloro-difluoro-methane (µg/L) | Bromo-chloro-methane (µg/L) | Surfac-tant as MBAS (mg/L) | alpha, gross (PCi/L-G) | beta, gross (PCi/L-G) | 226 radium (PCi/L-G) |
|---|---|---|---|---|---|---|---|
| (C-34-10)31caa-1 | - | - | - | - | - | - | - |
| (C-34-11)9ccd-1 | - | - | - | - | - | - | - |
| (C-34-11)14aad-2 | - | - | - | - | - | - | - |
| (C-34-11)21dcd-1 | - | - | - | - | - | - | - |
| (C-34-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-34-11)36dcc-2 | - | - | - | - | - | - | - |
| (C-35-10)6bad-1 | - | - | - | - | - | - | - |
| (C-35-10)18abc-1 | - | - | - | - | - | - | - |
| (C-35-10)18bad-1 | - | - | - | - | - | - | - |
| (C-35-11)8cdc-1 | - | - | - | - | - | - | - |
| (C-35-11)8ddc-1 | - | - | - | - | - | - | - |
| (C-35-11)9dba-1 | - | - | - | - | - | - | - |
| (C-35-11)11ccc-1 | - | - | - | - | - | - | - |
| (C-35-11)11ccc-3 | - | - | - | - | - | - | - |
| (C-35-11)12add-1 | - | - | - | - | - | - | - |
| (C-35-11)12ccc-2 | - | - | - | - | - | - | - |
| (C-35-11)13dad-1 | - | - | - | - | - | - | - |
| (C-35-11)14bca-1 | - | - | - | - | - | - | - |
| (C-35-11)16aab-1 | - | - | - | - | - | - | - |
| (C-35-11)25bcc-1 | - | - | - | - | - | - | - |
| (C-35-11)26acd-1 | - | - | - | - | - | - | - |
| (C-35-11)28aac-2 | - | - | - | - | - | - | - |
| (C-35-11)29add-1 | - | - | - | - | - | - | - |
| (C-35-11)29cab-1 | - | - | - | - | - | - | - |
| (C-35-11)29dbd-2 | - | - | - | - | - | - | - |
| (C-35-11)31acd-2 | - | - | - | - | - | - | - |
| (C-35-11)31dbd-1 | - | - | - | - | - | - | - |
| (C-35-11)34dbb-1 | - | - | - | - | - | - | - |
| (C-35-12)26bca-1 | - | - | - | - | - | - | - |
| (C-35-12)27bcd-1 | - | - | - | - | - | - | - |
| (C-35-12)36ddd-1 | - | - | - | - | - | - | - |
| (C-36-11)5aca-1 | - | - | - | - | - | - | - |
| (C-36-11)5dab-1 | - | - | - | - | - | - | - |
| (C-36-11)7aaa-2 | - | - | - | - | - | - | - |
| (C-36-11)7adc-1 | - | - | - | - | - | - | - |
| (C-36-11)11bac-1 | - | - | - | - | - | - | - |
| (C-36-11)18bdd-1 | - | - | - | - | - | - | - |
| (C-36-11)31abc-1 | - | - | - | - | - | - | - |
| (C-36-12)2dbc-1 | - | - | - | - | - | - | - |
| (C-36-12)3aad-2 | - | - | - | - | - | - | - |
| (C-36-12)3acc-1 | - | - | - | - | - | - | - |
| (C-36-12)9aac-1 | - | - | - | - | - | - | - |
| (C-36-12)11abd-1 | - | - | - | - | - | - | - |
| (C-36-12)21cbb-1 | - | - | - | - | - | - | - |
| (C-36-12)25bdd-1 | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Fluoro-trichloro-methane (µg/L) | Dichloro-difluoro-methane (µg/L) | Bromo-chloro-methane (µg/L) | Surfac-tant as MBAS (mg/L) | alpha, gross (PCi/L-G) | beta, gross (PCi/L-G) | 226 radium (PCi/L-G) |
|---|---|---|---|---|---|---|---|
| (C-36-12)36adb | - | - | - | - | - | - | - |
| (C-37-12)4bbc-1 | - | - | - | - | - | - | - |
| (C-37-12)9acc-1 | - | - | - | - | - | - | - |
| (C-37-12)11aaa-1 | - | - | - | - | - | - | - |
| (C-37-12)23abd-1 | - | - | - | - | - | - | - |
| (C-37-12)23acb-1 | - | - | - | - | - | - | - |
| (C-36-12)24ada-1 | - | - | - | - | - | - | - |
| (C-35-11)3dcd | <0.5 | <0.5 | <0.5 | - | 2 | - | - |
| (C-36-12)29abb-1 | - | - | - | - | <2 | <4 | - |
| (C-36-11)32ccb-1 | - | - | - | - | - | - | - |
| (C-35-11)24dba-1 | - | - | - | - | - | - | - |
| (C-35-11)24dba-2 | <1.0 | <1.0 | <1.0 | - | <4 | 8 | - |
| (C-36-12)17ddd | <1.0 | <1.0 | <1.0 | - | <2 | <10 | - |
| (C-36-12)32ccb-2 | <0.1 | <0.5 | <0.5 | - | 4 | - | - |
| (C-36-12)20acd | <1.0 | <1.0 | <1.0 | <0.02 | - | - | - |
| (C-36-11)30acc-1 | <0.5 | <0.5 | <0.5 | - | 13 | - | <1 |
| (C-36-11)30acc-2 | - | - | - | <0.02 | 4 | - | - |
| (C-35-11)10cdc | <1.0 | <1.0 | <1.0 | - | - | - | - |
| (C-35-10)18bda | <1.0 | <1.0 | <1.0 | - | <6 | 7 | - |
| (C-35-10)7ccc | <1.0 | <1.0 | <1.0 | - | <4 | <5 | - |
| (C-35-10)7caa | <1.0 | <1.0 | <1.0 | - | - | - | - |
| (C-36-12)15dbd | <0.5 | <0.5 | <0.5 | - | <2 | <3 | - |
| (C-36-12)24ada-2 | <0.5 | <0.5 | <0.5 | - | <1 | - | - |
| (C-35-11)9ccc | <0.1 | <0.5 | <0.5 | - | 4 | - | - |
| (C-36-11)19ddd | <0.5 | <0.5 | <0.5 | - | 6 | - | <1 |
| (C-36-12)3acc-1 | <0.5 | <0.5 | <0.5 | 0.01 | 4 | - | - |
| (C-35-11)9acd | <0.5 | <0.5 | <0.5 | - | <2 | - | - |
| (C-35-11)17dbc | - | - | - | - | - | - | - |
| (C-37-12)1bba-1 | <0.5 | <0.5 | <0.5 | - | - | - | - |
| (C-37-12)1bba-2 | <0.5 | <0.5 | <0.5 | - | - | - | - |
| (C-35-11)1cdc | <0.5 | <0.5 | <0.5 | - | 1 | 5 | - |
| (C-36-12)24cca | - | - | - | <0.02 | <2 | - | - |
| (C-36-12)3cdc | <1.0 | <1.0 | <1.0 | 0.19 | <5 | <5 | - |
| (C-36-11)7aba | <1.0 | <1.0 | <1.0 | - | <1 | <1 | - |
| (C-33-10)31ada-1 | - | - | - | - | - | - | - |
| (C-33-11)30bca-1 | - | - | - | - | - | - | - |
| (C-33-11)31aad-1 | - | - | - | - | - | - | - |
| (C-34-11)36dcc-3 | - | - | - | - | - | - | - |
| (C-35-11)19dbb-1 | - | - | - | - | - | - | - |
| (C-35-11)27dbb-1 | - | - | - | - | - | - | - |
| (C-35-11)30caa-1 | - | - | - | - | - | - | - |
| (C-35-11)33aac-1 | - | - | - | - | - | - | - |
| (C-35-11)33abd-1 | - | - | - | - | - | - | - |
| (C-35-11)33ccd-1 | - | - | - | - | - | - | - |
| (C-35-12)36caa-1 | - | - | - | - | - | - | - |
| (C-36-11)7cab-1 | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

***Table B1.*** *continued*

| WELL LOCATION | Fluoro-trichloro-methane (µg/L) | Dichloro-difluoro-methane (µg/L) | Bromo-chloro-methane (µg/L) | Surfac-tant as MBAS (mg/L) | alpha, gross (PCi/L-G) | beta, gross (PCi/L-G) | 226 radium (PCi/L-G) |
|---|---|---|---|---|---|---|---|
| (C-36-12)12dba-1 | - | - | - | - | - | - | - |
| (C-37-12)11dac-1 | - | - | - | - | - | - | - |
| (C-37-12)34abb-1 | - | - | - | - | - | - | - |
| (C-35-11)13ccb | - | - | - | - | - | - | - |
| (C-35-11)13cdb | - | - | - | - | - | - | - |
| (C-35-11)13ddb | - | - | - | - | - | - | - |
| (C-35-11)35bdd | - | - | - | - | - | - | - |
| (C-35-11)26dca | - | - | - | - | - | - | - |
| (C-35-11)26acd | - | - | - | - | - | - | - |
| (C-35-11)27aab | - | - | - | - | - | - | - |
| (C-35-11)22dcd | - | - | - | - | - | - | - |
| (C-35-11)22ddb | - | - | - | - | - | - | - |
| (C-35-11)22ada | - | - | - | - | - | - | - |
| (C-35-11)23cab | - | - | - | - | - | - | - |
| (C-35-11)23bdd-1 | - | - | - | - | - | - | - |
| (C-35-11)23bdd-2 | - | - | - | - | - | - | - |
| (C-35-11)23acd | - | - | - | - | - | - | - |
| (C-35-11)23abb | - | - | - | - | - | - | - |
| (C-35-11)24ccd | - | - | - | - | - | - | - |
| (C-35-11)24bdd | - | - | - | - | - | - | - |
| (C-35-11)26bbb | - | - | - | - | - | - | - |
| (C-35-11)22dad | - | - | - | - | - | - | - |

*USGS-U.S. Geological Survey; UDDW-Utah Division of Drinking Water; UGS-Utah Geological Survey; "-" indicates no data

# APPENDIX C
POTENTIAL CONTAMINANT SOURCES

***Table C1.*** *Potential contaminants, Cedar Valley, Iron County, Utah.*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 1 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, cows, stables | fertilizer, manure |
| 2 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 3 | FORMER CONCENTRATION OF ANIMALS | abandoned barn shed | fertilizer, manure |
| 4 | INDUSTRY | power sub station | PCB, metals, solvents |
| 5 | STORAGE TANK | gravity driven gas tank | petroleum |
| 6 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation | fertilizer, manure |
| 7 | GOVERNMENT | gravel piles, salt piles | metals, solvents, petroleum |
| 8 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, cows, horses, sheds | fertilizer, manure |
| 9 | FORMER CONCENTRATION OF ANIMALS | abandoned animal feeding operation, barnyard | fertilizer, manure |
| 10 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 11 | STORAGE TANK | gravity driven gas tank | petroleum |
| 12 | JUNK YARD/SALVAGE | personal junk yard/salvage | metals, solvents, petroleum |
| 13 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 14 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 15 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 16 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, sheep, cows | fertilizer, manure |
| 17 | STORAGE TANK | gravity driven gas tank | petroleum |
| 18 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, sheep, cows, | fertilizer, manure |
| 19 | JUNK YARD/SALVAGE | junk yard/salvage | metals, solvents, petroleum |
| 20 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | small corral | fertilizer, manure |
| 21 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 22 | MINING | abandoned coal mine shaft | metals, solvents |
| 23 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 24 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animal feeding operation, horses, cows | fertilizer, manure |
| 25 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | barn shed, corral, animal feeding operation, | fertilizer, manure |
| 26 | FORMER CONCENTRATION OF ANIMALS | abandoned barn shed, corral | fertilizer, manure |
| 27 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheds, animal feeding operation | fertilizer, manure |
| 28 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep grazing animal feeding operation, barns, | fertilizer, manure |
| 29 | JUNK YARD/SALVAGE | junk yard/salvage | metals, solvents, petroleum |
| 30 | JUNK YARD/SALVAGE | junk yard/salvage | metals, solvents, petroleum |
| 31 | INDUSTRY | power substation | PCB, metals, solvents |
| 32 | JUNK YARD/SALVAGE | junk yard/salvage | metals, solvents, petroleum |
| 33 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses animal feeding operation | fertilizer, manure |
| 34 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | llama animal feeding operation | fertilizer, manure |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 35 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses animal feeding operation, corral | fertilizer, manure |
| 36 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | small animal feeding operation horses, corral | fertilizer, manure |
| 37 | INDUSTRY | power sub station | PCB, metals, solvents |
| 38 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | cow animal feeding operation, small corral, | fertilizer, manure |
| 39 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animal feeding operation, ranch | fertilizer, manure |
| 40 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses animal feeding operation, corral, ranch | fertilizer, manure |
| 41 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | small corral, horses, animal feeding operation | fertilizer, manure |
| 42 | FORMER CONCENTRATION OF ANIMALS | abandoned corral, sheds | fertilizer, manure |
| 43 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral, animal feeding operation | fertilizer, manure |
| 44 | STORAGE TANK | vertical gas pump | petroleum |
| 45 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animal feeding operation, horses | fertilizer, manure |
| 46 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | farms, barns, animal feeding operation | fertilizer, manure |
| 47 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, corral, cows and | fertilizer, manure |
| 48 | BUSINESS | small business, horse trailers | metals, solvents, petroleum |
| 49 | STORAGE TANK | gravity driven gas tank | petroleum |
| 50 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | mountain ranch, horses animal feeding | fertilizer, manure |
| 51 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 52 | INDUSTRY | industry | metals, solvents, petroleum |
| 53 | INDUSTRY | fiber manufacture company | metals, solvents |
| 54 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, corral, horses | fertilizer, manure |
| 55 | STORAGE TANK | 2 gravity driven gas tanks | petroleum |
| 56 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animal feeding operation, horses | fertilizer, manure |
| 57 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation, pasture | fertilizer, manure |
| 58 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | caged sheep animal feeding operation, farm | fertilizer, manure |
| 59 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | fenced sheep animal feeding operation | fertilizer, manure |
| 60 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | fenced sheep animal feeding operation | fertilizer, manure |
| 296 | INDUSTRY | industry manufacter sheds, lumber, aluminum | metals, solvents |
| 61 | GOVERNMENT | abandoned government agency | metals, solvents, petroleum |
| 62 | STORAGE TANK | gravity driven gas tank | petroleum |
| 63 | LARGE LAWN | sod/ turf | fertilizer, manure |
| 64 | FORMER CONCENTRATION OF ANIMALS | abandoned barn, corral | fertilizer, manure |
| 65 | JUNK YARD/SALVAGE | junk yard/salvage | metals, solvents, petroleum |
| 66 | WASTE DISPOSAL | dilapidated buildings with land fill | metals, solvents |
| 68 | WASTE DISPOSAL | county land fill | metals, solvents |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 71 | WASTE DISPOSAL | facility related to land fill | metals, solvents |
| 73 | MINING | inactive mines | metals, solvents, petroleum |
| 74 | MINING | mines | metals, solvents, petroleum |
| 75 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 76 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, cows, corral | fertilizer, manure |
| 77 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corrals/abandoned? | fertilizer, manure |
| 78 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 79 | STORAGE TANK | gravity driven gas tank, 2 vertical gas pumps | petroleum |
| 80 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animal feeding operation | fertilizer, manure |
| 81 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | fenced sheep animal feeding operation | fertilizer, manure |
| 82 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animal feeding operation, horses and | fertilizer, manure |
| 83 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, corral, horses | fertilizer, manure |
| 84 | FORMER CONCENTRATION OF ANIMALS | abandoned animal feeding operation | fertilizer, manure |
| 85 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animal feeding operation, horses | fertilizer, manure |
| 86 | STORAGE TANK | gravity driven gas tank | petroleum |
| 87 | FORMER CONCENTRATION OF ANIMALS | abandoned animal feeding operation | fertilizer, manure |
| 88 | JUNK YARD/SALVAGE | junk yard/salvage, peacocks | |
| 89 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, sheds, barns | fertilizer, manure |
| 90 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 91 | STORAGE TANK | gravity driven gas tank | petroleum |
| 92 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | farm, sheds, corral, sheep animal feeding | fertilizer, manure |
| 93 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, animal feeding operation | fertilizer, manure |
| 94 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | cows, corral, animal feeding operation | fertilizer, manure |
| 95 | JUNK YARD/SALVAGE | junk yard/salvage | metals, solvents, petroleum |
| 96 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 97 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | cows, horses, animal feeding operation | fertilizer, manure |
| 98 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 99 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 100 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, cows | fertilizer, manure |
| 101 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 102 | STORAGE TANK | gravity driven gas tank | petroleum |
| 103 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep, horse, animal feeding operation | fertilizer, manure |
| 104 | STORAGE TANK | gravity driven gas tank | petroleum |
| 105 | BUSINESS | cabin makers, lumber piles | metals, solvents, petroleum |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 106 | BUSINESS | race track, motorway | metals, solvents, petroleum |
| 107 | STORAGE TANK | 2 gravity driven gas tank | petroleum |
| 108 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 109 | LARGE LAWN | small park | pesticides, fertilizer |
| 110 | STORAGE TANK | gravity driven gas tank | petroleum |
| 111 | BUSINESS | lumber piles, tractors | metals, solvents, petroleum |
| 112 | INDUSTRY | trucking industry | metals, solvents, petroleum |
| 113 | INDUSTRY | storage shed, garage for freight trucks | metals, solvents, petroleum |
| 114 | BUSINESS | storage units | metals, solvents, petroleum |
| 115 | BUSINESS | 24 hr truck service parts, rentals, sales, tractors | metals, solvents, petroleum |
| 116 | BUSINESS | machine and welding | metals, solvents, petroleum |
| 117 | INDUSTRY | industry stock yard | metals, solvents, petroleum |
| 118 | MEDICAL, BUSINESS | warehouse, animal hospital, cabinet & carpet | metals, solvents |
| 119 | LARGE LAWN | nursery | pesticides, fertilizer |
| 120 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 121 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 122 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | dairy operation, cows and horses animal | fertilizer, manure |
| 123 | SERVICE STATION | gas station | petroleum |
| 124 | SERVICE STATION | automotive repair | metals, solvents, petroleum |
| 125 | SERVICE STATION | automotive repair | metals, solvents, petroleum |
| 126* | BUSINESS | sheet metal | petroleum |
| 127 | BUSINESS | audio and electronic store | metals, solvents, petroleum |
| 128 | BUSINESS | motorcycle outlet | metals, solvents, petroleum |
| 131 | BUSINESS | industrial plaza, storage units, freight trucks | metals, solvents, petroleum |
| 132 | INDUSTRY | municipal airport facilities | metals, solvents, petroleum |
| 133 | MINING | gravel pit | metals, solvents, petroleum |
| 134 | MINING | inactive gravel pit | metals, solvents, petroleum |
| 135 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | cows, animal feeding operation | fertilizer, manure |
| 136 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, cows, corral | fertilizer, manure |
| 137 | STORAGE TANK | gravity driven gas tank | petroleum |
| 138 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 139 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 140 | STORAGE TANK | gravity driven gas tank | petroleum |
| 141 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation | fertilizer, manure |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 142 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 143 | STORAGE TANK | gravity driven gas tank | petroleum |
| 144 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 145 | STORAGE TANK | gravity driven gas tank | petroleum |
| 146 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 147 | STORAGE TANK | gravity driven gas tank | petroleum |
| 148 | STORAGE TANK | gravity driven gas tank | petroleum |
| 149 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animal feeding operation | fertilizer, manure |
| 150 | JUNK YARD/SALVAGE | junk yard/salvage | metals, solvents, petroleum |
| 151 | STORAGE TANK | gravity driven gas tank | petroleum |
| 152 | STORAGE TANK | gravity driven gas tank | petroleum |
| 153 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 154 | STORAGE TANK | gravity driven gas tank | petroleum |
| 155 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 156 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 157 | BUSINESS | small business, electronic | metals, solvents |
| 158 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 159 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, cows, horses | fertilizer, manure |
| 160 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animal feeding operation horses | fertilizer, manure |
| 161 | STORAGE TANK | gravity driven gas tank | petroleum |
| 162 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, cow, animal feeding operation | fertilizer, manure |
| 163 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 164 | MINING | gravel pit | metals, solvents, petroleum |
| 165 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 166 | MINING | gravel pit | metals, solvents, petroleum |
| 167 | MINING | related to gravel pits, storage building | metals, solvents, petroleum |
| 168 | MINING | gravel pit | metals, solvents, petroleum |
| 169 | MINING | gravel pit | metals, solvents, petroleum |
| 170 | MINING | gravel pit | metals, solvents, petroleum |
| 171 | GOVERNMENT | transportation facility, asphalt piles, garages | metals, solvents, petroleum |
| 172 | BUSINESS | hydraulic shop | metals, solvents, petroleum |
| 173 | BUSINESS | auto body shop | metals, solvents, petroleum |
| 174* | MINING | gravel pit, inactive? | metals, solvents, petroleum |
| 175* | GOVERNMENT | county road /transportation | metals, solvents, petroleum |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 176* | MEDICAL | animal shelter | metals, solvents |
| 177* | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 178* | GOVERNMENT | fire department | metals, solvents, petroleum |
| 179* | STORAGE TANK | 2 gravity driven gas tank | petroleum |
| 180* | BUSINESS | welding business | metals, solvents, petroleum |
| 181* | JUNK YARD/SALVAGE | recycle business | metals, solvents, petroleum |
| 182* | STORAGE TANK | gravity driven gas tank | petroleum |
| 183 | GOVERNMENT | transportation/ trucks | metals, solvents, petroleum |
| 184 | GOVERNMENT | transportation/ painting facility | metals, solvents, petroleum |
| 185 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 186* | INDUSTRY | food processor/ major industry | metals, solvents |
| 187* | BUSINESS | industrial plaza, storage sheds | metals, solvents, petroleum |
| 188* | GOVERNMENT | transportation facility | metals, solvents, petroleum |
| 189* | BUSINESS | custom meat shop | metals, solvents |
| 190* | BUSINESS | water well pump service | metals, solvents |
| 191* | STORAGE TANK | gravity driven gas tank | petroleum |
| 192* | WASTE DISPOSAL | street deptartment/ solid waste | metals, solvents, petroleum, |
| 193* | BUSINESS | rental and sales company, tractors | metals, solvents, petroleum |
| 194* | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, horses, sheep | fertilizer, manure |
| 195* | BUSINESS | auto rentals, u-hauls | metals, solvents, petroleum |
| 196 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | arabian horses, corrals, animal feeding | fertilizer, manure |
| 197 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | arabian corrals, stables | fertilizer, manure |
| 198 | JUNK YARD/SALVAGE | junk yard/salvage | metals, solvents, petroleum |
| 199 | STORAGE TANK | gravity driven gas tank | petroleum |
| 200* | MEDICAL | veterinarian clinic | metals, solvents |
| 201* | BUSINESS | storage units | metals, solvents, petroleum |
| 202* | BUSINESS | haul rental business | metals, solvents, petroleum |
| 203* | BUSINESS | log-home supplier | metals, solvents |
| 204* | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, animal feeding operation, | fertilizer, manure |
| 205* | INDUSTRY | power plant | PCB, metals, solvents |
| 206* | INDUSTRY | cola distributor | metals, solvents, petroleum |
| 332* | INDUSTRY | metal technologies | metals, solvents |
| 207* | BUSINESS | lodge unlimited (building supply?) | metals, solvents |
| 208* | SERVICE STATION | gas station | petroleum |
| 298* | BUSINESS | storage sheds | metals, solvents, petroleum |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 209* | BUSINESS | storage rentals | metals, solvents, petroleum |
| 210* | SERVICE STATION | tractor outlet, tractor repair | metals, solvents, petroleum |
| 211* | BUSINESS | electric company, manufacturing | metals, solvents |
| 212* | BUSINESS | storage units | metals, solvents |
| 213* | SERVICE STATION | brakes and automotives, metal shop | metals, solvents, petroleum |
| 214* | BUSINESS | industrial plaza, lumber warehouse, tire and | metals, solvents, petroleum |
| 215* | BUSINESS | storage units | metals, solvents |
| 216* | BUSINESS | appliances sales & service, warehouse | metals, solvents |
| 130* | BUSINESS | electrical contractor, residential/ commercial | metals, solvents |
| 217* | BUSINESS | rock masonry, bricks, wood | metals, solvents |
| 218* | CONCENTRATION OF ANIMALS AND/OR FEED LOT | big corral, stables | fertilizer, manure |
| 219* | LARGE LAWN | ball park | pesticides, fertilizer |
| 220 | MEDICAL | specialty clinic, orthopedic surgery | metals, solvents |
| 221 | LARGE LAWN | ball field, highschool | pesticides, fertilizer |
| 222 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 223 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, animal feeding operation | fertilizer, manure |
| 224 | JUNK YARD/SALVAGE | junk yard/salvage | metals, solvents, petroleum |
| 225 | FORMER CONCENTRATION OF ANIMALS | abandoned corral, sheds, stables | fertilizer, manure |
| 226 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, barns, sheds | fertilizer, manure |
| 227 | STORAGE TANK | gravity driven gas tank | petroleum |
| 228 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 229 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | small scale corral | fertilizer, manure |
| 230 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | farm, cows, animal feeding operation, barns | fertilizer, manure |
| 231 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, animal feeding operation | fertilizer, manure |
| 232 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, corral, cows | fertilizer, manure |
| 233 | LARGE LAWN | ball park | pesticides, fertilizer |
| 234 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 235 | BUSINESS | auto sales | metals, solvents, petroleum |
| 236 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | barns, sheds, animal feeding operation | fertilizer, manure |
| 237 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 238 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, animal feeding operation | fertilizer, manure |
| 239 | BUSINESS | heating and air | metals, solvents |
| 240 | GOVERNMENT | fire station | metals, solvents, petroleum |
| 241 | SERVICE STATION | gas station | petroleum |
| 242 | SERVICE STATION | gas station | petroleum |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 243 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 244 | GOVERNMENT | school buses | metals, solvents, petroleum |
| 245 | SERVICE STATION | diesel inc | metals, solvents, petroleum |
| 246 | SERVICE STATION | truck stop | petroleum |
| 247 | BUSINESS, STORAGE TANK | chemical/petroleum, gas pump | metals, solvents, petroleum |
| 248 | STORAGE TANK | gravity driven gas tank | petroleum |
| 249 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, cows | fertilizer, manure |
| 250 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, cows | fertilizer, manure |
| 251 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, animal feeding operation | fertilizer, manure |
| 252 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, cow, animal feeding operation | fertilizer, manure |
| 253 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | stables, corral, horses, cows, animal feeding | fertilizer, manure |
| 254 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, cow | fertilizer, manure |
| 255 | BUSINESS | nail and ceramic shop, artistic impression, | metals, solvents, petroleum |
| 256 | SERVICE STATION | gas station, car wash | metals, solvents, petroleum |
| 257 | MEDICAL | health care center, massage therapy, vitamin | |
| 258 | BUSINESS | auto sales | metals, solvents, petroleum |
| 259 | MINING | gravel pit | metals, solvents, petroleum |
| 260 | STORAGE TANK | gas pumps | petroleum |
| 261 | SERVICE STATION | frame auto body shop, service station | metals, solvents, petroleum |
| 262 | BUSINESS | cabinet, furniture | metals, solvents |
| 263 | BUSINESS | rentals, tillers, lawn mowers | metals, solvents, petroleum |
| 264 | STORAGE TANK | 2 gravity driven gas tank | petroleum |
| 265 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 266 | SERVICE STATION | automachine shop, engine rebuilding, service | metals, solvents, petroleum |
| 267 | BUSINESS | plaza, warehouse, construction, herb and food, | metals, solvents, petroleum |
| 268* | MEDICAL | veterinarian clinic | metals, solvents |
| 269* | BUSINESS | floor covering, carpet, vinyl, trailer sales | metals, solvents |
| 270* | SERVICE STATION | campground, gas pumps, service station | metals, solvents, petroleum |
| 271* | BUSINESS | laundromat | metals, solvents |
| 272* | BUSINESS | transmission specialist, car sales | metals, solvents, petroleum |
| 273* | BUSINESS | auto glass | metals, solvents, petroleum |
| 274* | BUSINESS | furniture store | metals, solvents, petroleum |
| 275* | CONCENTRATION OF ANIMALS AND/OR FEED LOT | small corral, cows | fertilizer, manure |
| 276* | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corrals, stables, cows, horses, animal feeding | fertilizer, manure |
| 277* | LARGE LAWN | golf course | pesticides, fertilizer |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 278 | JUNK YARD/SALVAGE | cars, junk yard/salvage | metals, solvents, petroleum |
| 279 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | stables, corrals | fertilizer, manure |
| 280 | BUSINESS | hanger, models of planes, trains, boats | metals, solvents |
| 281 | SERVICE STATION | car wash | metals, solvents, petroleum |
| 282 | LARGE LAWN | large lawn, school | pesticides, fertilizer |
| 283 | SERVICE STATION | gas station | petroleum |
| 284 | LARGE LAWN | large lawn, school | pesticides, fertilizer |
| 286* | INDUSTRY | power sub station | PCB, metals, solvents |
| 287 | BUSINESS | construction steel | metals, solvents, petroleum |
| 288 | BUSINESS | farm center, tractors | metals, solvents, petroleum |
| 289 | BUSINESS | livestock market, tractors, trailers, corrals | metals, solvents, petroleum, |
| 290 | BUSINESS | barber shop | metals, solvents |
| 291 | BUSINESS | carpet, cabinets, lighting | metals, solvents |
| 292 | BUSINESS | door manufacturing, store fixtures | metals, solvents |
| 293 | BUSINESS | craft tech, carpet, vinyl, hardwood | metals, solvents |
| 294 | INDUSTRY | generator city plant | PCB, metals, solvents |
| 295 | INDUSTRY | power sub station | PCB, metals, solvents |
| 297 | BUSINESS | floor coverings | metals, solvents |
| 299 | SERVICE STATION | automotive repair | metals, solvents, petroleum |
| 300* | BUSINESS | performance vehicles, snowmobiles, arctic | metals, solvents, petroleum |
| 301* | LARGE LAWN | large lawn, school | pesticides, fertilizer |
| 302* | LARGE LAWN | park | pesticides, fertilizer |
| 303 | MINING | coal mining | |
| 304* | LARGE LAWN | ball park | pesticides, fertilizer |
| 305* | MEDICAL | health care hospital | metals, solvents, petroleum |
| 306* | MEDICAL | oxygen and medical suppliers | metals, solvents |
| 307* | MEDICAL | health care center, skill nursing and rehab | metals, solvents |
| 308* | LARGE LAWN | ball park | pesticides, fertilizer |
| 309* | GOVERNMENT | fire station | metals, solvents, petroleum |
| 310* | LARGE LAWN | city park | pesticides, fertilizer |
| 311* | SERVICE STATION | car wash | metals, solvents, petroleum |
| 312* | BUSINESS | car dealer | metals, solvents, petroleum |
| 313* | BUSINESS | hardware store | metals, solvents |
| 314* | BUSINESS | auto dealer | metals, solvents, petroleum |
| 315* | BUSINESS | copy shop | metals, solvents |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 316* | LARGE LAWN | ball park | pesticides, fertilizer |
| 317* | CONCENTRATION OF ANIMALS AND/OR FEED LOT | large corral, horses, entertainment | fertilizer, manure |
| 318* | BUSINESS | towing company | metals, solvents, petroleum |
| 319* | SERVICE STATION | automotive | metals, solvents, petroleum |
| 320* | LARGE LAWN | cemetary | pesticides, fertilizer |
| 321* | CONCENTRATION OF ANIMALS AND/OR FEED LOT | small corral, horses | fertilizer, manure |
| 322* | BUSINESS | lumber | metals, solvents |
| 323* | STORAGE TANK | 2 gravity driven gas tanks | petroleum |
| 324* | BUSINESS | motors, auto dealer | metals, solvents, petroleum |
| 325* | BUSINESS | print shop | metals, solvents |
| 326* | MEDICAL | home med care, high tech health care services | metals, solvents |
| 327* | SERVICE STATION | gas station | petroleum |
| 328* | SERVICE STATION | auto service station | metals, solvents, petroleum |
| 329* | SERVICE STATION | gas station | petroleum |
| 330* | BUSINESS | auto parts | metals, solvents |
| 332* | INDUSTRY | metal technologies | metals, solvents |
| 333* | SERVICE STATION | car wash | metals, solvents, petroleum |
| 334* | SERVICE STATION | lube service station | metals, solvents, petroleum |
| 335* | MEDICAL | health care, rehab | metals, solvents |
| 336* | BUSINESS | paint and glass | metals, solvents |
| 337* | BUSINESS | tire company | metals, solvents |
| 338* | SERVICE STATION | gas station | petroleum |
| 339* | MEDICAL | dental health care | metals, solvents |
| 340* | SERVICE STATION | gas station | petroleum |
| 341* | MEDICAL | chiropractic care | metals, solvents |
| 342* | BUSINESS | carpet outlet, craft, print shop, copy center | metals, solvents |
| 343* | BUSINESS | photography, barber shop, tan shop, dry | metals, solvents |
| 344* | BUSINESS | carpet center, tile, ceramics | metals, solvents |
| 345* | LARGE LAWN | ball park | pesticides, fertilizer |
| 346* | LARGE LAWN, BUSINESS | nursery, hardware | pesticides, fertilizer |
| 347 | BUSINESS | upholstery | metals, solvents |
| 348 | BUSINESS | tire and tools | metals, solvents |
| 349 | SERVICE STATION | abandoned gas station | petroleum |
| 350 | BUSINESS | auto parts | metals, solvents |
| 351 | BUSINESS | outdoor power equipment | metals, solvents, petroleum |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 352 | SERVICE STATION | auto/tire service station, brakes, alignment, | metals, solvents, petroleum |
| 353 | SERVICE STATION | auto repair | petroleum |
| 354 | LARGE LAWN | nursery, hardware | pesticides, fertilizer |
| 355* | BUSINESS, MEDICAL | plaza: tanning, landromat, eye care center, | metals, solvents |
| 356* | SERVICE STATION, BUSINESS | car wash, laundromat cleaners | metals, solvents, petroleum |
| 357* | BUSINESS | plumbing supply, hardware store | metals, solvents |
| 358* | MEDICAL | dentists offices | metals, solvents |
| 359* | BUSINESS | window and door, awnings | metals, solvents |
| 360* | BUSINESS | glass, windshield repair and sales | metals, solvents |
| 361* | BUSINESS | auto dealer | metals, solvents, petroleum |
| 362* | SERVICE STATION | gas station | petroleum |
| 363* | BUSINESS | salon | metals, solvents |
| 364* | BUSINESS | machine and supply shop | metals, solvents |
| 365* | BUSINESS | beauty supply | metals, solvents |
| 366* | BUSINESS | cobbler and saddlery, western wear | metals, solvents |
| 367* | BUSINESS | hair and nail salon | metals, solvents |
| 368* | BUSINESS | vacuum, sewing, water beds | metals, solvents |
| 369* | MEDICAL | medical supply | metals, solvents |
| 370* | SERVICE STATION | gas station | petroleum |
| 371* | BUSINESS | upholstery | metals, solvents |
| 372* | BUSINESS | equipment, laser alignment | metals, solvents |
| 373* | SERVICE STATION | lube and oil filter, transmission tune up, service | metals, solvents, petroleum |
| 374* | BUSINESS | pets supply, fence company, vinyl fencing | metals, solvents |
| 375* | SERVICE STATION | tires | metals, solvents, petroleum |
| 376* | GOVERNMENT | government trucks | metals, solvents, petroleum |
| 377* | BUSINESS | auto sales | metals, solvents, petroleum |
| 378* | BUSINESS | auto parts | metals, solvents |
| 379* | SERVICE STATION | muffler | metals, solvents, petroleum |
| 380* | BUSINESS | complex, mattress factory, paint suppliers | metals, solvents |
| 381* | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses in corral, stables | fertilizer, manure |
| 382* | BUSINESS | farm feed supplier | metals, solvents, fertilizer, manure |
| 383* | SERVICE STATION | muffler shop | metals, solvents, petroleum |
| 384* | BUSINESS | sheds, truck trailer wharehouse | metals, solvents |
| 385* | BUSINESS | motor sport | metals, solvents, petroleum |
| 386* | BUSINESS | roofing supply, timber alot | metals, solvents |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 387* | BUSINESS | electrical suppliers | metals, solvents |
| 388* | INDUSTRY | power sub station | PCB, metals, solvents |
| 389* | BUSINESS | cooling heating supply | metals, solvents |
| 390* | INDUSTRY | flooring outlet, Glass supply, plumbing supply | metals, solvents |
| 391* | BUSINESS | interiors, floor coverings, design service | metals, solvents |
| 392* | INDUSTRY | railyard, | metals, solvents |
| 393* | SERVICE STATION | gas pumps | petroleum |
| 394* | BUSINESS | stoves, furniture | metals, solvents |
| 395* | SERVICE STATION | tire center, lubrication service station | metals, solvents, petroleum |
| 396* | BUSINESS | auto part store | metals, solvents |
| 397* | BUSINESS | lumber | metals, solvents |
| 398* | LARGE LAWN | nursery | pesticides, fertilizer |
| 399* | BUSINESS | plumbing, heating, sprinkler/electrical builder | metals, solvents |
| 400* | BUSINESS | auto body | metals, solvents, petroleum |
| 401* | BUSINESS | supply recycling | metals, solvents |
| 402* | BUSINESS | storage, cinder block garages | metals, solvents |
| 403* | BUSINESS | electric | metals, solvents |
| 404* | BUSINESS | fastening systems, power tools, repair | metals, solvents |
| 405* | BUSINESS | wood designs | metals, solvents |
| 406* | BUSINESS | machine shop | metals, solvents |
| 407* | BUSINESS | automobile source, dealer vacant lot | metals, solvents, petroleum |
| 408* | BUSINESS | cattle related items | metals, solvents |
| 409* | JUNK YARD/SALVAGE | salvage yard, radiators, mufflers, scraps | metals, solvents, petroleum |
| 410* | BUSINESS | farm feed | metals, solvents |
| 411* | BUSINESS | towing | metals, solvents, petroleum |
| 412* | BUSINESS | electrical distributors inc. | metals, solvents |
| 413* | BUSINESS | storage units | metals, solvents |
| 414* | BUSINESS | rubber | metals, solvents |
| 415* | SERVICE STATION | tire service, lube and oil, radiator, breaks, tune | metals, solvents, petroleum |
| 416* | BUSINESS | automotive, stove manufacturing | metals, solvents, petroleum |
| 417* | BUSINESS | storage, sheds | metals, solvents |
| 418* | STORAGE TANK | gravity driven gas tank | petroleum |
| 419* | BUSINESS | big storage sheds, stores trucks, campers, | metals, solvents, petroleum |
| 420* | BUSINESS | storage units | metals, solvents |
| 421* | LARGE LAWN | large lawn, school | pesticides, fertilizer |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 422* | BUSINESS | sheet metal, air conditioning, heating | metals, solvents |
| 423* | BUSINESS | building systems, concrete form rental and | metals, solvents, petroleum |
| 424* | BUSINESS | prop studio, wood, building supplies | metals, solvents |
| 425* | BUSINESS | back hoe loader, jack hammers, generators, | metals, solvents |
| 426* | STORAGE TANK | 2 gravity driven gas tanks | petroleum |
| 427* | BUSINESS | electric company, manufacture | metals, solvents |
| 428* | SERVICE STATION | tow car care center, mufflers | metals, solvents, petroleum |
| 429* | BUSINESS | mill and fixture company | metals, solvents |
| 430* | BUSINESS | beauty salon | metals, solvents |
| 431* | GOVERNMENT | fire station | metals, solvents, petroleum |
| 432* | SERVICE STATION | gas station | petroleum |
| 433* | SERVICE STATION | gas station | petroleum |
| 434* | MEDICAL | chiropractor | metals, solvents |
| 435* | SERVICE STATION | car wash | metals, solvents, petroleum |
| 436* | SERVICE STATION | gas station | petroleum |
| 437* | SERVICE STATION | gas station | petroleum |
| 438* | SERVICE STATION | gas station | petroleum |
| 439* | SERVICE STATION | gas station | petroleum |
| 440* | BUSINESS | appliance repair, stoves, refrigerator | metals, solvents |
| 441* | BUSINESS | hair salon, tanning | metals, solvents |
| 442* | BUSINESS, MEDICAL | plaza: hair salon, optometrist, mailing shop, | metals, solvents |
| 443* | BUSINESS | professional color lab | metals, solvents |
| 444* | BUSINESS | photography studio | metals, solvents |
| 445* | BUSINESS | auto parts, battery | metals, solvents |
| 446* | BUSINESS | hair salon | metals, solvents |
| 447* | MEDICAL | dentists offices | metals, solvents |
| 448* | BUSINESS | nail salon | metals, solvents |
| 449* | BUSINESS | beauty salon | metals, solvents |
| 450* | BUSINESS | mortuary | metals, solvents |
| 451* | MEDICAL | health center, chiropractic | metals, solvents |
| 452* | MEDICAL | dentists offices | metals, solvents |
| 453* | LARGE LAWN | large lawn/stadium | pesticides, fertilizer |
| 454* | STORAGE TANK | gravity driven gas tank | petroleum |
| 455* | GOVERNMENT | government, garages, gas pumps, possible | metals, solvents, petroleum |
| 456* | LARGE LAWN | nursery | pesticides, fertilizer |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 457* | LARGE LAWN | ball field, school | pesticides, fertilizer |
| 458* | MEDICAL | dentist offices | metals, solvents |
| 459* | BUSINESS | craft supply | metals, solvents |
| 460* | BUSINESS | beauty salon | metals, solvents |
| 461 | BUSINESS | hair salon | metals, solvents |
| 462* | BUSINESS | all season sports, snowmobiles, 3 wheeler | metals, solvents, petroleum |
| 463* | SERVICE STATION | motorcycle atv sales and service | metals, solvents, petroleum |
| 464 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 465 | MINING | mining, possible gravel/sand | |
| 466 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 467 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, cows | fertilizer, manure |
| 468 | STORAGE TANK | gravity driven gas tank | petroleum |
| 469 | BUSINESS | feed and pet store, dog and cat boarding and | metals, solvents |
| 470 | BUSINESS | hair salon | metals, solvents |
| 471 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 472 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 473 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep, goats, horse, corral | fertilizer, manure |
| 474 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, cows | fertilizer, manure |
| 475 | MINING | excavation pit, not active | metals, solvents, petroleum |
| 476 | LARGE LAWN | large lawn, elementary school | pesticides, fertilizer |
| 477 | INDUSTRY | power sub station | PCB, metals, solvents |
| 478 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral | fertilizer, manure |
| 479 | LARGE LAWN | large lawn, elementary school, soccer field | pesticides, fertilizer |
| 480 | LARGE LAWN | cemetary | pesticides, fertilizer |
| 481 | STORAGE TANK | gravity driven gas tank | petroleum |
| 482 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | stables, corral possibly abandoned | fertilizer, manure |
| 483 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, pony | fertilizer, manure |
| 484 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, sheep | fertilizer, manure |
| 485 | BUSINESS | machine shop, engine rebuilding | metals, solvents |
| 486 | LARGE LAWN | large lawn | pesticides, fertilizer |
| 487 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 488 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 489 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep, horses, corral | fertilizer, manure |
| 490 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral | fertilizer, manure |
| 491 | BUSINESS | stainless steel pumps, water wells | metals, solvents |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 492 | GOVERNMENT | corp, trucks, road, transportation | metals, solvents, petroleum |
| 493 | GOVERNMENT | rubbish bins, pvc pipes | metals, solvents |
| 494 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, cows, feed lot | fertilizer, manure |
| 495 | STORAGE TANK | gravity driven gas tank | petroleum |
| 496 | CONCENTRATION OF ANIMALS AND/OR FEED LOT, | corral, horse, gravity driven gas tank | fertilizer, manure, petroleum |
| 497 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral,  2 cows | fertilizer, manure |
| 498 | STORAGE TANK | gravity driven gas tank | petroleum |
| 499 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 500 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, cows | fertilizer, manure |
| 501 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 502 | STORAGE TANK | gravity driven gas tank | petroleum |
| 503 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 504 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animal feeding operation horses | fertilizer, manure |
| 505 | MEDICAL | animal clinic | metals, solvents |
| 506 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | small corral, sheep | fertilizer, manure |
| 507 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | barn sheds, animal feeding operation sheep | fertilizer, manure |
| 129 | JUNK YARD/SALVAGE | junk yard/salvage | metals, solvents, petroleum |
| 508 | FORMER CONCENTRATION OF ANIMALS | abandoned poultry coops | fertilizer, manure |
| 509 | FORMER CONCENTRATION OF ANIMALS | abandoned corral /abandoned feed lot | fertilizer, manure |
| 510 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 511 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 512 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |
| 513 | STORAGE TANK | gravity driven gas tank | petroleum |
| 514 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, cows, sheep | fertilizer, manure |
| 515 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 516 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, cows | fertilizer, manure |
| 517 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, goats, horses | fertilizer, manure |
| 518 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, stables, cows | fertilizer, manure |
| 519 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 520 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 521 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 522 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 523 | STORAGE TANK | gravity driven gas tank | petroleum |
| 524 | LARGE LAWN | large nursery | pesticides, fertilizer |
| 525 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | sheep animal feeding operation | fertilizer, manure |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 526 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, stables | fertilizer, manure |
| 527 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | stables, sheep | fertilizer, manure |
| 528 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 529 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 530 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, cows, few | fertilizer, manure |
| 531 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 532 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | animal feeding operation, cows | fertilizer, manure |
| 533 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horse | fertilizer, manure |
| 534 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral | fertilizer, manure |
| 535 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, pony | fertilizer, manure |
| 536 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral | fertilizer, manure |
| 537 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral | fertilizer, manure |
| 538 | GOVERNMENT | garage, storing device | metals, solvents |
| 539 | STORAGE TANK | gas pump | petroleum |
| 540 | JUNK YARD/SALVAGE | personal junk yard/salvage, trucks, trailers, | metals, solvents, petroleum |
| 541 | JUNK YARD/SALVAGE | personal junk yard/salvage, trucks, tires, cars, | metals, solvents, petroleum |
| 542 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 543 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral | fertilizer, manure |
| 544 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 545 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 546 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 547 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 548 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 549 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, goats | fertilizer, manure |
| 550 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 551 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 552 | FORMER CONCENTRATION OF ANIMALS | abandoned corral, sheep | fertilizer, manure |
| 553 | WASTE DISPOSAL | waste water facility | sewage |
| 554 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, cows, animal feeding operation | fertilizer, manure |
| 555 | JUNK YARD/SALVAGE | dumping ground, trucks, buses, cars, | metals, solvents, petroleum |
| 556 | JUNK YARD/SALVAGE, STORAGE TANK | dumping ground, trucks, buses, cars, scraps, | metals, solvents, petroleum |
| 557 | STORAGE TANK | gravity driven gas tank | petroleum |
| 558 | WASTE DISPOSAL | no tresspassing,non potable water, | metals, solvents, nitrate |
| 559 | STORAGE TANK | gravity driven gas tank | petroleum |
| 560 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, animals | fertilizer, manure |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 561 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, cows, horses | fertilizer, manure |
| 562 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horse | fertilizer, manure |
| 563 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, ostriches | fertilizer, manure |
| 564 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | personal stadium, horses, corrals, stables | fertilizer, manure |
| 565 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 566 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, stables, horses | fertilizer, manure |
| 567 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, stables, horses | fertilizer, manure |
| 568 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 569 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, cow | fertilizer, manure |
| 570 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 571 | STORAGE TANK | gravity driven gas tank | petroleum |
| 572 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 573 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 574 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 575 | JUNK YARD/SALVAGE | personal junk yard/salvage, trucks, cars, | metals, solvents, petroleum |
| 576 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral for rent | fertilizer, manure |
| 577 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral | fertilizer, manure |
| 578 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | formal corral, stables, stable and tack | fertilizer, manure |
| 579 | BUSINESS | store/storage | metals, solvents |
| 580 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 581 | JUNK YARD/SALVAGE | junk yard/salvage, trailers, tractors, trucks, | metals, solvents, petroleum |
| 582 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral, ranch | fertilizer, manure |
| 583 | MINING | excavation pit, gravel, sand | metals, solvents, petroleum |
| 584 | MINING | excavation pit, gravel, sand | metals, solvents, petroleum |
| 585 | MINING | small excavation pit | metals, solvents, petroleum |
| 586 | MINING | excavation pit, gravel, sand | metals, solvents, petroleum |
| 587 | MINING | excavation pit, not active | metals, solvents, petroleum |
| 588 | FORMER CONCENTRATION OF ANIMALS | abandoned corral, no tresspassing | fertilizer, manure |
| 589 | MINING | small excavation pit | metals, solvents, petroleum |
| 590 | CONCENTRATION OF ANIMALS AND/OR FEED LOT, | farm related business, barns, stables | metals, solvents |
| 591 | MINING | cinder pit | metals, solvents, petroleum |
| 592 | FORMER CONCENTRATION OF ANIMALS | abandoned barnyard, stable, corral | fertilizer, manure |
| 593 | MINING | collapsed mine, capped oil well | metals, solvents, petroleum |
| 594 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | no tresspassing, sheds, stables, cows, barns, | metals, solvents |
| 595 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 596 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 597 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 598 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, stables | fertilizer, manure |
| 599 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral, stables | fertilizer, manure |
| 600 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral | fertilizer, manure |
| 601 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | low lying sheds, stables, poultry animal feeding | fertilizer, manure |
| 602 | STORAGE TANK | gravity driven gas tank | petroleum |
| 603 | JUNK YARD/SALVAGE | personal junk yard, cars, trucks, tractors, wood | metals, solvents, petroleum |
| 331 | STORAGE TANK | 2 gravity driven gas tanks | petroleum |
| 604 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 605 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, stables | fertilizer, manure |
| 606 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral | fertilizer, manure |
| 607 | LARGE LAWN | ballpark | pesticides, fertilizer |
| 608 | STORAGE TANK | gravity driven gas tank | petroleum |
| 609 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral | fertilizer, manure |
| 610 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 611 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | private property, stables, barnyard | fertilizer, manure |
| 612 | STORAGE TANK | gravity driven gas tank | petroleum |
| 613 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | stables, corral, silos, mapped from distance | fertilizer, manure |
| 614 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | horses, corral | fertilizer, manure |
| 615 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 616 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 617 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 618 | STORAGE TANK | gravity driven gas tank | petroleum |
| 619 | MINING | inactive gravel pit | metals, solvents, petroleum |
| 620 | JUNK YARD/SALVAGE | personal junk yard/salvage, trucks, outhouse, | metals, solvents, petroleum |
| 621 | MINING | excavation pit, gravel, sand | metals, solvents, petroleum |
| 622 | MINING | excavation pit, gravel, sand | metals, solvents, petroleum |
| 623 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses, ponies | fertilizer, manure |
| 624 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 625 | STORAGE TANK | gravity driven gas tank | petroleum |
| 626 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |
| 627 | JUNK YARD/SALVAGE | hundreds of tires in yard | metals, solvents |
| 628 | STORAGE TANK | gravity driven gas tank | petroleum |
| 629 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | corral, horses | fertilizer, manure |

***Table C1.*** *countinued*

| SITE # | POTENTIAL CONTAMINANT | LOCATION/SOURCE DESCRIPTION | POLLUTANT |
|---|---|---|---|
| 630 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 631 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | ranch, farm related, corral, horses | fertilizer, manure |
| 632 | CONCENTRATION OF ANIMALS AND/OR FEED LOT | cows, animal feeding operation, corral, stables | fertilizer, manure |
| 633 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 634 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |
| 636 | FORMER CONCENTRATION OF ANIMALS | abandoned corral | fertilizer, manure |

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

# Critical Aquifer Recharge Areas

## Guidance Document

**January 2005**
**Publication Number 05-10-028**

*Printed on Recycled Paper*

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## Guidance Document

Prepared by:

Laurie Morgan
Washington State Department of Ecology
Water Quality Program

January 2005
Publication Number 05-10-028

*Printed on Recycled Paper*

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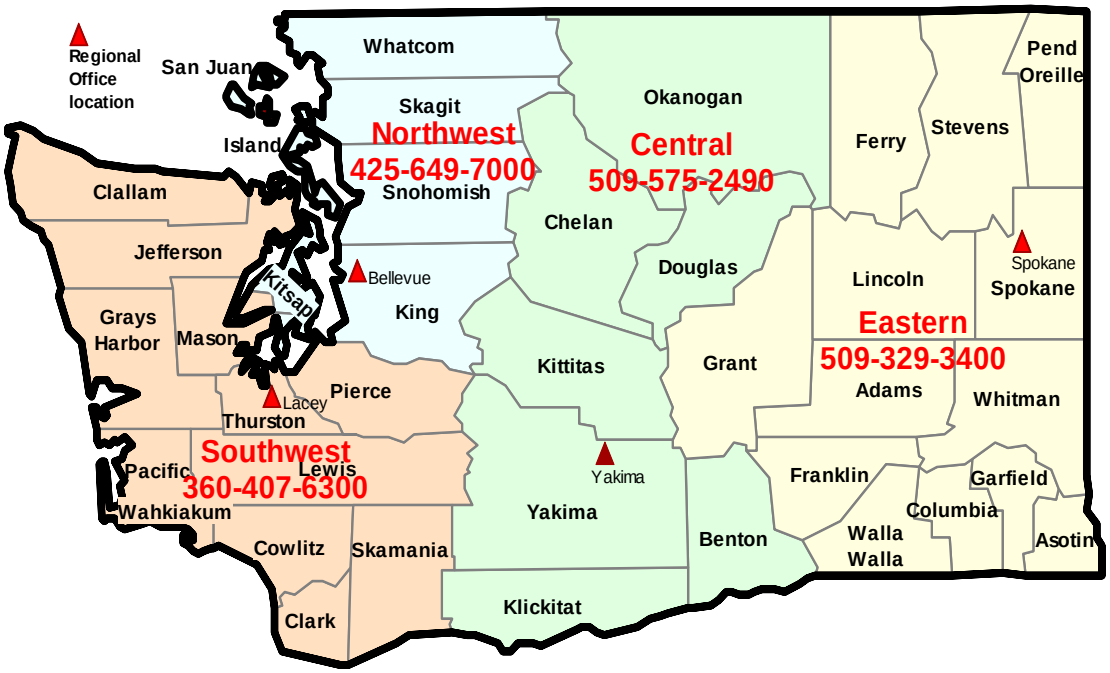


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# Acknowledgements

Many people have commented on this document and have provided helpful suggestions. Others have been involved with Critical Aquifer Recharge Areas and this document has benefited greatly from their knowledge and perspective. I would like to thank the following people for their help and guidance: John Sonnen, Thurston County; Ken Johnson, King County; Thomas Barry, city of Redmond; Richard Hoiland, city of Vancouver; Jalyn Cummings, Snohomish County; Doug Kelly, Island County; Catherine Weisman, Evergreen Rural Water of Washington; Susan Braley, John Stormon, Doug Wood, Bari Schreiner, Gerry Kunkel, Diane Dent, and Ann Kahler, Department of Ecology; Doug Peters and Chris Parsons, Department of Community, Trade and Economic Development; David Jennings, Department of Health; Jennifer Parker, U.S. Environmental Protection Agency; Kirk Cook, Department of Agriculture; and the Interagency Ground Water Committee.

I would also like to express deep appreciation for all of the counties and cities that are working on their Critical Aquifer Recharge Area ordinances and planning. I would particularly like to mention Eastern Washington jurisdictions working on ground water protection from which I have gained knowledge and perspective including Ferry County, Spokane County, the Columbia Basin Ground Water Management Area, and others.

# Section 1
## Introduction

This guidance document helps local jurisdictions and the public understand what is required for the protection of local groundwater resources under the Growth Management Act. It includes guidance for planning, ordinances, and for including the Best Available Science (BAS) as these relate to Critical Aquifer Recharge Areas.

This guidance will also explain how the laws and rules of the state of Washington for water quality, pollution prevention, and water resources relate to Critical Aquifer Recharge Area protection.

We are revising the guidance to improve usability and clarity, and to provide additional explanation.

**When the public drinking water supply is compromised**, the community faces risk and great expense. Contaminated water can cause illness and ingestion of toxic chemicals or other harmful substances. Remediation of contaminated ground water is overwhelmingly expensive. A contamination event can cause city wells to be shut down, result in expenses for new wells, and incur costs for cleaning up contaminated soil and ground water.

**Prevention of groundwater contamination is far less expensive than cleanup.** EPA studies have shown that investing funds for groundwater protection is cost-effective compared to groundwater cleanup at a ratio that runs anywhere from 1:5 to 1:200 (U.S. EPA, 1995).

**The Growth Management Act** requires protection of public groundwater drinking supplies so that tragic contamination events and their associated costs can be prevented. In addition, public drinking water supply depends on ground water availability. Without replenishment, the amount of water in aquifers can be diminished or even depleted.

**A good groundwater protection program involves**:

- Identifying groundwater resources at risk,
- Identifying threats to ground water, and
- Monitoring to make sure a condition that could cause an unacceptable risk is not occurring and taking action when necessary.

## The Growth Management Act and Critical Areas

The Growth Management Act (Chapter 36.70A Revised Code of Washington) requires comprehensive land use planning by counties and cities. The act, commonly known as the GMA, specifies 13 overall planning goals. These goals include urban growth, transportation, economic development, natural resource industries, public facilities, open space and recreation, historic preservation, environmental planning, and others.

The environmental planning goal is to "protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water" (RCW 36.70A.020**)**.

The GMA requires the designation and protection of "Critical Areas" to prevent harm to the community from natural hazards and to protect natural resources.

- **Natural hazards** are frequently flooded areas and geologically hazardous areas.
- **Natural resources** are wetlands, fish and wildlife habitat conservation areas, and "areas with a critical recharging effect on aquifers used for potable water," which are called **Critical Aquifer Recharge Areas**.

The goal of establishing Critical Aquifer Recharge Areas is to protect the ***functions and values*** of a community's drinking water by preventing pollution and maintaining supply.

## Critical Aquifer Recharge Areas

A Critical Aquifer Recharge Area (CARA) is defined by the GMA as "areas with a critical recharging effect on aquifers used for potable water."

The Washington Administrative Code (WAC) Chapter 365-190 uses the following definition:

> *"Areas with a critical recharging effect on aquifers used for potable water are areas where an aquifer that is a source of drinking water is vulnerable to contamination that would affect the potability of the water."*

Identifying "areas with a critical recharging effect on aquifers used for potable water," depends on understanding aquifer recharge and what is meant by "a critical recharging effect."

**Aquifer recharge** occurs where rainfall, snowmelt, infiltration from lakes, wetlands and streams, or irrigation water infiltrates into the ground and adds to the water underground that can supply a well. On the other hand, **discharge areas** are where ground water is headed toward the ground surface and ultimately flows out from a spring, wetland, stream, lake, estuary, or ocean shore. Wells can also serve as discharge areas, especially larger volume wells, such as those used by municipalities.

Most of a watershed is typically a recharge area, with discharge areas occurring to a more limited extent in topographically lower areas. Recharge areas and discharge areas can be mapped using hydrogeologic techniques to determine where ground water is and where it is flowing.

**Aquifers used for potable water** are identified by looking at existing and future planned uses. Existing wells and their protection areas, sole source aquifers, and aquifers otherwise identified as important supplies, are examples of "aquifers used for potable water."

**Setting priorities for** the most critical supplies helps jurisdictions make decisions about where to focus their efforts. Areas may be categorized to reflect these priorities. An example would be to apply more strict regulations and monitoring within the one-year time of travel of a city well, as opposed to more sparsely developed areas of the county. More strict regulation may be applied in an area where the aquifer is shallow and vulnerable to contamination than an aquifer that is deep and protected.

## Ground Water and Other Critical Areas

Ground water is inextricably linked with all of the critical areas: wetlands, fish and wildlife habitat, critical aquifer recharge areas, frequently flooded areas, and geologically hazardous areas.

- Ground water is a source of water to streams, lakes, estuaries, wetlands, and springs; and therefore serves a critical function for wildlife and fish habitat. Some plants that provide habitat, like willows, depend on shallow ground water.

- Ground water is often a key factor in flooding and geologic hazards.

The GMA also requires that local jurisdictions "give special consideration to conservation or protection measures necessary to preserve or enhance anadromous fisheries." Since ground water is an important component of stream flow, it is necessary to maintain the ground water supply to streams where needed to protect salmon and other anadromous species.

## Qualified Professional Assistance

Professional hydrogeologic work for the establishment of Critical Aquifer Recharge Areas should be performed by a hydrogeologist licensed in the state of Washington (RCW 18.220 and WAC 308-15). In particular, the delineation and characterization of aquifers and the analysis of environmental fate and transport of potential contaminants through the ground should be performed by a qualified licensed professional.

Many activities associated with Critical Aquifer Recharge Areas may be done by others (who are not licensed professional hydrogeologists) such as planning, pollution prevention, education and outreach, ordinance enforcement, and other activities associated with city and county programs.

# Section 2
## Basic Concepts

### Where Ground Water Comes From

**Recharge** is water that is added to ground water, whether it is from rainfall that infiltrates through the ground, or snowmelt, or some other source. Recharge can come from quite a distance through the ground over a long period of time, or it can come from relatively local and more recent sources.

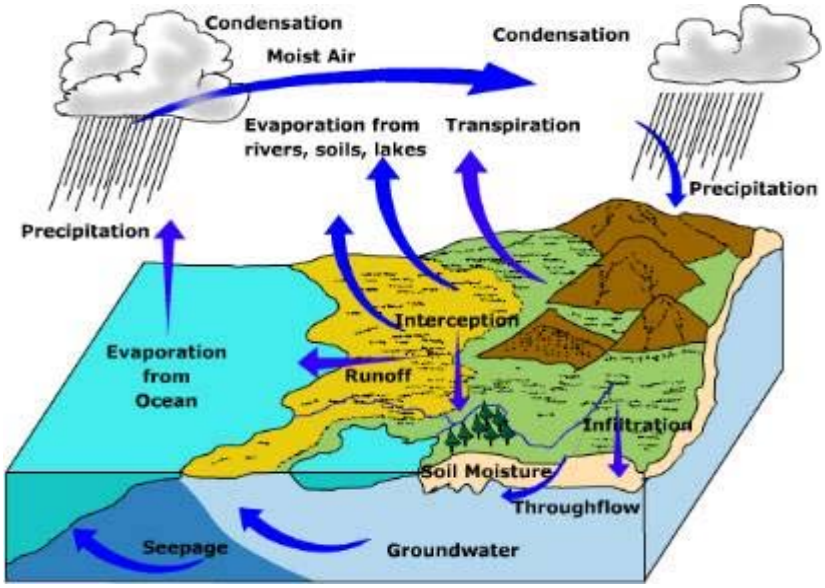



Figure 1: The Hydrologic Cycle

### The Hydrologic Cycle

The hydrologic cycle is how water evaporates from the oceans, gathers in clouds, and rains or snows onto the land. After it rains or the snowmelts, the water then either evaporates, is used up by plants, runs off to streams, lakes, or the ocean, or infiltrates into the soil. Some of this infiltration will reach the underground water table and will **recharge** the aquifer.

Recharge can also carry contaminants into ground water from the land surface. Therefore, recharge is at the center of preventing pollution and maintaining supply both for drinking water and for freshwater habitats.

**Where Ground Water Goes**

Ground water flows through the ground from where it is recharged to where it is discharged. **Discharge** is where water moves from underground to the land surface. Springs are a familiar example. Ground water also discharges to lakes and streams. In fact, in Washington, ground water can make up a majority of stream flow, especially in late summer and early fall (Pitz, Sinclair, 1999). This is why groundwater discharge is such an important aspect of maintaining or restoring freshwater habitat.

**The Water Table**

The water table occurs where the underground is saturated with water. Discharge of ground water, whether by pumping or by seeping into streams and springs, can lower the water table if the recharge does not keep up. The effect can be to pull the water down below a well or to dry up a stream. Sometimes the water table rises above the land surface. This can fill lakes and streams, or even cause flooding when the water has nowhere to drain.

People can cause the water table level to lower both by removing ground water from wells and by reducing the quantity of recharge, as happens where there is too much paved or impervious surface and ground water cannot infiltrate where it formerly did. Figure 2 shows the effects of a declining water table (modified from USGS illustration at http://ga.water.usgs.gov/edu/earthgwaquifer.html).

## The Importance of Recharge…

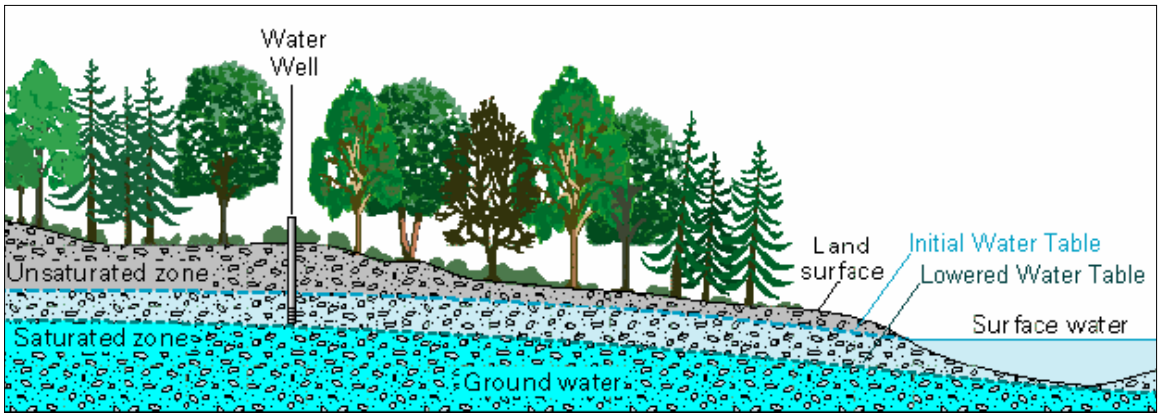



Figure 2: If the groundwater table drops to the lower dashed line, both the stream and the well go dry. The water table lowers when discharge (water out) is greater than recharge (water in).

Hydrogeologists can map recharge and discharge zones by measuring many water levels.

**The hydrogeologic setting** is the framework that controls groundwater occurrence and movement. Where ground water flows, the rate at which it flows, where it recharges or discharges, and how deep it occurs are all functions of what the land is like – the soil,

sediments and rocks that ground water moves through. The hydrogeologic setting also includes the topography and the weather patterns that control recharge.

**Susceptibility** refers to what the ground is like. When water can move readily through the ground, it can carry contaminants to ground water more quickly. Sandy shallow aquifers are more susceptible than deep aquifers that are overlain by clay.

**Vulnerability** refers to the risk of contamination from chemical use combined with the risk from the susceptibility of aquifers.

*Note: Sometimes, the terms vulnerability and susceptibility are used interchangeably, so you should be sure of the author's meaning when you encounter these terms.*

**Susceptibility factors:**

- **The vadose zone** consists of the unsaturated earth materials above an aquifer. Depth to water is the distance through the vadose zone a contaminant would travel to reach the water table. The deeper the water table, the longer the travel time.

- **Permeability** is a scientific measurement of the rate of infiltration in inches of water per hour. Infiltration rate is a measure of how fast water and pollutants can move downwards through the earth materials of the vadose zone. The more permeable the ground is, the faster water moves down through it, the more the underlying ground water is susceptible to contamination. Coarse sands and gravels allow water to pass through much more quickly than fine silts and clays.

- **Chemical retardation** is a measurement of how clays and organic matter react with some chemicals to slow their passage or change them chemically.

- **Adsorption** is a measurement of the tendency of ions dissolved in water to stick to particles of silt or clay. The particle size and the amount of organic matter affect the adsorption. A sand with no organic matter may not adsorb at all, while an organic silt or clay may adsorb well. In short, a contaminant can be captured or slowed down by sticking to clay.

- **Low permeability layers**, such as clay or glacial till, may occur between the land surface and an aquifer, either within the vadose zone or within an aquifer system. These layers would restrict downward migration of contaminants and would provide a measure of protection to the aquifer.

  *Note: Care should be taken with presuming a confining layer is protective, because layers may not be laterally extensive and may have some feature that allows leakage.*

- **Hydraulic conductivity** is a measure of how fast a quantity of water can move through an aquifer (for a given gradient through a unit area). The higher the hydraulic conductivity, the faster the flow.

- **Gradient** is the result of differences in elevation between two locations of the water table or the differences in pressure between locations in a confined aquifer. The higher the gradient, the faster the flow.

  *Just as a ball rolls downhill, water flows downhill – from higher water table elevations to lower water table elevations. Water also flows in the direction that pressure is moving it. Just as you can push a ball uphill, high-pressure conditions can push water upwards. Both pressure differences and elevation differences create gradients.*

- **Groundwater flow direction** is determined by gradients, which in turn are influenced by pumping, discharge to surface water, topography, and geologic setting.

- **Groundwater flow rate** is a result of hydraulic conductivity and gradient.

**Preventing pollution** depends on controlling land use activities to prevent contaminant spills and leaks. Critical aquifer recharge areas are designated so that greater control can occur where land use activities are a high-risk for polluting sensitive aquifers.

**Prioritization** of Critical Aquifer Recharge Areas can be accomplished by identifying where high-value water resources are located in highly susceptible areas (King County, 2004).

**Critical aquifer recharge area maps** are delineations of where a community's groundwater supply meets criteria such as susceptibility, potential for contamination, and priority.

**Wellhead protection zones** are areas around wells where contamination would result in polluting the water supply well within a specific time period. Time periods used by the Department of Health Drinking Water Program are six months, one year, five years, and ten years.

**Aquifers** are created when water saturates, or fills, the underground where the ground is permeable enough to yield useable quantities of water to a well. Layers that are not permeable enough to yield useable quantities of water to a well are called *aquitards*. Common types of aquifers are sand and gravel, fractured bedrock, and *kars*t (limestone).

In the Puget Sound region, the landscape that defines aquifers is mainly made up of glacial deposits. In Eastern Washington, the Columbia Flood basalts contain the main aquifers. In the Columbia Basin, irrigation has created aquifers by filling the sands and gravels over the Columbia Flood basalts.

There can be a number of aquifers at various depths beneath the ground and covering various spatial areas in width and depth. Water moves through the ground in different ways depending on what the ground is like.

A **confined aquifer** is an aquifer that lies beneath a confining layer, such as a silt or clay layer. This condition can cause the water to be under pressure, resulting in an artesian well. Sometimes this pressure is great enough to cause the well to flow out at the surface. Ground water in confined aquifers flows from the direction of the highest pressure to the lowest pressure.

A **water-table aquifer** is water under normal atmospheric pressure. This aquifer is not capped by a layer of clay or fine silt. Water-table aquifers flow generally in accordance with the topography towards rivers, streams, lakes, and springs.

There may be a whole system of multiple confined aquifers and a water-table aquifer in an area. Sometimes the water table aquifer and confined aquifers beneath are connected and water from one aquifer flows into another.

**Safe yield** (Fetter, 1980)is the amount of naturally occurring ground water that can be economically and legally withdrawn from an aquifer on a sustained basis without impairing the native groundwater quality or creating an undesirable effect such as environmental damage. It cannot exceed the increase in recharge or leakage from adjacent strata plus the reduction in discharge, which is due to the decline in head caused by pumping.

# Section 3
## Protecting the Functions and Values of Critical Aquifer Recharge Areas

The functions and values of Critical Aquifer Recharge Areas are to provide the public with clean, safe, and available drinking water. In order to accomplish this goal, information is needed about the location and extent of aquifers that supply public drinking water, the susceptibility of these supplies to contamination, and potential contamination risks. In addition, planning, programs, and ordinances are needed to prevent contamination from occurring.

The following steps characterize where groundwater resources are important to the community and how to protect them.

- **Identify** where groundwater resources are located.
- **Analyze** the susceptibility of the natural setting where ground water occurs.
- **Inventory** existing potential sources of groundwater contamination.
- **Classify** the relative vulnerability of ground water to contamination events.
- **Designate** areas that are most at risk to contamination events.
- **Protect** by minimizing activities and conditions that pose contamination risks.

- **Ensure** that contamination prevention plans and best management practices are followed.
- **Manage** groundwater withdrawals and recharge impacts to:
    - **Maintain availability** for drinking water sources.
    - **Maintain stream base flow** from ground water to support in-stream flows, especially for salmon-bearing streams.

The following section provides more details about each one of these steps

### Step 1: Identify where groundwater resources are located

The GMA discusses the use of both mapping and performance standards to identify critical areas.

**Maps** are highly useful for Critical Aquifer Recharge Areas because they can show the location of public water supply wells, private wells, and aquifer boundaries. They can also be used to show the location of areas that have been rated for susceptibility. Maps can be used to see where pollution prevention is most needed and to help plan development. Known Critical Aquifer Recharge Areas should be mapped.

**Performance standards** are the *criteria* for designation of a critical area. A performance standard is applied when reviewing development projects to determine what category of Critical Aquifer Recharge Area the proposal is in, and what the applicable site conditions are. Policies, planning, ordinances, and programs are applied based on the outcome of the evaluation of the proposal using performance standards.

The use of performance standards is recommended for …circumstances where critical areas cannot be specifically identified [WAC 365-190-040(1)]. The purpose of a performance standard is to have an objective standard for comparison (WWGMHB, 1997).

To use performance standards, local jurisdictions need sufficient information to:

- Make an informed determination as to whether or not critical areas are present on the site;
- Determine whether or not the proposed activity will impact those critical areas.

The *Critical Areas Handbook* (Washington Dept. of Community Trade and Economic Development, 2003) states that:

> *"Critical areas may be designated by adopting specific performance standards, delineating specific geographic areas, or both. Generally, performance standards are preferred, as any attempt to comprehensively map wetlands, for example, throughout a jurisdiction would likely be too inexact for regulatory purposes. Even so, mapping critical areas for information purposes is advisable. All areas meeting the definition of one or more critical area type, regardless of any formal identification, are required to be designated critical areas."*

**Identifying the Location and Extent of Drinking Water Supply Aquifers**

Mapping drinking water supply aquifers makes use of well location and well log information as well as the location and characteristics of aquifers.

**Well locations** are important to identify because it helps prioritize risk and guides local ordinances and planning near active public wells.

**Aquifer locations** are important to identify because it gives the jurisdiction information about where groundwater resources are. When new wells are needed, knowledge of where aquifers may supply water is critical. This knowledge is used in water system planning and is a vital consideration for long-term planning.

The following illustration shows:

- Public water supply wells (Group A) and their protection zones
- Smaller public water supply wells (Group B)
- Wells that serve one or two households •
- The location and the extent of a local aquifer - - - - - - - - - -

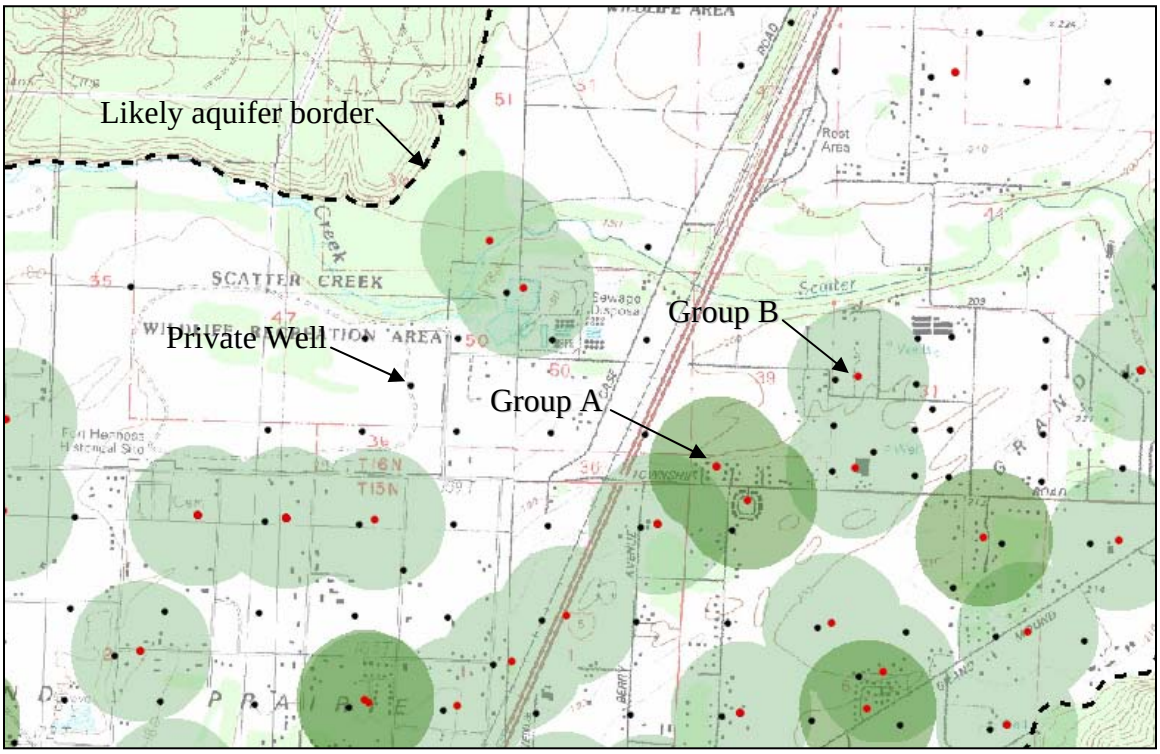



Figure 3: Location, extent, and uses of a drinking water supply aquifer.

*Note: The private wells on this map appear at the nearest quarter-quarter section, NOT where they are actually located on the ground. This is because well logs report locations this way, and that is what we have to use for mapping. Private wells are included in this illustration to give an idea of the use of the aquifer.*

**Public Water Supply Wells**

Public drinking water supply systems are regulated by the Department of Health under the Safe Drinking Water Act (SDWA). The state regulates systems with 15 or more connections, and the local health jurisdiction regulates systems with 3 to 14 connections.

The SDWA also includes the Source Water Protection Program. Under this program, wellhead protection zones are defined and the susceptibility of the well to contamination is rated. Potential contamination sources within the protection zones are also inventoried.

The wellhead protection zones are defined by the areas where a spill incident could result in contamination of the well within a specified time period. The time periods are six months, one year, five years, and ten years. Zones based on these time periods are known as time-of-travel zones. These mapped wellhead protection zones may be designated as a category of Critical Aquifer Recharge Area. A jurisdiction may have stricter requirements closer to the well. For example, some uses may be prohibited within the one-year time-of-travel zone that are allowed with mitigation in the ten-year time-of-travel zone.

Maps of public water supply wells and their protection zones are available on the internet:

- Washington State Department of Health Source Water Protection: http://www.doh.wa.gov/ehp/dw/our_main_pages/swap.htm
- Washington State Department of Ecology Facility/Site on the web: http://www.ecy.wa.gov/services/as/iss/fsweb/fshome.html

*Note: It should be kept in mind that any information system may have missing or inaccurate information.*

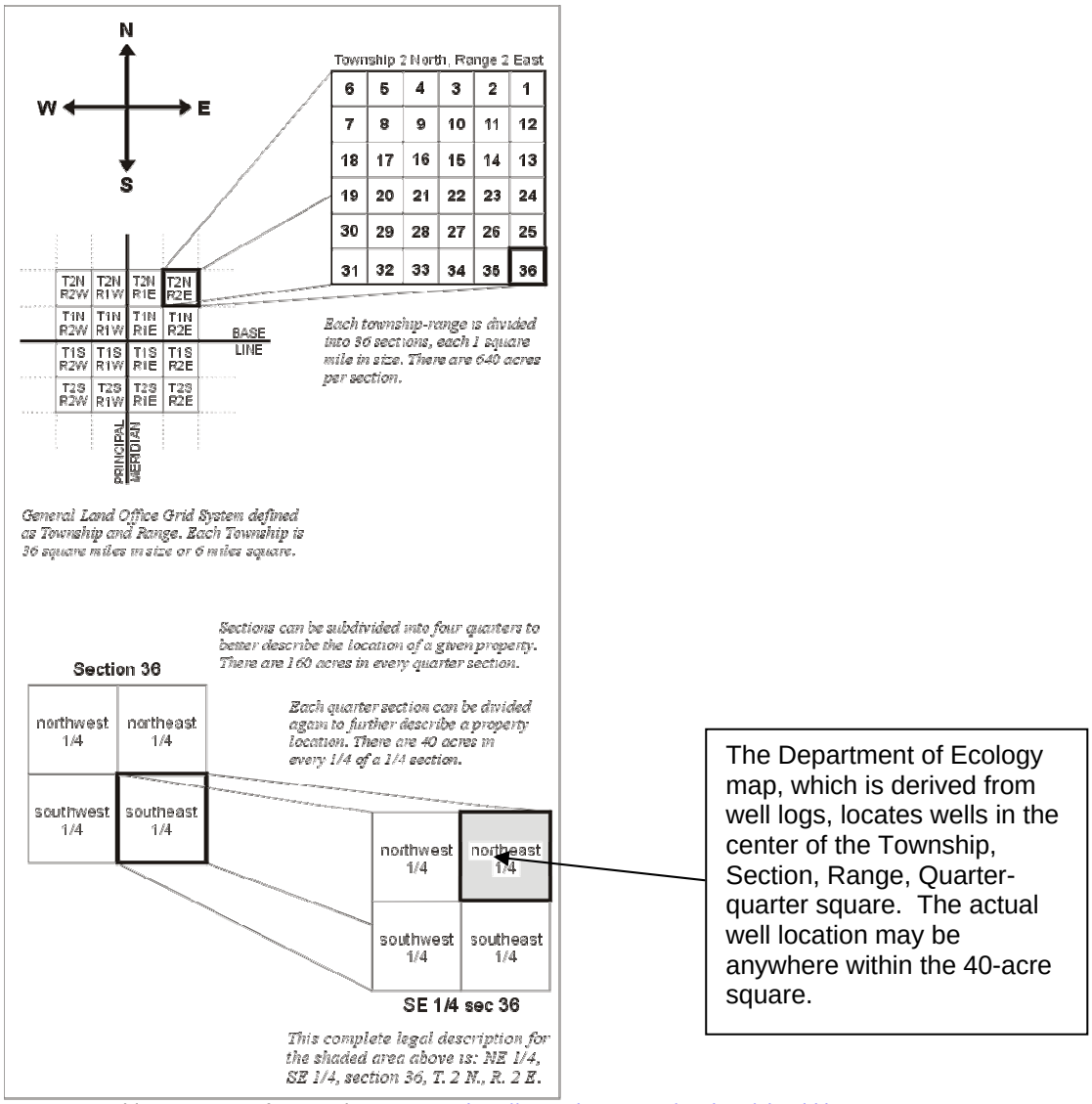
**Domestic Wells**

Residences that are located too far from a public water supply system must rely on individual wells, springs, or surface water. Individual domestic wells are an important and widespread source of drinking water supply in Washington.

Maps of domestic well locations together with well logs help with identifying the location, extent and use of drinking water supply aquifers.

To find information about domestic wells, contact the Department of Ecology Water Resources Program.

State law requires that a well log be filed with the Department of Ecology when a well is constructed. Well log information includes location by address and township/range/section/quarter-quarter.




The Department of Ecology map, which is derived from well logs, locates wells in the center of the Township, Section, Range, Quarter-quarter square. The actual well location may be anywhere within the 40-acre square.

Source: Washington Dept. of Natural Resources, http://www.dnr.wa.gov/geology/glogrid.htm#trs

Figure 4: Township, range, section, quarter-quarter, and well location

Well logs are available at the Department of Ecology Regional Offices in Lacey, Yakima, Spokane, and Bellevue. Many counties also maintain copies. The Department of Ecology Well Log Viewer internet site has downloadable well logs, well records, and maps of well locations: http://apps.ecy.wa.gov/welllog/.

The well locations were created by placing a point at the center of the township/range/section/quarter/quarter-quarter square. The following should be kept in mind when using these well locations:

- There are many wells for which well logs have not been submitted, and therefore do not appear on this map.
- Sometimes the location information written on the well log is incorrect, and so the location shown for the well on the map is inaccurate.

  *It is up to the well driller to provide accurate information on the well log. The well owner should make sure the location information is correct.*
- The point that represents the well is placed in the center of the township, range, section, quarter-quarter square. The actual location of the well is anywhere within the 40-acre square.

  For example, if the center of the square is in a lake, and the actual well location is on shore, the map will plot the well in the lake. The well IS NOT in the lake. There are thousands of well logs, and the locations have not been adjusted individually.

**Well Identification Using Parcel Maps**

Another way of identifying private wells is to look at a map of parcels with existing residences that are outside of public water supply service areas. This will give an indication of areas within the jurisdiction that rely on private wells.

**Aquifers**

This section looks at what tools are used to identify and characterize aquifers. Well logs, maps, testing, and modeling are tools used to identify aquifers.

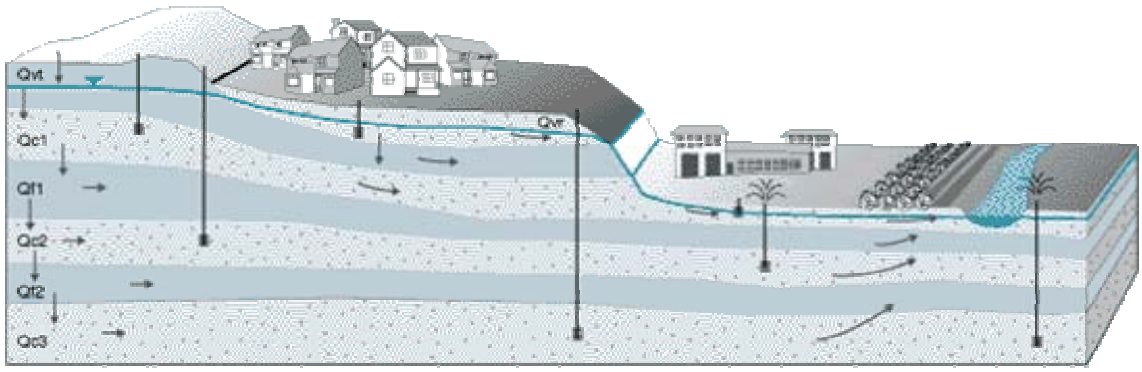



Figure 5: Representation of an aquifer system (Jones, 1999)

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W11448
UNIQUE WELL I.D. # ACR 769
Water Right Permit No. Appl. → G2-29165 - Prelim Permit

(1) OWNER: Name CITY OF LACEY Address P.O.Box 3400, 420 College St. Lacey, WA 98509-3400

(2) LOCATION OF WELL: County Thurston - NW 1/4 NW 1/4 Sec 24 T. 18 N., R. 1W W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) MADRONA PARK SUBDIVISION

(3) PROPOSED USE: ☐ Domestic ☐ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☒ Other ☐

(4) TYPE OF WORK: Owner's number of well (If more than one) "C"
Abandoned ☐ New well XX Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable XX Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 16 inches.
Drilled 334 feet. Depth of completed well 333 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 16" Diam. from +2 ft. to 265 ft.
Welded ☒ " Diam. from ft. to ft.
Liner installed ☐ Threaded ☐ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Westco
Type Stainless steel Model No.
Diam. 14" Slot size 150/120 from 265 ft. to 282 ft.
Diam. 14" Slot size 150 from 294 ft. to 306 ft.
14" 150/100 313 326

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 130 ft.
Material used in seal ~~Bentonite~~ Quick Grout
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 219.53 ft. below top of well Date 6/4/97
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Hokkaido
Yield: 1025 gal./min. with 2.01 ft. drawdown after 1 hrs.
" 1025 " 2.00 " 2 "
" 1025 " 2.21 " 4.23 "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

| Time | Water Level | Time | Water Level | Time | Water Level |
|---|---|---|---|---|---|
| 0 | 221.75 | 10m | 219.77 | 120m | 219.7 |
| 1 min. | 219.69 | 30m | 219.76 | | |
| 5 min. | 219.81 | 60m | 219.70 | | |

Date of test 6/4/97
Bailer test gal./min. with ft. drawdown after hrs.
Airtest gal./min. with stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☒ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

| MATERIAL | FROM | TO |
|---|---|---|
| Brown gray sandy till, hard | 0' | 10' |
| Gray brown sandy till w/cobbles | 10' | 69' |
| Dirty sand and gravel, moist | 69' | 76' |
| Brown gray till | 76' | 79' |
| Brown clay with gravel | 79' | 87' |
| Brown waterbearing sand & gravel | 87' | 121' |
| Brown silty sand with gravel | 121' | 123' |
| Blue gray clay | 123' | 133' |
| Brown silty sand, $H_2O$ | 133' | 153' |
| Brown silty sand with clay and gravel, $H_2O$ | 153' | 163' |
| Brown sandy silt with gravel, $H_2O$ | 163' | 195' |
| Yellowish Sand & Gravel with binder, waterbearing | 195' | 306' |
| Brown Sand and gravel with clay lenses | 306' | 328' |
| Brown, fine to medium sand with gravel | 328' | 331' |
| Brown silty sand with binder | 331' | 334' |
| Bottom hole | 334' | |

Work Started March 21, 1997 Completed June 11, 1997

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME HOKKAIDO DRILLING & DEVELOPING CORP. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address P.O. BOX 100, GRAHAM, WA 98338-0100
(Signed) (WELL DRILLER) License No. 1146
Contractor's Registration No. HOKKADD178D3 Date JUNE 24, 1997

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

Figure 6: Well logs include observations about aquifers and the earth materials that overlie the aquifers.

**Well logs** contain information about aquifers:

- Location of the well
- The kinds and depths of underground materials (sand, gravel, silt, clay, bedrock, etc.)
- Where the aquifers are and how far they extend. Many well logs are needed for this analysis.
- An estimate of the amount of water that can be pumped from a well. Estimates from many well logs and other methods help estimate the amount of water that an aquifer could yield.

**Maps** are used to help define the boundaries of aquifers.

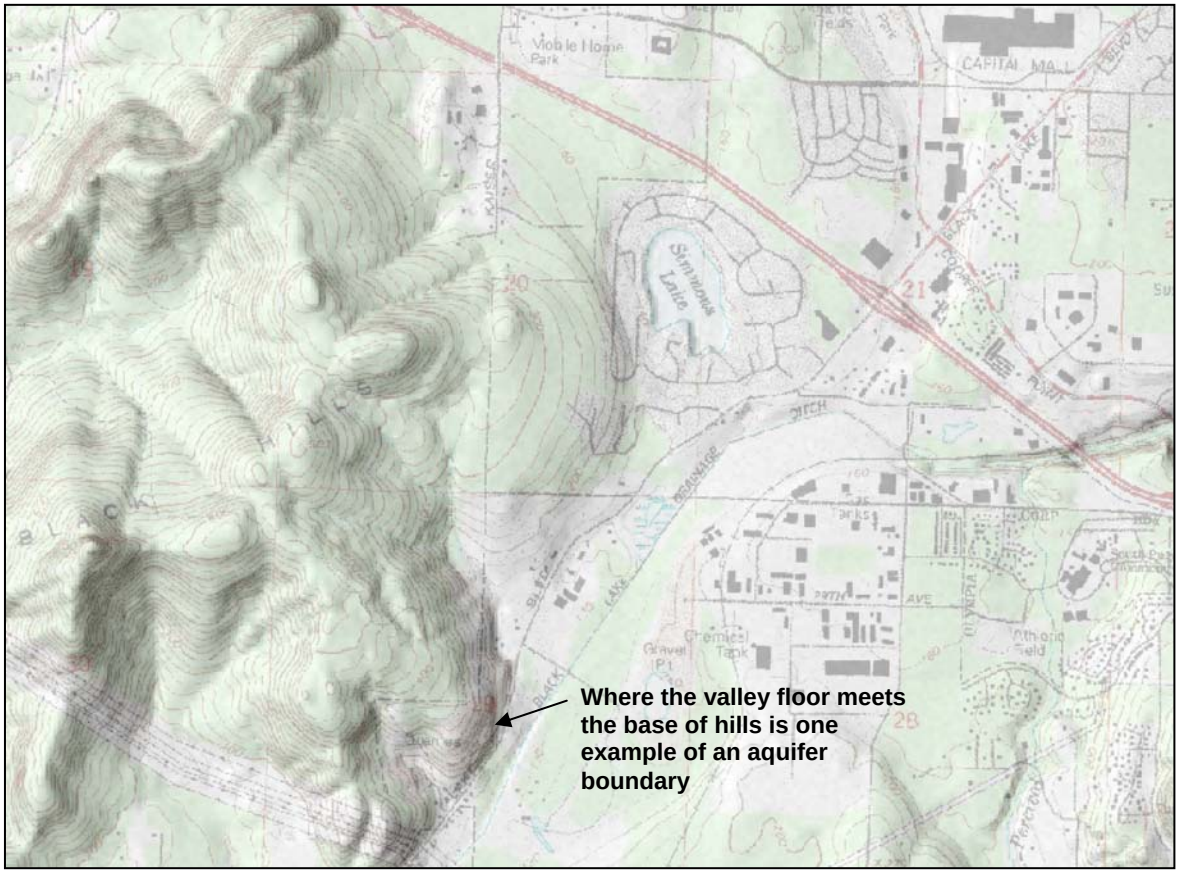



Figure 7: This topographic map shows hilly bedrock next to a flatter river valley. The boundary of the aquifer is likely to be where the hills slope up from the valley.

**Topographic** maps show landscape changes that are often associated with aquifer boundaries. (For example, the boundary for a river valley aquifer may be where the bedrock slopes up from the valley floor.)

**Surficial geology** maps show where geologic materials are located that are likely to contain aquifers, such as alluvial deposits.

**Testing methods** help hydrogeologists to identify and characterize aquifers. For example, aquifer tests involve pumping water out of a well at a known rate and measuring the effect in other wells over time. These tests show how much water can be pumped from a well, how far away other wells can be affected, and where the aquifer boundaries are. They also show to what extent water from one aquifer may leak into another.

**Geophysical methods** are used to determine characteristics such as the nature and geometry of geologic materials, the extent of aquifers, depth to water, and water quality.

**Modeling** takes all of the available information and observations that a hydrogeologist has and uses the computer to account for known conditions. It allows a hydrogeologist to model different (what-if) scenarios and to find out what may happen when various choices are made. Example questions that modeling can address are:

- What would the effect of pumping from a well field be on stream flow?
- If a spill occurred here, how long would it be before the contaminants reach the well?
- How would a drought affect water table levels and stream flows?

**Hydrogeology** studies look at all the available resources to map and describe aquifers. Consultants, the state, academic studies, the U.S. Geological Survey (USGS) and other agencies are sources of this type of information. These studies can be used to support the identification and characterization of Critical Aquifer Recharge Areas. Figures 8 and 9 show a hydrogeologic map and cross-section from a USGS study in Jefferson County (Simonds, 2004).

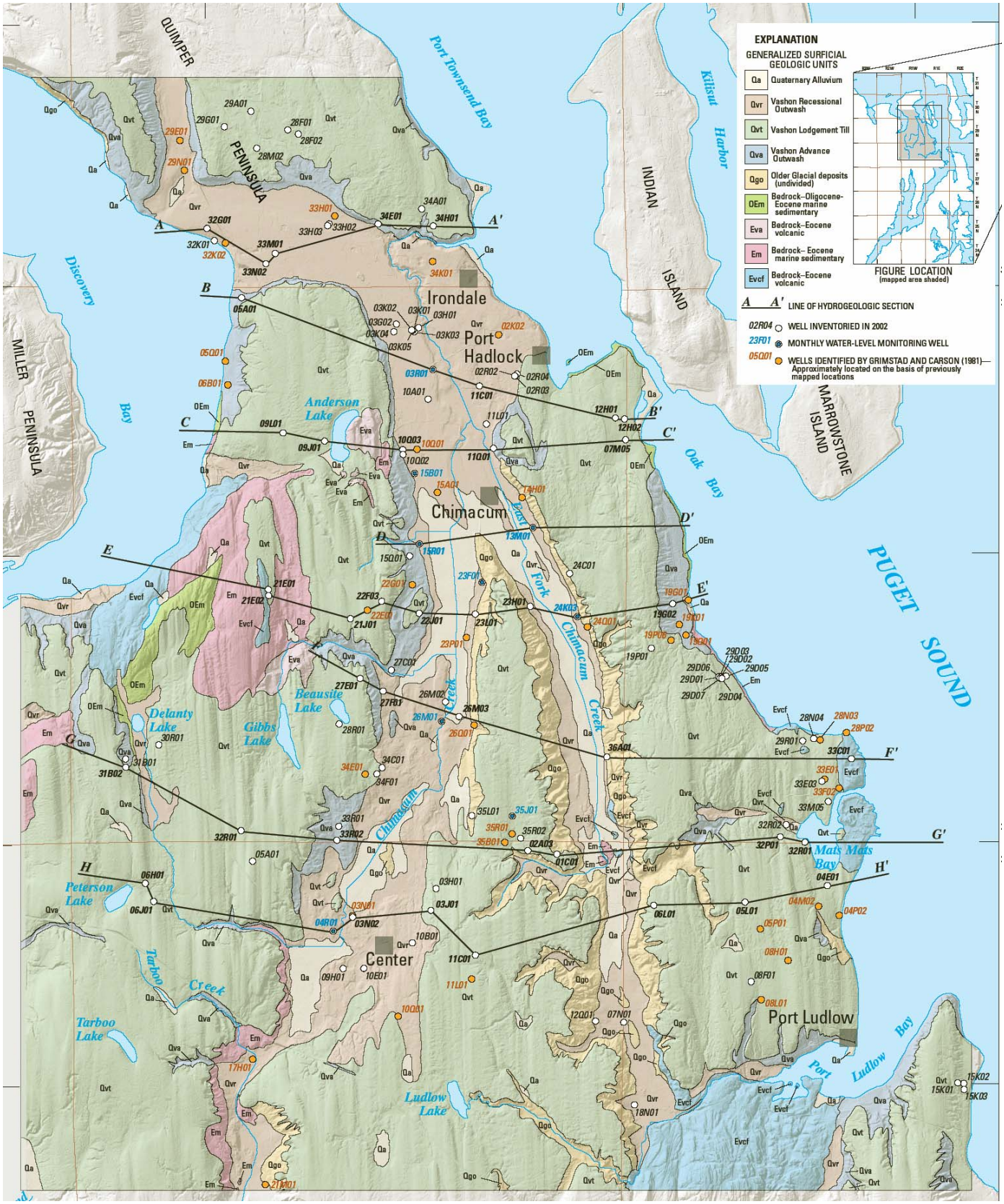



Figure 8: Hydrogeologic map of the Chimacum Basin (Simonds, 2004)

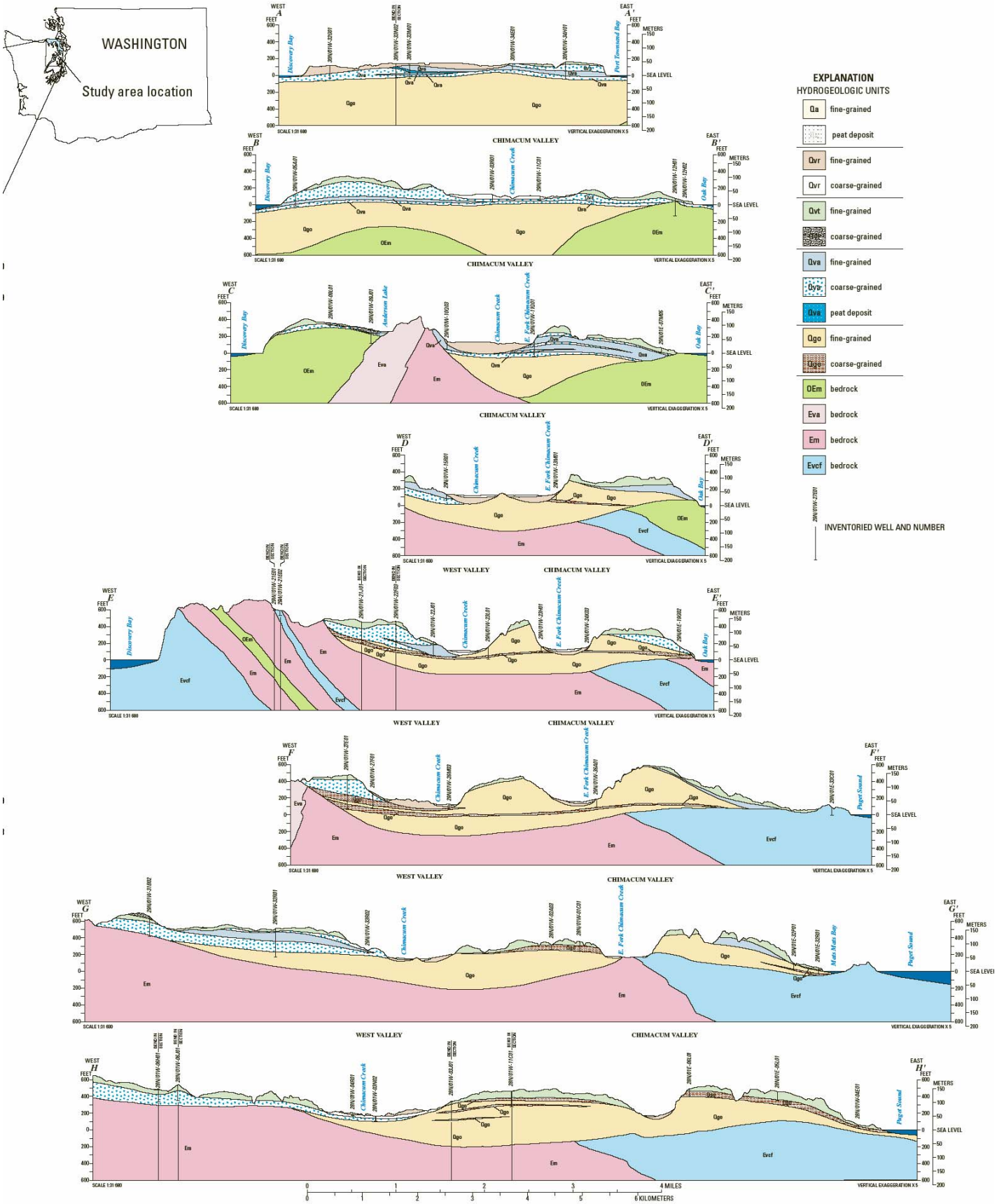



Figure 9: Hydrogeologic cross-sections of the Chimacum Basin (Simonds, 2004)

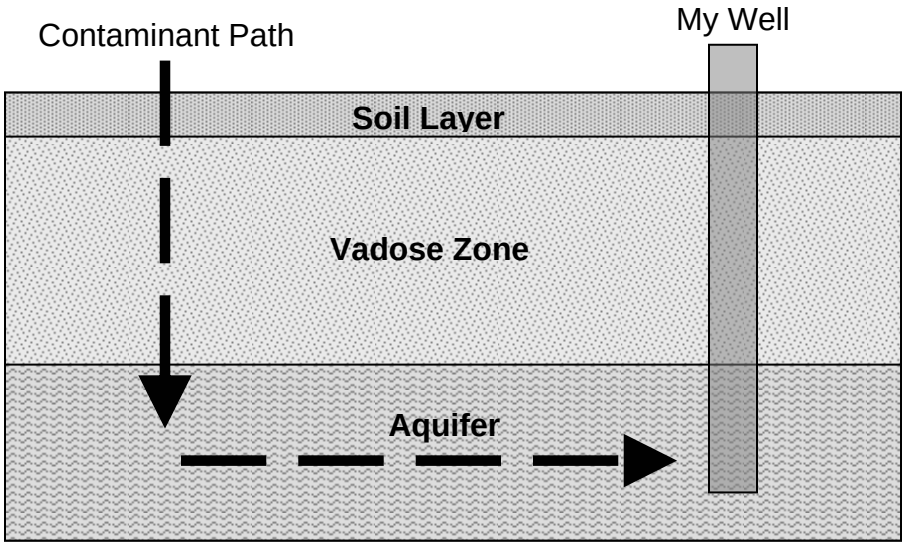



Figure 10: Contaminant path, vadose zone, and aquifer schematic drawing.

### Step 2: Analyze the susceptibility of the natural setting where ground water occurs.

How do contaminants get to a well? First, a contaminant is spilled onto the ground and travels downward to the aquifer. Then it is carried by the flow of water through the aquifer until it reaches a well.

How fast and how far a contaminant travels depends on both the natural setting and the chemical and physical characteristics of the contaminant. There are many different chemicals with varied characteristics and this makes assessing all of the possible environmental fate scenarios difficult.

It is much more feasible to start with characterizing susceptibility. This involves determining the physical characteristics of the ground above the aquifer, called the vadose zone, and the characteristics of the aquifer. With susceptibility assessed, the nature of the contaminants can be taken into account by limiting or prohibiting the use of chemicals that are high-risk contaminants within high priority susceptible areas.

**Susceptibility of the ground (vadose zone)**

Along with the characteristics of the contaminant, the characteristics of the **vadose zone** determines how easily a spill of a contaminant could get down to the water table. Characteristics important for susceptibility assessment typically may include depth to water, infiltration rate, permeability, chemical retardation factors, adsorption, and the presence or absence of a impermeable layer.

**Susceptibility of the aquifer**

The characteristics of the aquifer control how fast a contaminant reaches a well, once it has entered the aquifer. Factors typically considered in assessing the susceptibility of aquifers include hydraulic conductivity, vertical and horizontal gradients, and ground water flow direction and rate.

**Hydrogeologic studies** contain information about aquifers useful for understanding aquifer characteristics and relative susceptibility. Where aquifer studies have not yet been undertaken, well logs and maps of surficial geology and soils will begin to provide an idea of relative susceptibility to contamination. A qualified professional knows how to use this information along with other methods to describe the overall hydrogeologic setting and its relative susceptibility.

Hydrogeologists use this information along with contaminant characteristics such as solubility, sorption, concentration, and other chemical and physical properties to answer questions such as:

- How likely is it that a contaminant spilled in a certain location would reach a well?
- How fast would a contaminant spill get to a water well?
- How concentrated would the contaminant still be when it got there?

**Source water protection susceptibility rating**

The Department of Health evaluates and assigns a susceptibility rating for each public water supply well, based on a number of factors, including whether or not there is a protective confining layer above the aquifer. This rating and information is useful in support of a susceptibility assessment, along with wellhead protection plans, which include information about how fast a contaminant could move toward the well based on time-of-travel estimates.

## Step 3. Inventory existing potential sources of groundwater contamination.

Anywhere that a potential pollutant is used, handled, transferred, or stored is a potential source of groundwater contamination. Examples are facilities for transferring chemicals from trucks to tanks, drycleaners, machinery manufacturers, and many more. The U.S. EPA Potential Sources of Drinking Water Contamination Index is in Appendix A.

Many of these facilities may be constructed, maintained, and operated in a way that prevents spills from getting to the ground as much as is feasible. Some operations, however, are inherently more risky for pollution than others. These would include facilities that handle a large quantity of toxic materials, especially where these toxic materials are transferred or handled, increasing the possibility of an incident leading to a spill.

**Source water protection contaminant inventories**

Public water supply systems with 15 or more connections are regulated under the federal Safe Drinking Water Act. They must inventory potential contamination sources around the wells. The Department of Health works with the Department of Ecology to provide web-based maps of potential contamination sources along with locations of wellhead protection zones. The Facility-Site atlas can be accessed from the Department of Ecology geographic information system (GIS) applications website: http://www.ecy.wa.gov/services/gis/apps/apps.htm

The GIS cover of facilities and sites regulated by the Department of Ecology can be accessed from the GIS Data website (click on Facility Site): http://www.ecy.wa.gov/services/gis/data/data.htm

## Step 4. Classify the relative vulnerability of ground water to contamination events.

All ground water is vulnerable; some areas where strategic public groundwater resources are located are more vulnerable than other areas. The concept of using criteria to create classifications or categories of vulnerability helps local jurisdictions apply the appropriate measures for the risks involved.

**Susceptibility** refers to natural conditions, and **vulnerability** refers to the total contamination risk from both the natural conditions and potential contaminant sources. The base classification of Critical Aquifer Recharge Areas can be based on susceptibility, and an overlay of existing contamination sources used to give the community an idea of where its strategic groundwater supplies may be most at risk under current land use conditions.

For new development, classification based on natural conditions allows a jurisdiction to make decisions about the type of land uses that should or should not be allowed, or which may be allowed with conditions.

There is more than one way to classify Critical Aquifer Recharge Areas. Here are three methods and some illustrations:

- Categories based on susceptibility
    - Water table sand and gravel aquifers
    - Deeper less susceptible aquifers
    - Confined aquifers

- Categories based on set priorities and risk
    - Large public water supply systems one-year time of travel protection zone
    - Densely populated areas that rely on ground water

    - Medium public water supply systems protection zones
    - Rural areas with a high dependence on ground water
    - Discontinuous local drinking water aquifers of limited extent
    - Sole Source Aquifers

- Categories based on areas that have the same policies, plans, ordinances, and programs that will be applied.

The examples are not meant to be exhaustive. The categories depend on local hydrogeologic settings, use of the drinking water aquifers, and the actions that a local jurisdiction needs to set in place to protect the public potable groundwater resource.

### Step 5. Designate areas that are most at risk to contamination events.

The next step in establishing Critical Aquifer Recharge Areas is to designate areas where the public drinking water supply has been determined to be at risk for contamination.

So that local planning and regulation can be guided appropriately, designation makes it clear.

- Where these areas are located (map) and what the performance standards are (criteria).
- Why they are at risk (susceptibility and potential contaminant sources).
- What the importance of this area is to the public drinking water supply (prioritization).

### Step 6..Protect by minimizing activities and conditions that pose contamination risks.

Anywhere chemicals are stored, handled, transferred, or used is a potential spill or leak risk.

There are all too many examples of groundwater contamination here in Washington. Municipal water supplies have been contaminated by industrial or commercial use of chemicals. The city of Tumwater, the city of Vancouver, and the city of Lakewood all have had contaminated wells. In Eastern Washington, well water turned yellow from dinoseb, a pesticide spilled at Alexander Farms. These events have been expensive and distressing.

Local jurisdictions need authority to require pollution prevention and to obtain compliance before a situation contaminates the local drinking water supply. Ordinances can be specific to the jurisdiction, or a jurisdiction may choose to adopt state or federal laws or rules by reference. Often, county or city hazardous waste pollution prevention programs with associated regulations are operated to prevent local land use activities from creating major cleanup sites.

### Step 7. Ensure that contamination prevention plans and best management practices are followed.

The best plans and practices cannot prevent contamination if they are not used. The ability to inspect, obtain compliance and enforce is needed to make sure that the county or city can stop a threat to ground water when the land user is negligent or uncooperative.

### Step 8. Manage groundwater withdrawals and recharge.

- Maintain availability for drinking water sources.
- Maintain stream-base flow from ground water to support instream flows, especially for salmon-bearing streams.

**Recharge**

Development has a profound effect on the hydrology of an area. The increase in impervious surfaces and disturbance of natural vegetation result in increasing runoff and decreasing recharge. Local jurisdictions can improve recharge by encouraging methods that increase recharge, such as low impact development and rain gardens.

The Puget Sound Action Team is a helpful resource for information and assistance with low impact development at http://www.psat.wa.gov/Programs/LID.htm. While maintaining recharge is good for aquifers, it is also good for preventing polluted run-off from reaching sensitive surface waters.

**Water supply planning**

The Watershed Planning Act (Chapter 90.82 RCW) provides for water supply planning by local entities within a Water Resources Inventory Area (WRIA), including at least the counties, the largest city or town within the WRIA, and the water utility that uses the most water. Many of the WRIAs are engaged in watershed planning. For the current status of watershed planning, see the website
http://www.ecy.wa.gov/watershed/index.html

Ground Water Management Areas may be established by either the state or local government under RCW 90.44.400. Criteria for identifying potential Ground Water Management Areas include (among others): Aquifer systems that are declining due to restricted recharge or over-utilization and aquifers identified as the primary source of supply for public water supply systems.

Large water systems regulated by the Department of Health are required to have a water system plan. This plan includes analyses of future water demand and supply. Smaller water systems are required to have a small water system management program (see http://www.doh.wa.gov/ehp/dw/Programs/water_sys_plan.htm).
The Water System Planning Handbook (Washington State Dept. of Health, 1997) is available on the web at http://www.doh.wa.gov/ehp/dw/Publications/newes2.pdf.

Local governments also include water planning in their comprehensive plans and must meet water supply planning requirements under the Growth Management Act. The Washington Deptartmen of Community, Trade, and Economic Development has written a fact sheet called Watershed Planning that explains the link between growth management, and watershed planning at http://www.cted.wa.gov/DesktopModules/CTEDPublications/CTEDPublicationsView.aspx?tabID=0&alias=CTED&lang=en&ItemID=897&MId=944&wversion=Staging.

# Section 4
## Best Available Science

**Best available science** is required by the Growth Management Act and is defined by the Washington Administrative Code. Best available science guidance has been published by the Department of Community, Trade, and Economic Development. These sources should be consulted to obtain a good knowledge of how the concept of best available science functions within the Growth Management Act.

The main sources of information for requirements of the Growth Management Act and related rules for best available science and critical areas are:

- **Chapter 36.70A.172 RCW**
  **Critical areas, ddesignation and protection, best available science to be used.**

  In designating and protecting critical areas under this chapter, counties and cities shall include the best available science in developing policies and development regulations to protect the functions and values of critical areas. In addition, counties and cities shall give special consideration to conservation or protection measures necessary to preserve or enhance anadromous fisheries.

- **Chapter 365-195-905 through 925 WAC**

  **Chapter 365-195-905 WAC discusses the characteristics of a valid scientific process:**

  In the context of critical areas protection, a valid scientific process is one that produces reliable information useful in understanding the consequences of a local government's regulatory decisions and in developing critical areas policies and development regulations that will be effective in protecting the functions and values of critical areas.

***The objective of including science*** *is "to protect the* ***functions and values*** *of critical areas." Science plays a central role in delineating critical areas, identifying functions and values, and recommending strategies to protect their functions and values (OCD, 2003).*

The rule goes on to list the characteristics of a valid scientific process, including peer review, methods, logical conclusions and reasonable inferences, quantitative analysis, context, and references. It then lists sources, including research, monitoring, inventory, survey, modeling, assessment, synthesis, and expert opinion. This section of the WAC is particularly applicable to Critical Aquifer Recharge Areas.

- **The *Critical Areas Handbook*** (Washington Dept. of Community Trade and Economic Development, 2003). This Handbook is available on the internet at http://qa.cted.wa.gov/portal/alias__CTED/lang__en/tabID__418/DesktopDefault.aspx

See Appendix B – Resources for more information about how to obtain or access these sources.

**How best available science applies to Critical Aquifer Recharge Areas**

Science for **Critical Aquifer Recharge Areas** involves knowledge about the occurrence and movement of ground water.

- Identifying where "areas with a critical recharging effect on potable aquifers" are located.
- Analyzing their physical characteristics.
- Assessing the risk for contamination.
- Evaluating effective best management practices for preventing contamination.
- Assessing the potential impacts on drinking water sources and stream flow from groundwater withdrawals and changes in recharge.

*The GMA requires best available science to be used for* ***special consideration of anadromous fish species****. Science is used to establish where ground water affects streams and other surface water habitats, and what the effects are.*

Best available science and the functions and values of Critical Aquifer Recharge Areas.The Growth Management Act requires protection of **water quality and quantity**:

- Planning goals include water quality and availability:

  RCW 36.70A.020 – Planning goals

  *Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water.*

- Comprehensive plans should address groundwater quality and quantity protection in the land use element:

  RCW 36.70A.070 Comprehensive plans – Mandatory Elements

  *The land use element shall provide for protection of the quality and quantity of ground water used for public water supplies.*

Best available science for Critical Aquifer Recharge Areas, therefore, should address both quality and quantity.

**When Should Best Available Science Be Applied?**

1. Upfront, during the planning process:

   Two main benefits of applying best available science **upfront** in the planning process (Washington Department of Community Trade and Economic Development, 2003) are:

   - It enables understanding of where critical areas are located and how they naturally function. This guides how best to regulate land uses that may impact critical areas.
   - Upfront planning and adoption of scientifically defensible development standards enables decisions to be made with information that is on-hand instead of needing to be developed for each project. This should lessen the expense and time needed to make decisions.

2. At the time of application:

   Project review may entail that the applicant provide the county or city with information that is supported by best available science. An example would be a hydrogeologic report. This information is especially important to evaluate projects against performance-based standards.

**Sources for Best Available Science for Critical Aquifer Recharge Areas**

Groundwater scientists rely on a number of standard methods for characterizing the occurrence and movement of ground water. These methods involve everything from topographic maps, aerial photos, on-the-ground mapping, use of existing maps for soils and geology, well log analysis, aquifer tests, geophysics, water quality testing, water level measurements, monitoring well installations, testing for seepage of ground water into streams (or from streams into ground water), and modeling.

There are also dozens of approaches to assessing groundwater vulnerability or susceptibility to contamination in the professional literature. Pollution prevention and best management practices for preventing contamination are widely published.

These methods have **standards of practice**. Some examples, just to name a few, are:

- Quality assurance standards for water quality sampling
- Standard methods for measuring water levels
- Aquifer test methods and standards
- Field methods

**Existing Sources of Information**

Local government can use information that local, state or federal natural resource agencies have determined represents the best available science. They can also use information provided by a qualified scientific expert or team of qualified scientific experts.

Sources that provide scientifically valid information useful for Critical Aquifer Recharge Areas include:

**Public water supply data and source water protection information**

- Well head protection zone plans
- Contaminant inventories
- Aquifer characterization/susceptibility rating
- Well information
- Water quality sampling data
- System size and location
- Water system plans
- Studies completed for public water supply systems

**State, federal, local, academic, and consultant studies**

- USGS studies
- Water supply papers
- State studies
- Consultant studies for local government
- Consultant studies for a state-regulated facility
- Academic studies

Smaller jurisdictions can rely on the information generated by public water supply systems, state, and federal required studies for facilities located within their jurisdiction, and other studies as listed above. A literature review helps to document best available science for the record. Asking for volunteers in the community, technical assistance from

the state, and applying for grants are ways to augment local resources. (See WAC 365-195-910 (2)).

**What Are the Potential Consequences If Best Available Science Is Not Applied?**

Failure to apply best available science for critical areas under the Growth Management Act may be appealed to the Growth Management Hearings Board. When the board finds a county or city in noncompliance with the Growth Management Act, the board issues a Compliance Order. Failure to comply with a board order can result in state sanctions and loss of funding. See Appendix B for where to find more information about the Growth Management Hearings Board.

# Section 5
# Working with State and Federal Laws and Rules

The Washington State Growth Management Act and rules refer to how local authorities should coordinate with other government authorities in several places. Three of the concepts contained in the GMA rules follow.

- Local government should consider and coordinate with state, federal, and other authority's laws, rules, and permits (WAC 365-195-735 – State and Regional Authorities).
- Local plans and policies may in some respects be adequately implemented by adopting the provisions of such other programs as part of the local regulations (WAC 365-195-825 – Regulations specifically required by the act).
- Projects may be approved based on compliance with other local, state or federal rules or laws, providing environmental concerns are mitigated (RCW 43.21C.240 – Project review under the growth management act).

The GMA allows jurisdictions to avoid duplication of effort by making use of what is already being done by others. The functions and values of Critical Aquifer Recharge Areas should still be protected. Success, then, depends on identifying potential contamination sources, identifying other laws, rules, and planning efforts that are relevant to Critical Aquifer Recharge Areas and identifying where local action is needed to ensure protection.

## Potential Contamination Sources

EPA has listed common potential sources of contamination along with likely contaminants. The U.S. EPA Potential Sources of Drinking Water Contamination Index Listed in Appendix A is the table copied from their web page, which also may be accessed at http://www.epa.gov/safewater/swp/sources1.html

This chart lists some potential facilities and activities where one might find the contaminants referred to as *primary and secondary drinking water standards.* The listing of a contaminant does not mean that it will always occur at the associated source, nor does it encompass all contaminants that may be present. Sources are divided into four major categories:

- Commercial/industrial
- Residential municipal
- Agricultural/rural
- Miscellaneous (underground injection control/naturally occurring)

This list is intended as a resource guide for creating an inventory list. A state or local community may have different sources of concern from the list in Appendix A based on local variability such as existing industrial activity, and known contaminant occurrence information.

## Existing Regulation of Potential Contamination Sources

The GMA lists laws, rules, permits, and planning processes to consider in WAC 365-195-710 – Identification of other laws.

The following table (after Cook, 2000) lists many of the activities relevant to groundwater protection along with the citation.

Table 1: Laws, rules, and guidance for groundwater protection

| Activity | Statute - Regulation - Guidance |
|---|---|
| Above Ground Storage Tanks | Chapter 173-303-640 WAC |
| Animal Feedlots | Chapter 173-216 WAC, Chapter 173-220 WAC |
| Automobile Washers | Chapter 173-216 WAC, Best Management Practices for Vehicle and Equipment Discharges (WDOE WQ-R-95-56) |
| Below Ground Storage Tanks | Chapter 173-360 WAC |
| Dangerous Waste Regulations<br>- Siting of Chemical Treatment Storage and Disposal Facilities;<br>- Hazardous Waste Generators (*Boat Repair Shops, Biological Research Facility, Dry Cleaners, Furniture Stripping, Motor Vehicle Service Garages, Photographic Processing, Printing and Publishing Shops, etc.)*<br>- Spills and discharges into the environment | Chapter 173-303 WAC<br>- Chapter 173-303-282 WAC<br>- Chapter 173-303-170 WAC<br>- Chapter WAC 173-303-145 |
| Injection Wells (Dry Wells) | Federal 40 CFR Part 144—Underground Injection Control Program and Part 146—Underground Injection Control Program: Criteria And Standards; Chapter 173-218 WAC |
| Junk Yards and Salvage Yards | Chapter 173-304 WAC, Best Management Practices to Prevent Stormwater Pollution at Vehicles Recycler Facilities (WDOE 94-146) |
| Oil and Gas Drilling | Chapter 332-12-450 WAC, Chapter 173-218 WAC |
| On-Site Sewage Systems (Large Scale) | Chapter 173-240 WAC |
| On-Site Sewage Systems < 14,500 gal/day | Chapter 246-272 WAC, Local Health Ordinances |

Table 1. continued

| Activity | Statute - Regulation - Guidance |
|---|---|
| Pesticide Storage and Use | Chapter 15.54 RCW, Chapter 17.21 RCW |
| Sawmills | Chapter 173-303 WAC, 173-304 WAC, Best Management Practices to Prevent Stormwater Pollution at Log Yards (WDOE 95-53) |
| Solid Waste Handling and Recycling Facilities | Chapter 173-304 WAC |
| Surface Mining | Chapter 332-18 WAC |
| Waste Water Application to Land Surface | Chapter 173-216 WAC, Chapter 173-200 WAC, Guidance on Land Treatment of Nutrients in Wastewater, with Emphasis on Nitrogen, Best Management Practices for Irrigated Agriculture |

## Identifying Gaps in Protection

Federal and state laws and rules do not replace local planning, ordinances, and programs. Local jurisdictions should maintain the ability to protect ground water under their own authority. Local government can focus on local conditions in a way that the state cannot.

The Department of Ecology through RCWs, WACs, and permits, sets minimum operating standards for many types of potentially polluting facilities. If a permitted facility is poorly managed or experiences some sort of engineering failure (which may happen even with good management), contamination may be released into the environment.

Local government planning can influence the types of future developments that occur in various areas and may be able to encourage potentially contaminating facilities to locate in areas where the aquifer has a lower susceptibility if contaminants are released. In this way the potential for aquifer pollution is lowered and the public is protected. Land use planning at the local level is the most effective way to influence where facilities choose to locate.

- **Counties and cities.**
  - Regulate land use through comprehensive planning, zoning, and ordinances.
  - Have authority to ensure a landowner does not pollute the public drinking water supply.
  - Are more able to track conditions and adapt to local concerns much more readily than the state.
- **Federal and state laws, rules, and programs are often targeted toward larger facilities**. For example, pollution prevention plans are required by the state if a facility generates 2,640 pounds of hazardous waste a year. A much smaller quantity of hazardous chemicals can cause contamination, especially if improper disposal into a septic system or a dry well occurs. The local jurisdiction should consider requiring pollution prevention plans where needed and not already required.

- **Compliance depends on state resources to enforce**. The state covers a large area and a large number of facilities, and therefore illegal activities may occur that are not detected by the state until contamination has occurred. Local attention can prevent the creation of new cleanup sites.

**Prohibited and conditioned uses**

Some land use activities, such as landfills, have been found to be a high-risk for groundwater contamination. Although a high-risk use may be regulated by other authorities, local jurisdictions should consider prohibiting these uses from being located within high-risk high-priority Critical Aquifer Recharge Areas. Where these uses are already sited, they should be closely monitored and strict pollution prevention requirements followed.

Examples of uses that should be considered for prohibition in Critical Aquifer Recharge Areas are landfills, wood treatment facilities, chrome platers, tank farms, and facilities that treat, store, or dispose of hazardous waste. Chemical facilities that transfer or use large amounts of chemicals should also be considered to be a risk for ground water contamination.

Some uses that have a moderate to low risk for contamination can be allowed within Critical Aquifer Recharge Areas conditionally on meeting certain requirements for approval. These are typically pollution prevention measures such as secondary containment for chemical storage areas, spill prevention measures, and contingency plans for emergencies.

Here are some questions the local jurisdiction should consider when coordinating their planning and ordinances with federal and state laws, rules, and programs.

- Does the jurisdiction know where potentially polluting activities are located?
- Are effective protective requirements for potentially polluting activities in place?
- Is there provision for compliance monitoring?
- Is there a means to obtain compliance if there is a violation?
- Does the jurisdiction have a plan for ensuring that existing land uses are protective of ground water?

# Section 6
## Adapting to Local Conditions and Settings

The Growth Management Act allows for differences in regional or local conditions.

See WAC 365-195-060 Regional and Local Variations

Washington has varied landscapes and populations, from sparsely populated rural areas to large cities, from dry desert to rain forest.

**Ferry County** has a population of 7300 (in 2003). Republic, the county seat, has a population of 975 people. Ferry County is located in the mountainous Okanogan region where ponderosa pines flourish in the dry climate.

**King County** has both populous and rural areas and has varied landscapes, from the Puget Sound to the high plateau in the shadow of Mount Rainier. The total population of King County was 1,779,300 in 2003.

The settings in which ground water occurs, the resources for programs, and the resources at risk vary in different parts of the state. This means that a program that protects the functions and values of Critical Aquifer Recharge Areas in one part of the state will not necessarily look like a program in another.

The Western Washington GMA Hearings Board (WWGMHB) states:

> The GMA does not require a "one size fits all" approach. A GMHB is to be guided by a common sense appreciation of the size and resources of a local jurisdiction and the magnitude of the problems to be addressed. *MCCDC v. Shelton* 96-2-0014 (FDO 11-14-96)

The fundamental requirement of the Growth Management Act is that the functions and values of the critical area should be protected. For Critical Aquifer Recharge Areas, that means that public drinking water quality and quantity should be addressed in planning and ordinances.

A good groundwater program:

- Identifies threats to ground water.
- Identifies groundwater resources at risk.
- Monitors to make sure a condition that could cause an unacceptable risk is not occurring.
- Educates and informs people so that they can do their best to protect ground water
- Takes action when necessary!

# Section 7
## Adaptive Management – Change Happens

The GMA requires periodic review and update of plans and ordinances for critical areas. In addition, when the scientific information for addressing critical areas is inadequate, it requires that adaptive management be used in order to determine the impacts on the critical areas from development regulations and to reduce those impacts to protect the functions and values of the critical areas. (WAC 365-195-920 <http://www.leg.wa.gov/WAC/index.cfm?section=365-195-920&fuseaction=section>)

Adaptive management involves strategic testing of hypotheses and related monitoring to see how well plans, ordinances, and programs are protecting Critical Aquifer Recharge Areas. Changes are then made as more is known or as early hypotheses are proven incorrect, as conditions change, or to improve or correct a method of protection as needed. Monitoring data results can also lead to changes in how monitoring is done and what is monitored. The comprehensive plan and development regulations should include an iterative process for amendments as new information becomes available.

Examples of new information are hydrogeologic studies that provide more information about the boundaries and characteristics of aquifers; significant land use changes and the associated groundwater contamination risks associated with population increases; and the results of the evaluation of voluntary and regulatory programs. A fundamental component of adaptive management is the commitment to change based upon the outcome of testing hypotheses through strategic monitoring.

# Section 8
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# Appendix A
## U.S. EPA Potential Sources of Drinking Water Contamination Index

| POTENTIAL SOURCE | CONTAMINANT |
|---|---|
| **Commercial / Industrial** | |
| Above-ground storage tanks | Arsenic, Barium, Benzene, Cadmium, 1,4-Dichlorobenzene or P-Dichlorobenzene, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Lead, Trichloroethylene (TCE), Tetrachloroethylene or Perchlorethylene (Perc) |
| Automobile, body shops/repair shops | Arsenic, Barium, Benzene, Cadmium, Chlorobenzene, Copper, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, 1,4-Dichlorobenzene or P-Dichlorobenzene, Lead, Fluoride, 1,1,1-Trichloroethane or Methyl Chloroform, Dichloromethane or Methylene Chloride, Tetrachloroethylene or Perchlorethylene (Perc), Trichloroethylene (TCE), Xylene (Mixed Isomers) |
| Boat repair/refinishing/marinas | Benzene, Cadmium, cis 1,2-Dichloroethylene, Coliform, Cryptosporidium, Dichloromethane or Methylene Chloride, *Giardia Lambia*, Lead, Mercury, Nitrate, Nitrite, trans 1,2-Dichloroethylene, Tetrachloroethylene or Perchlorethylene (Perc), Trichloroethylene (TCE), Vinyl Chloride, Viruses |
| Cement/concrete plants | Barium, Benzene, Dichloromethane or Methylene Chloride, Ethylbenzene, Lead, Styrene, Tetrachloroethylene or Perchlorethylene (Perc), Toluene, Xylene (Mixed Isomers) |
| Chemical/petroleum processing | Acrylamide, Arsenic, Atrazine, Alachlor, Aluminum (Fume or Dust), Barium, Benzene, Cadmium, Carbofuran, Carbon Tetrachloride, Chlorobenzene, Copper, Cyanide, 2,4-D, 1,2-Dibromoethane or Ethylene Dibromide (EDB), 1,2-Dichlorobenzene or O-Dichlorobenzene, 1,4-Dichlorobenzene or P-Dichlorobenzene, 1,1-Dichloroethylene or Vinylidene Chloride, cis 1,2 Dichloroethylene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) adipate, Di(2-ethylhexyl) phthlate, 1,2-Dichloroethane or Ethylene Dichloride, Dioxin, Endrin, Epichlorohydrin, Ethylbenzene, Hexachlorobenzene, Hexachlorocyclopentadiene, Lead, Mercury, Methoxychlor, Polychlorinated Biphenyls, Selenium, Styrene, Sulfate, Tetrachloroethylene or Perchlorethylene (Perc), Toluene, 1,2,4-Trichlorobenzene, 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Vinyl Chloride, Xylene (Mixed Isomers), Zinc (Fume or Dust) |
| Construction/demolition | Arsenic, Asbestos, Benzene, Cadmium, Chloride, Copper,Cyanide, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Fluorides, Lead, Selenium, Tetrachloroethylene or Perchlorethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Turbidity, Xylene (Mixed Isomers), Zinc (Fume or Dust) |
| Dry cleaners/dry cleaning | Tetrachloroethylene or Perchlorethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, 1,1,2-Trichloroethane |
| Dry goods manufacturing | Barium, Benzene, Cadmium, Copper, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) phthlate, Lead, 1,1,1-Trichloroethane or Methyl Chloroform, Polychlorinated Biphenyls, Tetrachloroethylene or Perchlorethylene (Perc), Toluene, Trichloroethylene (TCE), Xylene (Mixed Isomers) |
| Electrical/electronic manufacturing | Aluminum (Fume or Dust), Antimony, Arsenic, Barium, Benzene, Cadmium, Chlorobenzene, Copper, Cyanide, Carbon Tetrachloride, 1,2-Dichlorobenzene or O-Dichlorobenzene, 1,2-Dichloroethane or Ethylene Dichloride, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) phthlate, Ethylbenzene, Lead, Mercury, Polychlorinated Biphenyls, Selenium, Styrene, Sulfate, Tetrachloroethylene or Perchlorethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, 1,1,2-Trichloroethane, Trichloroethylene (TCE), Thallium, Toluene, Vinyl Chloride, Xylene (Mixed Isomers), Zinc (Fume or Dust) |

| POTENTIAL SOURCE | CONTAMINANT |
|---|---|
| **Commercial / Industrial** continued | |
| Fleet/trucking/ bus terminals | Arsenic, Acrylamide, Barium, Benzene, Benzo(a)pyrene, Cadmium, Chlorobenzene, Cyanide, Carbon Tetrachloride, 2,4-D, 1,2-Dichlorobenzene or O-Dichlorobenzene, 1,4-Dichlorobenzene or P-Dichlorobenzene, 1,2-Dichloroethane or Ethylene Dichloride, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) phthlate, Epichlorohydrin, Heptachlor (and Epoxide), Lead, Mercury, Methoxychlor, Pentachlorophenol, Propylene Dichloride or 1,2-Dichloropropane, Selenium, Styrene, Toxaphene, Tetrachloroethylene or Perchlorethylene (Perc), Toluene, 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Vinyl Chloride, Xylene (Mixed Isomers) |
| Food processing | Arsenic, Benzene, Cadmium, Copper, Carbon Tetrachloride, Dichloromethane or Methylene Chloride, Lead, Mercury, Picloram, Tetrachloroethylene or Perchlorethylene (Perc), Toluene, 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Xylene (Mixed Isomers) |
| Funeral services/taxidermy | Glyphosate, Dichloromethane or Methylene Chloride, Nitrate, Nitrite, Total Coliforms, Viruses |
| Furniture repair/manufacturing | Barium, 1,2-Dichloroethane or Ethylene Dichloride, Dichloromethane or Methylene Chloride, Ethylbenzene, Lead, Mercury, Selenium, Trichloroethylene (TCE) |
| Gas stations (see also above ground/underground storage tanks, motor-vehicle drainage wells) | cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Tetrachloroethylene or Perchlorethylene (Perc), Trichloroethylene (TCE) |
| Graveyards/cemeteries | Dalapon, Lindane, Nitrate, Nitrite, Total Coliforms, Viruses. |
| Hardware/lumber/parts stores | Aluminum (Fume or Dust), Barium, Benzene, Cadmium, Chlorobenzene, Copper, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl)adipate, Di(2-ethylhexyl) phthlate, 1,4-Dichlorobenzene or P-Dichlorobenzene, Ethylbenzene, Lead, Mercury, Tetrachloroethylene or Perchlorethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Toluene, Xylene (Mixed Isomers) |
| Historic waste dumps/landfills | Atrazine, Alachlor, Carbofuran, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Diquat, Dalapon, Glyphosate, Dichloromethane or Methylene Chloride, Nitrate, Nitrite, Oxamyl (Vydate), Sulfate, Simazine, Tetrachloroethylene or Perchlorethylene (Perc), Trichloroethylene(TCE) |
| Home manufacturing | Arsenic, Barium, Benzene, Cadmium, Chlorobenzene, Copper, Carbon Tetrachloride, 1,2-Dichlorobenzene or O-Dichlorobenzene, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) phthlate, Ethylbenzene, Lead, Mercury, Selenium, Styrene, Tetrachloroethylene or Perchlorethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Toluene, Turbidity, Xylene (Mixed Isomers) |
| Industrial waste disposal wells (see UIC for more information on concerns, and locations) | Acrylamide, Arsenic, Atrazine, Alachlor, Aluminum (Fume or Dust), Ammonia, Barium, Benzene, Cadmium, Carbofuran, Carbon Tetrachloride, Chlorobenzene, Copper, Cyanide, 2,4-D, 1,2-Dibromoethane or Ethylene Dibromide (EDB), 1,2-Dichlorobenzene or O-Dichlorobenzene, 1,4-Dichlorobenzene or p-Dichlorobenzene, 1,1-Dichloroethylene or Vinylidene Chloride, cis 1,2 Dichloroethylene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) adipate, Di(2-ethylhexyl) phthlate, 1,2-Dichloroethane or Ethylene Dichloride, Dioxin, Endrin, Epichlorohydrin, Hexachlorobenzene, Hexachlorocyclopentadiene, Lead, Mercury, Methoxychlor, Oxamyl (Vydate), Polychlorinated Biphenyls, Selenium, Styrene, Sulfate, Tetrachloroethylene or Perchlorethylene (Perc), Toluene, 1,2,4-Trichlorobenzene, 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Vinyl Chloride, Xylene (Mixed Isomers), Zinc (Fume or Dust) |
| Junk/scrap/salvage yards | Barium, Benzene, Copper, Dalapon, cis 1,2-Dichloroethylene, Diquat, Glyphosate, Lead, Polychlorinated Biphenyls, Sulfate, Simazine, Trichloroethylene (TCE), Tetrachloroethylene or Perchlorethylene (Perc) |

| POTENTIAL SOURCE | CONTAMINANT |
|---|---|
| **Commercial / Industrial** continued | |
| Machine shops | Arsenic, Aluminum (Fume or Dust), Barium, Benzene, Boric Acid, Cadmium, Chlorobenzene, Copper, Cyanide, Carbon Tetrachloride 2,4-D, 1,4-Dichlorobenzene or P-Dichlorobenzene, 1,2-Dichloroethane or Ethylene Dichloride, 1,1-Dichloroethylene or Vinylidene Chloride, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) phthlate, Ethylbenzene, Fluoride, Hexachlorobenzene, Lead, Mercury, Polychlorinated Biphenyls, Pentachlorophenol, Selenium, Styrene, Tetrachloroethylene or Perchlorethylene (Perc), Toluene, 1,1,1-Trichloroethane or Methyl Chloroform, 1,1,2-Trichloroethane, Trichloroethylene (TCE), Xylene (Mixed Isomers), Zinc (Fume or Dust) |
| Medical/vet offices | Arsenic, Acrylamide, Barium, Benzene, Cadmium, Copper, Cyanide, Carbon Tetrachloride, Dichloromethane or Methylene Chloride, 1,2-Dichloroethane or Ethylene Dichloride, Lead, Mercury, Methoxychlor, 1,1,1-Trichloroethane or Methyl Chloroform, Radionuclides, Selenium, Silver, Tetrachloroethylene or Perchlorethylene (Perc), 2,4,5-TP (Silvex), Thallium, Xylene (Mixed Isomers) |
| Metal plating/finishing/fabricating | Antimony, Aluminum (Fume or Dust), Arsenic, Barium, Benzene, Cadmium, Carbon Tetrachloride, Chlorobenzene, Chromium, Copper, Cyanide, 1,4-Dichlorobenzene or P-Dichlorobenzene, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) adipate, Ethylbenzene,Lead, Mercury, Polychlorinated Biphenyls, Pentachlorophenol, Selenium, Styrene, Sulfate, Tetrachloroethylene or Perchlorethylene (Perc), , Thallium, Toluene, 1,1,1-Trichloroethane or Methyl Chloroform, 1,1,2-Trichloroethane, Trichloroethylene(TCE), Vinyl Chloride, Xylene (Mixed Isomers), Zinc (Fume or Dust) |
| Military Installations | Arsenic, Barium, Benzene, Cadmium, Chlorobenzene, 1,2-Dichlorobenzene or O-Dichlorobenzene, 1,2-Dichloroethane or Ethylene Dichloride, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Hexachlorobenzene, Lead, Mercury, Methoxychlor, 1,1,1-Trichloroethane or Methyl Chloroform, Radionuclides, Selenium, Tetrachloroethylene or Perchlorethylene (Perc), , Toluene, Trichloroethylene (TCE) |
| Mines/gravel pits | Lead, Selenium, Sulfate, Tetrachloroethylene or Perchlorethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, Turbidity |
| Motor pools | cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, |
| Motor vehicle waste disposal wells (gas stations, repair shops) See UIC for more on concerns for these sources http://www.epa.gov/safewater/uic/cv-fs.html | Arsenic, Barium, Benzene, Cadmium, Chlorobenzene, Copper, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, 1,4-Dichlorobenzene or P-Dichlorobenzene, Lead, Fluoride, 1,1,1-Trichloroethane or Methyl Chloroform, Dichloromethane or Methylene Chloride, Tetrachloroethylene or Perchlorethylene (Perc), Trichloroethylene (TCE), Xylene (Mixed Isomers) |
| Office building/complex | Barium, Benzene, Cadmium, Copper, 2,4-D, Diazinon, 1,2-Dichlorobenzene or O-Dichlorobenzene, Dichloromethane or Methylene Chloride, Diquat, 1,2-Dichloroethane or Ethylene Dichloride, Ethylbenzene, Glyphosate, Lead, Mercury, Selenium, Simazine, Tetrachloroethylene or Perchlorethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Vinyl Chloride, Xylene (Mixed Isomers**)** |
| Photo processing/printing | Acrylamide, Aluminum (Fume or Dust), Arsenic, Barium, Benzene, Cadmium, Carbon Tetrachloride, Chlorobenzene, Copper, Cyanide, 1,1-Dichloroethylene or Vinylidene Chloride, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) phthlate, 1,2-Dichlorobenzene or O-Dichlorobenzene, 1,4-Dichlorobenzene or P-Dichlorobenzene, 1,2-Dichloroethane or Ethylene Dichloride, 1,2-Dibromoethane or Ethylene Dibromide (EDB), Heptachlor epoxide, Hexachlorobenzene, Lead, Lindane, Mercury, Methoxychlor, Propylene Dichloride or 1,2-Dichloropropane, Selenium, Styrene, Tetrachloroethylene or Perchlorethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, Toluene, 1,1,2-Trichloroethane, Trichloroethylene(TCE), Vinyl Chloride, Xylene (Mixed Isomers), Zinc (Fume or Dust) |

| POTENTIAL SOURCE | CONTAMINANT |
|---|---|
| **Commercial / Industrial** continued | |
| Synthetic / plastics production | Antimony, Arsenic, Barium, Benzene, Cadmium, Carbon Tetrachloride, Chlorobenzene, Copper, Cyanide, 1,2-Dichlorobenzene or O-Dichlorobenzene, 1,4-Dichlorobenzene or P-Dichlorobenzene, 1,2-Dichloroethane or Ethylene Dichloride, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) adipate, Di(2-ethylhexyl) phthlate, Ethylbenzene, Hexachlorobenzene, Lead, Mercury, Methyl Chloroform or 1,1,1-Trichloroethane, Pentachlorophenol, Selenium, Styrene, Tetrachloroethylene or Perchlorethylene (Perk), Toluene,, Trichloroethylene (TCE), Vinyl Chloride, Xylene (Mixed Isomers), Zinc (Fume or Dust) |
| RV/mini storage | Arsenic, Barium, Cyanide, 2,4-D, Endrin, Lead, Methoxychlor |
| Railroad yards/maintenance/fueling areas | Atrazine, Barium, Benzene, Cadmium, Dalapon, 1,4-Dichlorobenzene or P-Dichlorobenzene, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Lead, Mercury, Tetrachloroethylene or Perchlorethylene (Perc**),** Trichloroethylene (TCE). |
| Research laboratories | Arsenic, Barium, Benzene, Beryllium Powder, Cadmium, Carbon Tetrachloride, Chlorobenzene, Cyanide, 1,2-Dichloroethane or Ethylene Dichloride, 1,1-Dichloroethylene or Vinylidene Chloride, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Endrin, Lead, Mercury, Polychlorinated Biphenyls, Selenium, Tetrachloroethylene or Perchlorethylene (Perc), Thallium, Thiosulfates, Toluene, 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Vinyl Chloride, Xylene (Mixed Isomers) |
| Retail operations | Arsenic, Barium, Benzene, Cadmium, 2,4-D, 1,2-Dichloroethane or Ethylene Dichloride, Lead, Mercury, Styrene, Tetrachloroethylene or Perchlorethylene (Perc), Toluene, 1,1,1-Trichloroethane, Vinyl Chloride |
| Underground storage tanks | Arsenic, Barium, Benzene, Cadmium, 1,4-Dichlorobenzene or P-Dichlorobenzene, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Lead, Tetrachloroethylene or Perchlorethylene (Perc), Trichloroethylene (TCE). |
| Wood preserving/treating | cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Lead, Sulfate |
| Wood/pulp/paper processing | Arsenic, Barium, Benzene, Cadmium, Carbon Tetrachloride, Copper, Dichloromethane or Methylene Chloride, Dioxin, 1,2-Dichloroethane or Ethylene Dichloride, Ethylbenzene, Lead, Mercury, Polychlorinated Biphenyls, Selenium, Styrene, Tetrachloroethylene or Perchlorethylene (Perc), Trichloroethylene (TCE), Toluene, 1,1,1-Trichloroethane or Methyl Chloroform, Xylene (Mixed Isomers) |
| **Residential / Municipal** | |
| Airports (maintenance/fueling areas) | Arsenic, Barium, Benzene, Cadmium, Carbon Tetrachloride, cis 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Ethylbenzene, Lead, Mercury, Selenium, Tetrachloroethylene or Perchlorethylene (Perc), 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Xylene (Mixed Isomers) |
| Apartments and condominiums | Atrazine, Alachlor, Coliform, Cryptosporidium, Dalapon, Diquat, *Giardia Lambia*, Glyphosate, Nitrate, Nitrite, Picloram, Sulfate, Simazine, Vinyl Chloride, Viruses |
| Camp grounds/RV parks | Benomyl, Coliform, Cryptosporidium, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Isopropanol, Nitrate, Nitrite, Picloram, Sulfate, Simazine, Turbidity, Vinyl Chloride, Viruses |
| Cesspools - large capacity (see UIC for more information) | Atrazine, Alachlor, Carbofuran, Coliform, Cryptosporidium, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Sulfate, Simazine, Vinyl Chloride, Viruses |
| Drinking water treatment facilities | Atrazine, Benzene, Cadmium, Cyanide, Fluoride, Lead, Polychlorinated Biphenyls, Toluene, Total Trihalomethanes, 1,1,1-Trichloroethane or Methyl Chloroform |
| Gas pipelines | cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Tetrachloroethylene or Perchlorethylene (Perc), Trichloroethylene or TCE |
| Golf courses and urban parks | Arsenic, Atrazine, Benzene, Chlorobenzene, Carbofuran, 2,4-D, Diquat, Dalapon, Glyphosate, Lead, Methoxychlor, Nitrate, Nitrite, Picloram, Simazine, Turbidity |

| POTENTIAL SOURCE | CONTAMINANT |
|---|---|
| **Residential / Municipal** continued | |
| Housing developments | Atrazine, Alachlor, Coliform, Cryptosporidium, Carbofuran, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Dichloromethane or Methylene Chloride, Nitrate, Nitrite, Picloram, Simazine, Trichloroethylene (TCE), Turbidity, Vinyl Chloride, Viruses |
| Landfills/dumps | Arsenic, Atrazine, Alachlor, Barium, Benzene, Cadmium, Carbofuran, cis 1,2 Dichloroethylene, Diquat, Glyphosate, Lead, Lindane, Mercury, 1,1,1-Trichloroethane or Methyl Chloroform, Dichloromethane or Methylene Chloride, Nitrate, Nitrite, Picloram, Selenium, Simazine, Trichloroethylene (TCE) |
| | |
| Public buildings (e.g., schools, town halls, fire stations, police stations) and Civic Organizations | Arsenic, Acrylamide, Barium, Benzene, Beryllium Powder, Cadmium, Carbon Tetrachloride, Chlorobenzene, Cyanide, 2,4-D, 1,2-Dichlorobenzene or O-Dichlorobenzene, 1,4-Dichlorobenzene or P-Dichlorobenzene, Dichloromethane or Methylene Chloride, Di(2-ethylhexyl) phthlate, 1,2-Dichloroethane or Ethylene Dichloride, Endothall, Endrin, 1,2-Dibromoethane or Ethylene Dibromide (EDB), Lead, Lindane, Mercury, Methoxychlor, Selenium, Toluene, 1,1,1-Trichloroethane or Methyl Chloroform, Trichloroethylene (TCE), Vinyl Chloride, Xylene (Mixed Isomers) |
| Septic systems | Atrazine, Alachlor, Carbofuran, Coliform, Cryptosporidium, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Sulfate, Simazine, Vinyl Chloride, Viruses |
| Sewer lines | Coliform, Cryptosporidium, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Sulfate, Simazine, Vinyl Chloride, Viruses |
| Stormwater infiltration basins/injection into wells (UIC Class V), runoff zones | Atrazine, Alachlor, Coliform, Cryptosporidium, Carbofuran, Chlorine, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Dichloromethane or Methylene Chloride, Nitrate, Nitrite, Nitrosamine, Oxamyl (Vydate), Phosphates, Picloram, Simazine, Trichloroethylene(TCE), Turbidity, Vinyl Chloride, Viruses |
| Transportation corridors (*e.g.*, roads, railroads) | Dalapon, Picloram, Simazine, Sodium, Sodium Chloride, Turbidity |
| Utility stations | Arsenic, Barium, Benzene, Cadmium, Chlorobenzene, Cyanide, 2,4-D, 1,4-Dichlorobenzene or P-Dichlorobenzene, 1,2-Dichloroethane or Ethylene Dichloride, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Lead, Mercury, Picloram, Toluene, 1,1,2,2- Tetrachloroethane, Tetrachloroethylene or Perchlorethylene (Perc), Trichloroethylene (TCE), Xylene (Mixed Isomers) |
| Waste transfer /recycling | Coliform, Cryptosporidium, *Giardia Lambia*, Nitrate, Nitrite, Vinyl Chloride, Viruses |
| Wastewater treatment facilities/discharge locations (incl. land disposal and underground injection of sludge) | Cadmium, Coliform, Cryptosporidium, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Dichloromethane or Methylene Chloride, Fluoride, *Giardia Lambia*, Lead, Mercury, Nitrate, Nitrite, Tetrachloroethylene or Perchlorethylene (Perc) Selenium, sulfate, Trichloroethylene (TCE), Vinyl Chloride, Viruses |
| **Agricultural / Rural** | |
| Auction lots/boarding stables | Coliform, Cryptosporidium, *Giardia Lambia*, Nitrate, Nitrite, Sulfate, Viruses |
| Animal feeding operations/ confined animal feeding operations | Coliform, Cryptosporidium, *Giardia Lambia*, Nitrate, Nitrite, Sulfate, Turbidity, Viruses |
| Bird rookeries/wildlife feeding /migration zones | Coliform, Cryptosporidium, *Giardia Lambia*, Nitrate , Nitrite , Sulfate, Turbidity, Viruses |
| Crops - irrigated + non-irrigated EXIT disclaimer | Benzene, 2,4-D, Dalapon, Dinoseb, Diquat, Glyphosate, Lindane, Lead, Nitrate, Nitrite , Picloram, Simazine, Turbidity |
| Dairy operations | Coliform, Cryptosporidium, *Giardia Lambia*, Nitrate , Nitrite, Sulfate, Turbidity, Viruses |
| Drainage wells, lagoons and Liquid waste disposal -agricultural EXIT disclaimer | Atrazine, Alachlor, Coliform, Cryptosporidium, Carbofuran, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Sulfate, Simazine, Vinyl Chloride, Viruses |
| Managed forests/grass lands | Atrazine, Diquat, Glyphosate, Picloram, Simazine, Turbidity |
| Pesticide/fertilizer storage facilities | Atrazine, Alachlor, Carbofuran, Chlordane, 2,4-D, Diquat, Dalapon, 1,2-Dibromo-3-Chloropropane or DBCP, Glyphosate, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Simazine, 2,4,5-TP (Silvex) |

| POTENTIAL SOURCE | CONTAMINANT |
|---|---|
| **Agricultural / Rural** continued | |
| Rangeland/grazing lands EXIT disclaimer | Coliform, Cryptosporidium, *Giardia Lambia*, Nitrate, Nitrite, Sulfate, Turbidity, Viruses |
| Residential wastewater lagoons | Atrazine, Alachlor, Carbofuran, Coliform, Cryptosporidium, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Sulfate, Simazine, Vinyl Chloride, Viruses |
| Rural homesteads | Atrazine, Alachlor, Carbofuran, Coliform, Cryptosporidium, cis 1,2-Dichloroethylene, trans 1,2-Dichloroethylene, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Sulfate, Simazine, Vinyl Chloride, Viruses |
| **MISCELLANEOUS SOURCES** | |
| Abandoned drinking water wells (conduits for contamination) | Atrazine, Alachlor, Coliform, Cryptosporidium, Carbofuran, Diquat, Dalapon, *Giardia Lambia*, Glyphosate, Dichloromethane or Methylene Chloride, Nitrate, Nitrite, Oxamyl (Vydate), Picloram, Simazine, Trichloroethylene (TCE), Turbidity, Vinyl Chloride, Viruses |
| Naturally occurring | Arsenic, Asbestos, Barium, Cadmium, Chromium, Coliform, Copper, Cryptosporidium, Fluoride, *Giardia Lambia,* Iron, Lead, Manganese, Mercury, Nitrate, Nitrite, Radionuclides, Selenium, Silver, Sulfate, Viruses, Zinc (Fume or Dust) |
| Underground injection control (UIC) wells CLASS I - deep injection of hazardous and non-hazardous wastes into aquifers separated from underground sources of drinking water | see UIC at http://www.epa.gov/safewater/uic/index.html |
| UIC wells CLASS II deep injection wells of fluids associated with oil/gas production (for more detailed list of sites click here) | see UIC at http://www.epa.gov/safewater/uic/index.html |
| UIC wells CLASS III re-injection of water/steam into mineral formations for mineral extraction | see UIC at http://www.epa.gov/safewater/uic/index.html |
| UIC wells CLASS IV - officially banned. Inject hazardous or radioactive waste into or above underground sources of drinking water | see UIC at http://www.epa.gov/safewater/uic/index.html |
| UIC wells Class V (SHALLOW INJECTION WELLS). Click here for more information on sources of UIC Class V wells | http://www.epa.gov/safewater/uic/cv-fs.html |

# Appendix B
## Where to Get More Information

### GMA Hearings Boards

GMA Hearings Boards were created by the legislature to hear cases related to the Growth Management Act. The three GMA Hearings boards are for Eastern Washington, Western Washington, and Central Puget Sound. Critical Areas planning and ordinance decisions are subject to review by the board. The board hears cases when a "Petition for Review" is filed.

The GMA Hearings Board website, http://www.gmhb.wa.gov/, contains a wealth of information about the boards and how they work. Each of the boards has a decision digest where decisions that effect critical aquifer recharge areas (CARAs) and other growth management issues can be viewed on-line.

You may also contact the Hearings Board as follows:

| **Central Puget Sound** | **Western Washington** | **Eastern Washington** |
|---|---|---|
| King, Snohomish, Pierce and Kitsap counties<br><br>900 4th Avenue Suite 2470<br>Seattle, WA. 98164<br><br>Tel: (206) 389-2625<br>Fax: (206) 389-2588<br>E-mail to:<br>central@cps.gmhb.wa.gov | Western Washington counties not in the central Puget Sound<br><br>905 24th Way SW, Suite B-2<br>Olympia, WA 98502<br><br>P.O. Box 40953 (MS: 40953)<br>Olympia, WA. 98504-0953<br><br>Tel: (360) 664-8966<br>Fax: (360) 664-8975<br>E-mail to:<br>western@ww.gmhb.wa.gov | Counties and cities east of the crest of the Cascade Mountains<br><br>15 West Yakima, Suite 102<br>Yakima, WA 98902<br><br>Tel: (509) 574-6960<br>Fax: (509) 574-6964<br>E-mail to:<br>AAndreas476@EW.GMHB.WA.GOV |

Ten counties and their included cities in Washington are not required to plan fully under the GMA. These jurisdictions must still plan for Critical Areas and Natural Resources Lands. These ten counties are Adams, Asotin, Cowlitz, Grays Harbor, Klickitat, Lincoln, Okanogan, Skamania, Whitman, and Wahkiakum.

### GMA Laws and Regulations

The Office of the Code Reviser website is at http://slc.leg.wa.gov/.

The Revised Code of Washington and the Washington Administrative Code are also available at public libraries.

## Planning Resources

**Washington State Department of Community, Trade, and Economic Development** is responsible for administering the Growth Management Act and has many helpful documents on-line: http://www.cted.wa.gov/portal/alias__CTED/lang__en/tabID__375/DesktopDefault.aspx

**The Municipal Research & Services Center of Washington** has vast amounts of helpful on-line information for counties and cities, including Growth Management Act information: http://www.mrsc.org/

**Recognition and technical assistance programs**

Envirostars: http://www.envirostars.org/

**Best available science for critical aquifer recharge areas**

King County Dept. of Natural Resources, 2004. Chapter 6: Critical Aquifer Recharge Areas *in* Best Available Science, Volume I – A Review of Science Literature, King County Executive Report, Critical Areas, Stormwater, and Clearing and Grading Proposed Ordinances, February 2004, http://www.metrokc.gov/DDES/cao/

## Local Pollution Prevention Information

King County Hazardous Waste: http://www.govlink.org/hazwaste/

Thurston County Hazardous Waste: http://www.co.thurston.wa.us/health/ehrp/hwaste.html

Spokane Joint Aquifer Board: http://www.spokaneaquifer.org/Factsheet3_aquifer.pdf

## Geologist/Hydrogeologist Licensing Laws and Regulations

Department of Licensing Geology License Website: http://www.wa.gov/dol/bpd/geofront.htm

Washington State Code Reviser Website, with links to RCWs and WACs: http://slc.leg.wa.gov/

Both of the above websites have links to the Geologist Licensing laws and regulations: RCW 18.220 and WAC 308-15.

## State Ground Water Protection Programs

### Washington State Department of Health Drinking Water Program

The Department of Health is responsible for administering the Safe Drinking Water Act program for the state. This includes regulating public water supplies and administering the Source Water Protection program.

The federal Safe Drinking Water Act includes provisions for preventing contamination of drinking water for Group A public water supply systems (15 or more connections).

Drinking Water Program website: http://www.doh.wa.gov/ehp/dw/default.htm

Source Water Protection website:
http://www.doh.wa.gov/ehp/dw/Our_Main_Pages/swap.htm.

Here is a quote from this website:

> *The SWAP program will result in an evaluation of the source water that provides drinking water to Group A public water systems in Washington state. This evaluation will estimate the degree to which a given public water source is at risk from contamination. Once completed, the assessment results will be used to assist local communities in targeting and implementing protection measures such as Best Management Practices (BMPs), zoning overlays, critical area ordinances and public education. The information can also be used to help focus technical assistance outreach efforts and compliance inspections.*

Chapter 173-200 WAC, Ground Water Quality Standards,
http://www.ecy.wa.gov/biblio/wac173200.html

Implementation Guidance for the Ground Water Quality Standards,
http://www.ecy.wa.gov/biblio/96002.html

Washington State Department of Ecology, 1992. *Assessing The Impacts Of Community Onsite Sewage Systems On Ground Water Quality, Part 2 Chapter Permit Writer's Manual*, Washington State Department of Ecology, Publication Number 92-109, revised 2001, http://www.ecy.wa.gov/biblio/92109.html, pages VIII-2 through VIII-8.

Chapter 173-303 WAC, Dangerous Waste Regulations,
http://www.ecy.wa.gov/biblio/wac173303.html

Washington State Department of Ecology Sand and Gravel General Permit:
http://www.ecy.wa.gov/programs/wq/sand/index.html

## Washington State Underground Injection Control Program

- Website: http://www.ecy.wa.gov/programs/wq/grndwtr/uic/index.html
- Rule: http://www.ecy.wa.gov/biblio/wac173218.html

## Federal Ground Water Programs

### U.S. Environmental Protection Agency - Drinking Water Program

EPA Safe Drinking Water Act Maximum Contaminant Levels (MCLs), http://www.epa.gov/safewater/mcl.html

## Delineation and Vulnerability Methods

Focazio, M.J., T.E. Reilly, M.G. Ruper, D.R. Helsel, 2003. *Assessing Ground-Water Vulnerability to Contamination: Providing Scientifically Defensible Information for Decision Makers*, U.S. Geological Survey Circular 1224, 33 pp., http://water.usgs.gov/pubs/circ/2002/circ1224/

Erwin, M.L., and Tesoriero, A.J., Predicting ground-water vulnerability to nitrate in the Puget Sound Basin: U.S. Geological Survey Fact Sheet FS-061-97, on-line at URL http://wa.water.usgs.gov/fs.061-97/index.html, accessed Nov. 10, 1997, HTML format.

Garrigues, R.S., K. Sinclair, J. Tooley, 1998. Chehalis River Watershed Surficial Aquifer Characterization, Washington State Department of Ecology Environmental Assessment Program Watershed Ecology Section, Publication Number 98-335, 22 pp. http://www.ecy.wa.gov/biblio/98335.html

US EPA, 2000. Technical Assistance Document (TAD) for Delineating "Other Sensitive Ground Water Areas", EPA Office of Water Publication Number 816-R-00-016, 22 p. http://www.epa.gov/safewater/uic/tad_sensitive_gw.pdf

US EPA, 1993. A Review of Methods for Assessing Aquifer Sensitivity and Ground Water Vulnerability to Pesticide Contamination, US EPA Office of Water, Publication No. 813-R-93-002, September 1993, 147 pp. + appendices.

FUGRO Airborne Surveys Groundwater Recharge Mapping http://www.fugroairborne.com.au/CaseStudies/recharge.shtml

> *This is a private company who uses airborne geophysics for ground water and geology mapping. The method is used for TDS mapping, saltwater intrusion, water depth, and recharge area mapping. This is included here as an example of an airborne geophysical method for mapping recharge areas, and does not imply an endorsement.*

## Eastern Washington Studies

Whiteman, K.J., J.J. Vaccaro, J.B. Gonthier, H.H. Bauer, 1994. *The Hydrogeologic Framework and Geochemistry of the Columbia Plateau Aquifer System, Washington, Oregon, and Idaho*: U.S. Geological Survey Professional Paper 1413-B, 73 p.

Drost, B.W., S.E. Cox, and K.M. Schurr, 1997. *Changes in Ground-Water Levels and Ground-Water Budgets, from Predevelopment to 1986, in Parts of the Pasco Basin, Washington*: U.S. Geological Survey Water-Resources Investigations Report 96-4086, 172 p.

On-line USGS publication index, Columbia Basin NAWQA:
http://wa.water.usgs.gov/ccpt/pubs/

On-line USGS publication index, Yakima Basin NAWQA:
http://oregon.usgs.gov/projs_dir/yakima/pubs.html

## Western Washington Studies

Vaccaro, J.J., A.J. Hansen, Jr., and M.A. Jones, 1998. *Hydrogeologic Framework of the Puget Sound Aquifer System, Washington and British Columbia, Regional Aquifer System Analysis*, U.S. Geological Survey Professional Paper 1424-D, 77 pp.

Garrigues, R.S., K. Sinclair, J. Tooley, 1998. *Chehalis River Watershed Surficial Aquifer Characterization*, Washington State Department of Ecology Environmental Assessment Program Watershed Ecology Section, Publication Number 98-335, 22 pp.

Cox, S.E. and Kahle, S.C., 1999. *Hydrogeology, Ground-Water Quality, and Sources of Nitrate in Lowland Glacial Aquifers of Whatcom County, Washington, and British Columbia, Canada*: U.S. Geological Survey Water-Resources Investigations Report 98-4195, 251p.

On-line USGS publication index, Puget Sound NAWQA:
http://wa.water.usgs.gov/ps.publication.index.html

## Ground Water Quality Studies

Erickson, D. and D. Norton, 1990. *Washington State Agricultural Chemicals Pilot Study, Final Report*, Washington State Department of Ecology, 76 pp. + appendices.

## Saltwater Intrusion

Washington State Dept. of Ecology Water Resources Program, 2002. Brochure: Seawater Intrusion in Washington, http://www.ecy.wa.gov/pubs/0211018.pdf

## Impervious Surfaces

Booth, D.B., September 2000. *Forest Cover, Impervious-Surface Area, and the Mitigation of Urbanization Impacts in King County, Washington.* Center for Urban Water Resources, University of Washington, http://depts.washington.edu/cuwrm/

## Database Sources

Washington State Department of Ecology on-line:

- Facility/Site: http://www.ecy.wa.gov/services/as/iss/fsweb/fshome.html

  Facilities and sites that are regulated by the Department of Ecology.
- Toxic cleanup sites: http://www.ecy.wa.gov/programs/tcp/cscs/CSCSpage.HTM
- Leaking underground storage tank sites: http://www.ecy.wa.gov/programs/tcp/ust-lust/tanks.html
- EIM: http://www.ecy.wa.gov/services/as/iip/eim/index.html

  Environmental Information Management System; sampling, measurements, and monitoring results. The link to query EIM on-line and download data is on this page.
- Environmental Assessment Program groundwater studies: http://www.ecy.wa.gov/programs/eap/groundwater/underwaystudies.html.
- GIS home page: http://www.ecy.wa.gov/services/gis/index.html

Washington State Department of Health on-line:

The Department of Health is launching a new website for water system data. The website is not yet available as of publication of this document. For currently available information on-line, and to check for new developments, see the Drinking Water Program website at http://www.doh.wa.gov/ehp/dw/default.htm.

U.S. Geological Survey on-line:

- Washington State bibliography: http://wa.water.usgs.gov/biblio.html

  This bibliography contains references to published reports, maps, journal articles, and proceedings related to the water resources of Washington State as published by the U.S. Geological Survey, or in cooperation with other Federal or State agencies.
- Washington State water at: http://waterdata.usgs.gov/wa/nwis/nwis

  NWIS, or National Water Information System, is the USGS on-line database for water resources data. This site contains data collected in the state of Washington, including groundwater and surface water data and the associated water-quality data, meteorological data, and site information.

U.S. Department of Agriculture Natural Resource Conservation Service on-line:

- NRCS soils website: http://soils.usda.gov/
- NRCS Washington website: http://www.wa.nrcs.usda.gov/
- Washington State on-line soil surveys (SSURGO): http://www.or.nrcs.usda.gov/pnw_soil/wa_reports.html
- NRCS snow survey and water resources information: http://www.wa.nrcs.usda.gov/snow/index.html

The NRCS Snow Survey Program provides mountain snowpack data and stream flow forecasts for the western United States.

Common applications of snow survey products include water supply management, flood control, climate modeling, recreation, and conservation planning.

LaSpina, J., Palmquist, R. 1992. Catalog of Contaminant Databases; *A Listing of Databases of Actual or Potential Contaminant Sources*. Washington State Department of Ecology. 92-52.

# Appendix C
## Selected GMA Hearings Board Decisions

**Examples of GMA Hearings Board Decisions from the Digests**

Each GMA Hearings Board publishes a digest of decisions that makes it easier to find decisions related to various topics. Here are some examples of decisions from the digests from the Central Puget Sound, Western Washington, and Eastern Washington Growth Management Hearings Boards:

***Mapping and performance standards:***

Central Puget Sound:

> "The use of performance standards is recommended in the Minimum Guidelines for … circumstances where critical areas (*e.g.*, aquifer recharge areas, wetlands, significant wildlife habitat, etc.) cannot be specifically identified." WAC 365-190-040(1). However, where critical areas are known, cities and counties cannot rely solely upon performance standards to designate these areas. [*Pilchuck II, 5347c,* FDO, at 41-42.]

***Local government discretion and the GMA framework:***

Western Washington:

> The GMA provides that ultimate planning decisions rest with the local government. Such decisions are not unfettered but must be within the range of discretion allowed by the GMA. A GMHB does not substitute its judgment as to the best alternative available, but reviews the local government action to determine if it complies with the goals and requirements of the GMA. CCNRC v. Clark County 92-2-0001 (FDO 11-10-92)

Eastern Washington:

> The Act requires protection of critical areas, and the county is given the opportunity to select the manner of that protection. Their choice is given great deference. Easy, et al. v. Spokane County, EWGMHB 96-1-0016, Order on Compliance (Sep. 23, 1997).

***What protecting Critical Areas (CA) means:***

Central Puget Sound:

> The Act's directive that local governments are to "protect" critical areas means that they are to preserve the structure, value and functions of wetlands, aquifer recharge areas used for potable water, fish, and wildlife habitat conservation

areas, frequently flooded areas and geologically hazardous areas. [derived from WAC 365-195-825(2)(b)] [*Pilchuck II, 5347c,* FDO, at 20.]

Western Washington:

The GMA requirement to protect CAs directs a local government to adopt appropriate and specific criteria and/or standards. Willapa v. Pacific County 99-2-0019 (FDO 10-28-99)

***Compliance monitoring and enforcement:***

Western Washington:

If BMPs are relied upon for protection of CAs some form of monitoring and enforcement must be included to ensure that the plans are actually implemented and followed. ARD v. Shelton 98-2-0005 (FDO 8-10-98)

Eastern Washington:

Further, laws can be so vague that they simply are unenforceable. That is the case here. Such an ordinance cannot satisfy GMA's duty to adopt enforceable "development regulations" to "protect" critical areas. A person should be able to determine what the law is by reading the published code. Ordinance no. 109-2003 (ICAO) relies on language too vague to create an enforceable standard and therefore cannot not operate to "control" land use activities and does not satisfy the county's GMA obligation to adopt "development regulations" to protect critical areas. The enforcement measures adopted by the county provide only for ad hoc enforcement. This does not constitute a reasoned adaptive management program, particularly where, as here, there is no provision for the monitoring of compliance. Larson Beach Neighbors and Jeanie Wagenman v. Stevens County, EWGMHB 00-1-0016, EWGMHB, Order on Compliance, November 13, 2003.

***Critical Aquifer Recharge Areas:***

Eastern Washington:

The GMA directs counties to designate, classify and protect areas with a "critical recharging effect on aquifers used for potable water." It is necessary to determine the location of recharge areas as a first step in designating and protecting them. The county must provide criteria necessary to indicate when an area needs specific scientific analysis to determine whether it is a critical aquifer recharge area. Save Our Butte Save Our Basin Society, et al. v. Chelan County, EWGMHB 94-1-0015, Compliance Hearing Order (Apr. 8, 1999).

***Critical Areas and pre-existing land uses:***

Western Washington:

A local government must regulate preexisting uses in order to fulfill its duty to protect critical areas. GMA requires any exemption for preexisting use to be limited and carefully crafted. PPF v. Clallam County 00-2-0008 (FDO 12-19-00).

***Critical Areas and best available science:***

Central Puget Sound:

When any local government in the Central Puget Sound region adopts amendments to policies and regulations that purport to protect critical areas pursuant to RCW 36.70A.060(2), those enactments will be subject to meeting the best available science requirements of RCW 36.70A.172 and the potential of appeal to this Board pursuant to RCW 36.70A.280. [Tulalip II, 9313, 1/28/00 Order, at 4.]

# Appendix D
## Example Costs and Consequences of Ground Water Contamination

***Former Pacific wood treating site (at the Port of Ridgefield)***

A former Port tenant using wood treating chemicals contaminated ground water beneath the Port of Ridgefield and the National Wildlife Refuge. Sediments of Lake River have also been contaminated. The cost of this clean up has been estimated at $40 to $50 million dollars.

Source: Department of Ecology Budget and Program Overview 2003-05
http://www.ecy.wa.gov/pubs/0301023.pdf

***City of Tumwater, Palermo Well Field***

In 1993, the city of Tumwater, Palermo well field was contaminated with trichloroethylene (TCE) and was threatened by perchloroethylene (PCE). Three of the city's six wells were removed from service and replaced with two new wells at another location. The total cost for dealing with solvent contamination was $3.9 million dollars, the cleanup took more than six years, and three of six city wells were closed for five years.

Sources:

http://www.crcwater.org/issues5/0#0, from an article by Joel Coffidis in the Daily Olympian, July 1, 1998: WATER SAFETY: EPA tests pinpoint the origin of the toxic chemicals that have closed three wells.

http://www.epa.gov/superfund/sites/npl/nar1484.htm, NPL Site Narrative at Listing, U.S. EPA web site, latest update information 1997. Source: Superfund NPL Assessment Program (SNAP) Database.

***Alexander Farms***

In 1998, yellow water was found coming out of two domestic wells in the vicinity of the Alexander Farms site. The source was from a spill of dinoseb, a pesticide. More than 12,000 tons of Dinoseb-contaminated soils were excavated. The costs to owners for cleanup were said to top $1 million (Tri-city Herald, 4/26/2002).

## *Boomsnub electroplating facility*

The Boomsnub Corporation is an electroplating facility located in Vancouver, Washington. Repeatedly and illegally, it has disposed of spent hexavalent chrome into the environment. As a result, the entire water supply for the city of Vancouver and the Clark County area was threatened.

The groundwater remediation project cost more than $3 million to the Washington State taxpayers. At least six thousand tons of highly contaminated soils have been removed. In 1995, it was estimated that $10 million would be spent in an attempt to save the city of Vancouver water supply.

Sources:
Excerpt from US EPA Office of Enforcement FY 1995 Enforcement and Compliance Assurance Accomplishments Report – United States v. Boomsnub Corporation (W.D. WA) http://www.epa.gov/compliance/resources/reports/accomplishments/oeca/fy95accomplishment.pdf

## *Walkerton, Ontario, Canada*

The town of Walkerton, Ontario, Canada, endured a horrible contamination event that killed seven people and sickened hundreds in May 2000. The cause was the application of manure to fertilize a field near a town well. The town well was supposed to be monitored, but the person who was supposed to sample and make sure the well was chlorinated had fallen into improper practices.

The following excerpt is from the *Report of The Walkerton Inquiry: The Events of May 2000 And Related Issues*, http://www.walkertoninquiry.com/report1/index.html#summary):

> *[Improper practices] included mislabeling sample bottles for microbiological testing, failing to adequately chlorinate the water, failing to measure chlorine residuals daily, making false entries on daily operating sheets, submitting false annual reports to the Ministry of the Environment (MOE), and operating wells without chlorination.*

A groundwater protection program would have identified the well location and its importance, and would have identified the risk inherent in allowing manure to be spread on adjacent land. Only compliance monitoring would have caught the inadequate practices of the water system operator. Compliance monitoring is important for operators of facilities that are contamination risks for the same reasons.

A cost estimate of the remediation alone was set at $9,222,215. A fuller explanation of the costs is available at http://www.newswire.ca/releases/November2001/26/c0319.html.

The Walkerton Inquiry homepage is located at http://www.walkertoninquiry.com/index.html.

# Appendix E
## Example County Fact Sheets for Pollution Prevention

Photos courtesy of U.S. EPA Region 10

The following fact sheet is copied from the Thurston County Business Pollution Prevention Program Fact Sheet - Floor Drains (February 2004), http://www.co.thurston.wa.us/health/ehrp/hwaste.html

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# Floor Drains

*"Convenient disposal to floor drains today can lead to expensive clean-up costs later when you try to sell or refinance your property."*

**The Problem**

Many types of businesses use floor drains as an easy way to dispose of floor cleaning or other wastes. What many business owners do not realize is that putting wastes down floor drains may violate the Thurston County Nonpoint Source Pollution Ordinance and several other federal and state laws.

Many floor drains send untreated wastes directly to storm drains, septic systems, dry wells, pits, or ditches. When wastes enter these types of drains, they pass through soil and may enter groundwater, or may enter streams or lakes directly -- *they do not necessarily go to a sewage treatment plant.* Moreover, even a treatment plant cannot effectively handle many types of wastes.

When commercial property is sold or refinanced, finance companies often require an environmental site assessment that evaluates whether property is contaminated. Convenient disposal to floor drains today can lead to expensive clean up costs later when you try to sell or refinance your property. Irresponsible disposal can also lead to contaminated drinking water that may affect your community and your family.

## What You Can Do

*Find out where your floor drains go.* Consider each drain separately. Call your city or county public works department or local sewer utility and ask for help in identifying where your drains lead. If your business was built before 1970, or is located in a rural area, your floor drains most likely do not lead to a sanitary sewer.

*If your floor drain is already connected to a sanitary sewer.* You still need to meet local sewer discharge limits. All discharges to a sewer system are authorized by the LOTT Wastewater Alliance. LOTT may be reached at 753-8428.

*If your floor drain is not connected to a sanitary sewer. C*ontact the Thurston County Business Pollution Prevention Program for help in determining if you have a pollution problem from this floor drain. Two options to consider for non-connected floor drains.

1. Connect the floor drain to a sanitary sewer and meet sewer discharge limits; or
2. Seal the floor drain and change your current disposal practices.

## Practical tips to eliminate the use of and, therefore, the need for a floor drain:

3. Sweep and spot-mop floors frequently to minimize the need for complete floor cleaning. Improve general housekeeping practices.
4. Build a "dead-end" sump where occasional wastewater can collect and either evaporate or be pumped into a dedicated and labeled container. Sludge that may build up in the sump will need to be removed and possibly managed as hazardous waste.
5. If you must keep a floor drain, consider installing a recirculating floor scrubber or "closed-loop" wastewater recycling system, or investigate treatment-by-generator options.

## Keep a Record of Your Actions

If you seal off a floor drain, create a record of past uses for the drain, the date when the drain was sealed, and describe the physical location of the drain before it was sealed. Keep records of flow into any drains that are connected to a sanitary sewer to demonstrate that you have met discharge permit requirements. This information may be important if the property is offered for sale, and it could be useful in reducing liability in the case of an investigation of contaminated soil or ground water.

## Additional Information

Staff from the Thurston County Business Pollution Prevention Program is available to answer questions about floor drains, best management practices for wastewater, and other hazardous

waste related issues. We also offer free, non-regulatory on-site technical assistance. Please contact the Business Pollution Prevention Program at (360) 786-5457, Monday through Friday, from 8 a.m. to 5 p.m., or at TDD (360) 754-2933 or see our website at http://www.co.thurston.wa.us/health/ehrp/hwaste.html.

**Other Hazardous Waste Management and Disposal Fact Sheets**

- *Antifreeze, Used Oil, and Oil Filters*
- *Compliance with Nonpoint Source Pollution Ordinance*
- *Disposal of Petroleum-Contaminated Absorbent Materials*
- *Doing Business in a Wellhead Protection Area*
- *Hazardous Waste Management in Printing and Photography*
- *Secondary Containment*
- *Solvents and Parts Cleaners*
- *Spill Plans*
- *Storing and Labeling Hazardous Waste*
- *Used Shop Towels*

February 2004

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The following fact sheet is copied from the Thurston County Business Pollution Prevention Program Fact Sheet - Secondary Containment (February 2004), http://www.co.thurston.wa.us/health/ehrp/hwaste.html

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# Secondary Containment

## *"Liquid hazardous materials such as petroleum products, antifreeze, and solvents can present a threat to soil, ground water, and surface water."*

**The Problem**

Liquid hazardous materials such as petroleum products, antifreeze, and solvents can present a threat to soil, ground water, and surface water if accidentally spilled or leaked. These substances must be stored so that if a spill or leak does occur, the material remains contained and does not contaminate the environment. A solution to the problem is to use secondary containment when storing hazardous liquids.

**The Regulatory Requirements**

The Thurston County Nonpoint Source Pollution Ordinance (Article VI of the Sanitary Code) requires that hazardous waste, including petroleum products, be stored so that if a container leaks or ruptures the contents will not contaminate ground or surface water. The best way to ensure this is to provide secondary containment for all containers of liquid hazardous products and wastes.

The Thurston County Critical Areas Ordinance Chapter 17.15.520 C(2) also requires businesses that are located in aquifer recharge areas to provide secondary containment for hazardous materials that are stored on-site.

The Thurston County Mineral Extraction Code requires that fuel and hazardous materials are stored according to the requirements of the Nonpoint Source Pollution Ordinance. The Department of Ecology requires coverage and containment of hazardous materials through the "National Pollutant Discharge Elimination System and State Waste Discharge General Permit for Process Water and Stormwater Associated with Sand and Gravel Operations and Asphalt Batch Operations" RCW Chapter 90.48.

**What is Secondary Containment?**

Secondary containment is a liquid-tight barrier that will adequately contain hazardous materials that are released from a storage container. A simple example of secondary containment is placement of a 5-gallon drum (primary containment) inside a 55-gallon drum (secondary containment). Another example is placement of 55-gallon drums or a large fuel tank (primary containment) inside a liquid-tight concrete bunker (secondary containment). The outer wall of a double-walled fuel storage tank is also an example of secondary containment.

The size and design of a secondary containment unit or device depends on the type and amount of material that it holds.

**The Options**

Four secondary containment method options will satisfy Thurston County regulatory requirements. Liquid hazardous materials, including petroleum products, can be:

1. Stored indoors on a liquid-tight concrete floor without secondary containment if the storage area is able to contain 100 percent of the largest container in the event of a spill and prevent it from flowing or leaking out of the building. Also, spilled or leaked materials must be prevented from entering floor drains that are not part of a liquid-tight containment system designed to capture and hold hazardous materials.
2. Stored in outdoor or indoor covered secondary containment that can hold 110 percent of the volume of the largest storage container or 10 percent of the total volume stored, whichever is greatest, plus the displacement volume of any items inside the containment.
3. Stored in **outdoor uncovered** secondary containment that can hold 120 percent of the volume of the largest storage container *or* 10 percent of the total volume stored, whichever is greatest, plus the displacement volume of any items inside the containment.
4. Stored in UL-certified double-walled storage tanks. The volume requirements that are listed in options 1, 2 and 3 do not apply to these storage tanks, because they do not require additional containment provisions.

**Secondary Containment Criteria**

*Chemical Compatibility and Structural Integrity*

- The structural materials used in secondary containment units, including expansion joints and seals (if applicable) must be chemically compatible with the substance(s) that will be contained.
- Secondary containment must be maintained liquid-tight at all times, except when draining storm water under direct supervision (see below).
- Secondary containment must be physically adequate to hold a release and remain liquid-tight.
- Discharge valves must be closed and locked when not in use. The key or combination for the lock must be kept on-site and available during all work shifts.

*Stormwater Accumulation and Discharge*

- Stormwater must be managed in accordance with the Thurston County Drainage Design and Erosion Control Manual.
- Outdoor uncovered containments must be maintained free of stormwater accumulation.
- An operator must be present during stormwater discharge from secondary containment.
- All discharge valves must be closed and locked after a supervised discharge is completed.
- Stormwater discharged from petroleum product secondary containment must be treated through an oil/water separator. (See the Thurston County fact sheet "Oil/Water Separators.")

**Spills**

Keep secondary containment areas free of small spills and drips. Drip pans that can be conveniently cleaned are helpful in preventing contamination of the secondary containment area. Hazardous materials, liquid hazardous waste and petroleum product spills must be cleaned up immediately.

Remember that even a small spill, drip, or leak must be cleaned up and disposed of as a hazardous waste. Absorbents and other cleanup materials that are contaminated must also be managed as a hazardous waste. Up to 55 gallons of petroleum-contaminated absorbents may be deposited at the Thurston County Waste and Recovery Center annually, as explained in the Thurston County fact sheet "Disposal of Petroleum Contaminated Absorbent Materials."

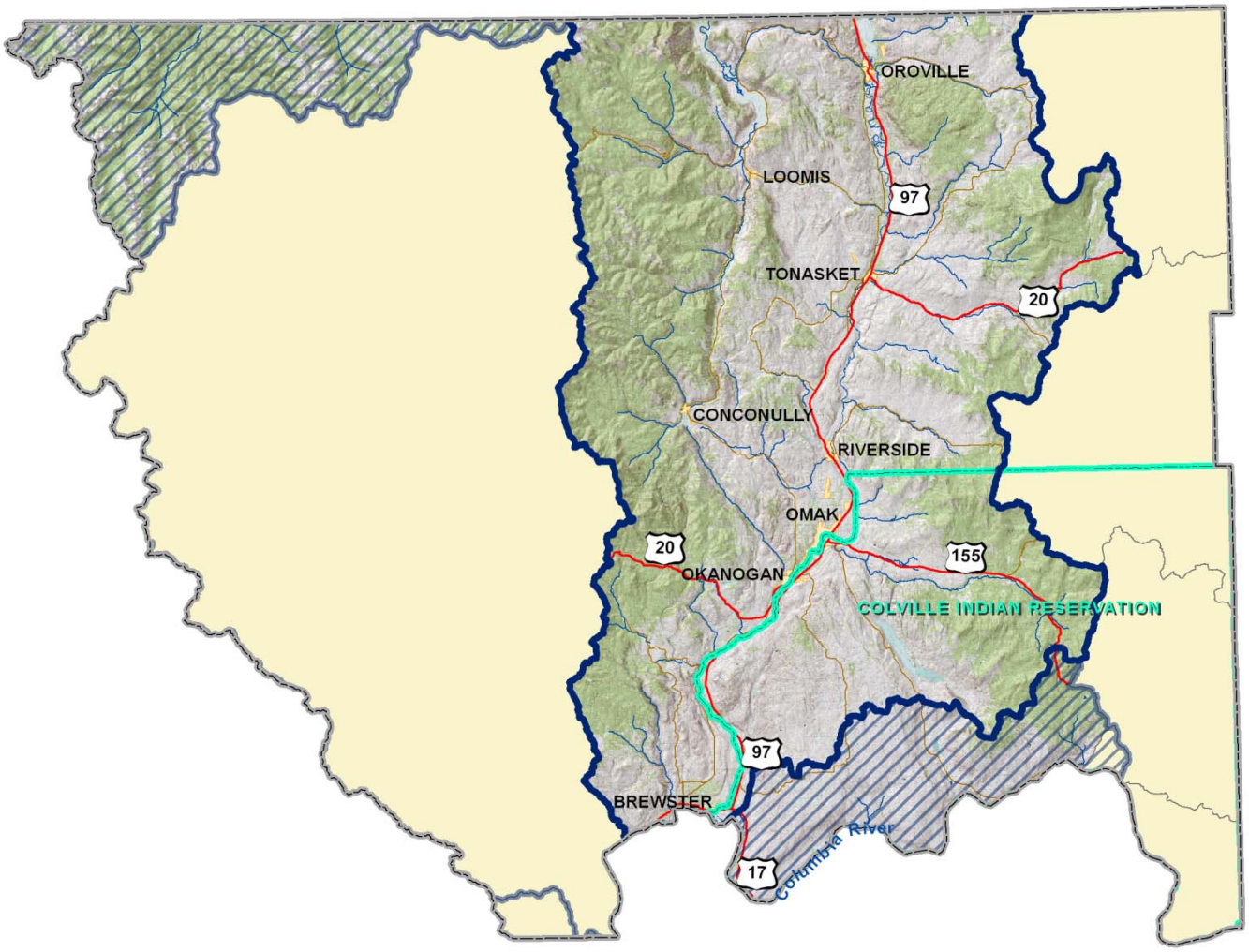
**Additional Information**

Please call the Thurston County Business Pollution Prevention Program at (360) 786-5457 or TDD 754-2933 or see our website at http://www.co.thurston.wa.us/health/ehrp/hwaste.html.

June 2004

# OKANOGAN WATERSHED PLAN

# Level 1 Technical Assessment

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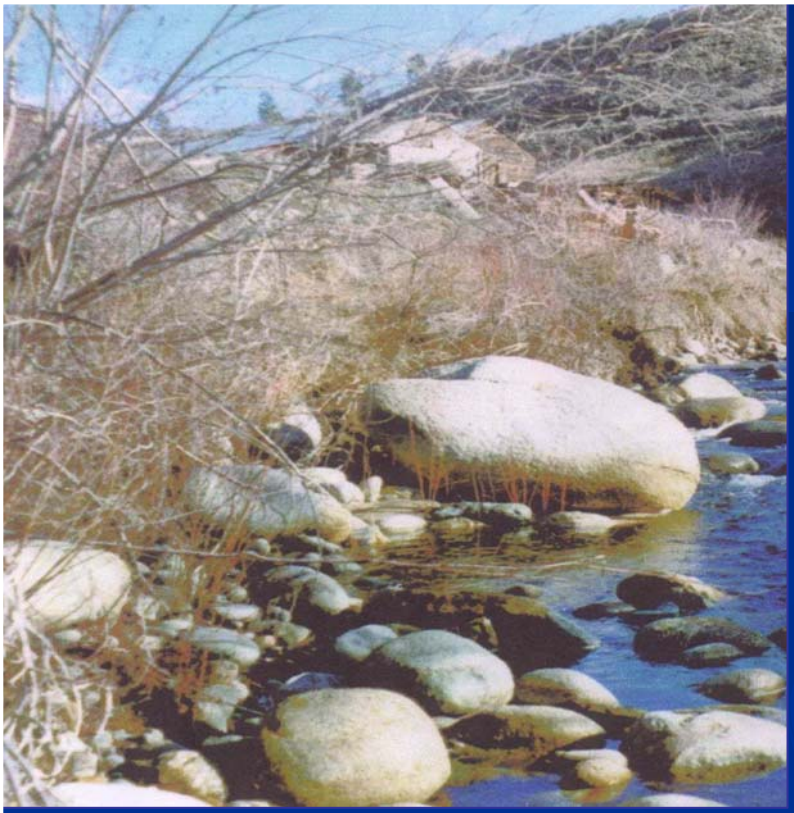
- Water Quantity Assessment
- Water Storage Assessment
- Water Quality assessment
- Aquatic Habitat Assessment
- Data Gaps

# Level 1 Watershed Technical Assessment



## FINAL REPORT

**Okanogan River Watershed Resource Inventory Area 49**

September 2006

**Project No. 4138301**

Prepared for:

Okanogan Watershed Planning Unit

Prepared by:

ENTRIX, Inc.
Seattle, WA

# OKANOGAN RIVER WATERSHED RESOURCE INVENTORY AREA 49

## Level 1 Watershed Technical Data Assessment

Prepared for:

Okanogan Watershed Planning Unit
Okanongan, WA

Prepared by:

**ENTRIX, INC.**
Seattle, WA

Project No. 4138301

September, 2006

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## List of Acronyms

| | |
|---|---|
| **AF** | acre-feet |
| **AFY** | acre-feet per year |
| **ASR** | aquifer storage and recovery |
| **BIBI** | Benthic Index of Biological Integrity |
| **BOD** | biochemical oxygen demand |
| **BOR** | Bureau of Reclamation |
| **CCT** | Colville Confederated Tribes |
| **CDAP** | cumulative departure from average precipitation |
| **cfs** | cubic feet per second |
| **CI** | Commercial and Industrial |
| **CRT** | Columbia River Treaty |
| **CWD** | Coarse Woody Debris |
| **CWSP** | Coordinated Water System Plan |
| **DDE** | Dichlorodiphenyldichloroethylene |
| **DDT** | Trichloro-2,2-bis-(4'-chlorophenyl)ethane |
| **DO** | dissolved oxygen |
| **DOH** | Washington State Department of Health |
| **Ecology** | Washington State Department of Ecology |
| **EIS** | Environmental Impact Statement |
| **EMAP** | Environmental Monitoring and Assessment Program |
| **ESA** | Endangered Species Act |
| **ESU** | Evolutionary Significant Unit |
| **FWSS** | future water supply strategies |

| | |
|---|---|
| **GDU** | Genetic Diversity Unit |
| **GIS** | Geographical Information Systems |
| **gpm** | gallons per minute |
| **GWIS** | Ground Water Information System |
| **HCU** | hydrologic unit code |
| **HPA** | Hydraulic Project Approval |
| **HUC** | hydrological unit criteria |
| **IBI** | Index of Biological Integrity |
| **IFIM** | Instream Flow Incremental Methodology |
| **JTU** | Jackson Turbidity Unit |
| **LFA** | Limiting Factors Assessment |
| **LOD** | Large Organic Debris |
| **LSR's** | Late-Successional Reserves |
| **LWD** | large woody debris |
| **MAF** | mean annual flow |
| **MAP** | Mean annual precipitation |
| **MDD** | maximum demand day |
| **MGY** | million gallons per year |
| **MLSR** | Managed Late-Success ional Reserves |
| **NASS** | National Agricultural Statistics Service |
| **NCDC** | National Climate Data Center |
| **NMFS** | National Marine Fisheries Service |
| **NOAA** | National Oceanographic Atmospheric Association |

| | |
|---|---|
| **NRCS** | National Resource Conservation Service |
| **NTU** | nephelometric turbidity unit |
| **NWPPC** | Northwest Power Planning Council |
| **OBMEO** | Okanogan Baseline Monitoring and Evaluation Program |
| **OCD** | Okanogan Conservation District |
| **OWC** | Okanogan Watershed Committee |
| **PCPs** | Polychlorinated Biphenyls |
| **PFC** | properly functioning conditions |
| **RCW** | Revised Code of Washington |
| **RM** | river mile |
| **RWC** | Regulation of Washington |
| **SaSI** | Salmonid Stock Inventory |
| **SASSI** | Salmon and Steelhead Habitat Inventory |
| **SAV** | submerged aquatic vegetation |
| **SCS** | Soil Conservation Service |
| **SHB** | State House Bill |
| **SOSCP** | South Okanagan-Similkameen Conservation Program |
| **SRA** | Salmon Recovery Act |
| **SRFB** | Salmon Recovery Funding Board |
| **SSHEAR** | Salmonid Screening Habitat Enhancement and Restoration |
| **SSHIAP** | Salmon, Steelhead Habitat Inventory and Assessment Project |
| **TAG** | Okanogan Technical Advisory Group |
| **TDS** | total dissolved solids |

| | |
|---|---|
| **TMDLs** | Total Maximum Daily Loads |
| **TSS** | total suspended solids |
| **TWR** | Trust Water Right program |
| **USACE** | Army Corps of Engineers |
| **USFS** | United States Forest Service |
| **USGS** | US Geological Survey |
| **WAC** | Washington Administrative Code |
| **WAU** | watershed assessment unit |
| **WCC** | Washington Conservation Commission |
| **WDF** | Washington Department of Fisheries |
| **WDFW** | Washington Department of Fish and Wildlife |
| **WDNR** | Washington Department of Natural Resources |
| **WDOE** | Washington Department of Ecology |
| **WNDR** | Washington Department of Natural Resources |
| **WQI** | water quality index |
| **WRATS** | Washington Department of Ecology Water Right Application Tracking System |
| **WRCC** | Western Region Climate Center |
| **WRF** | Water Resources Forum |
| **WRIA** | Water Resource Inventory Areas |
| **WSA** | Watershed Analysis |
| **WSP** | Wild Salmon Policy |
| **WWTIT** | Western Washington Treaty Indian Tribes |

## Glossary of Terms

**303 (d) List** – The federal Clean Water Act requires states to maintain a list of stream segments that do not meet water quality standards. The list is called the 303(d) list because of the section of the Clean Water Act that makes the requirement.

### A

**abiotic factors** – Physical environmental factors (i.e. water, temperature, soil, light) that influence the composition and growth of an ecosystem.

**acre-foot –** A measurement of water. The volume of water required to cover 1 acre of land to the depth of 1 foot.

**adaptation** – A specific structure or behavior that helps an organism survive and reproduce in a particular environment; the process that enables organisms to become better suited to their environment.

**Adaptive management** – Monitoring or assessing the progress toward meeting objectives and incorporating what is learned into future management plans.

**Adfluvial** – Migratory between lakes and rivers or streams or, life history strategy in which adult fish spawn and juveniles subsequently rear in streams but migrate to lakes for feeding as subadults and adults. *Compare fluvial*.

**adjudication** – A determination by the State Superior Court of the relative rights of the various claimants to use water from a water source.

**Administratively Withdrawn Areas** – A land management designation for federally-administered lands within the range of the northern spotted owl (LJSFS and BLM 1994). Administratively Withdrawn Areas are identified in current Forest and District Plans or draft plan preferred alternatives and include recreation and visual areas, back county, and other areas where management emphasis precludes scheduled timber harvest.

**aerobic** – Living, active, or occurring in the presence of oxygen. For instance, soil microorganisms which degrade sewage effluent from septic systems need oxygen in order to function.

**aggradation** – The geologic process of filling and raising the level of the streambed or floodplain by deposition of material eroded and transported from other areas.

**agriculture** – The science or process of farming or cultivating the soil for the production of plants and animals that will be useful to humans in some way.

**alderfly** – An aquatic macroinvertebrate of the order *Megaloptera*. Alderfly larvae have projections or filaments, but no wings. They are somewhat sensitive to pollution.

**alevins (also sac fry or yolk-sac fry)** – Larval salmonid that has hatched but has not fully absorbed its yolk sac, and generally has not yet emerged from the spawning gravel. Absorption of the yolk sac, the alevin's initial energy source, occurs as the larva develops its mouth, digestive tract, and excretory organs and otherwise prepares to feed on natural prey.

**algae** – Varied aquatic protists (single celled phytoplankton members of the plant community with nuclei); they lack vascular tissue, and are usually photosynthetic.

**algal bloom** – An explosive population increase in algae that occurs when large amounts of phosphates and/or nitrates enter a body of water in the presence of warm temperatures.

**Allocation** – Designation by Dept. of Ecology of specific amounts of water resource for specific beneficial uses. (WAC 173-500-050).

**Alluvial fan** – A relatively flat to gently sloping landform composed of predominantly coarse grained soils, shaped like an open fan or a segment of a cone, deposited by a stream where it flows from a mountain valley onto a plain or broader valley, or wherever the stream gradient suddenly decreases. Alluvial fans typically contain several to many unconfined, distributary channels that migrate back and forth across the fan over time. This distribution of flow across several stream channels provide for less erosive water velocities, maintaining and creating suitable rearing salmonid habitat over a wide range in flows. This landform has high subsurface water storage capacity. They frequently adjoin terraces or floodplains.

**Alluvial** – Originated through the transport by and deposition from running water. An example is a deposit of sand or mud.

**Alluvium** – Sediment such as clay, silt, sand, gravel of other sediments deposited by running water.

**ambient monitoring** – Monitoring that is done to determine existing environmental conditions, contaminant levels, rates, or species in the environment, against which future conditions can be compared.

**anadromous fish** – Species, such as salmon and steelhead, which hatch in fresh water, spend a large part of their lives in the ocean, and return to fresh water rivers and streams to spawn.

**anaerobic** – Lacking or not needing oxygen.

**andesitic** – pertaining to a volcanic igneous rock containing plagioclase feldspar with a sodium to calcium ratio in the andesine range.

**annelids** – Aquatic macroinvertebrates of the phylum Annelida; segmented worms with bilateral symmetry, closed circulatory systems, and complete digestive systems; includes leeches.

**apparent color** – The color given to water by dissolved substances and suspended matter (i.e. metallic ions, plankton, algae, industrial pollution, and plant pigments). Apparent color provides useful information about the water's source and content.

**appropriation** – The process of legally acquiring the rights to specific amounts of water for application to beneficial uses. (WAC 173-500-050)

**aquaculture** – The production of fish, shellfish, invertebrates, and plants in marine, brackish, or freshwater.

**aquatic** – Living or growing in or on the water.

**aquatic ecosystem** – Any body of water, such as a stream, lake or estuary, and all organisms and nonliving components within it functioning as a natural system.

**aquatic worms** – Aquatic macroinvertebrates without legs, including flatworms (planaria), roundworms (nematodes), and freshwater earthworms (oligochaetes). They can tolerate pollution.

**Aquifer Protection Areas** – A special district allowing monthly fees on water withdrawals or on-site sewage disposal to finance the protection, preservation, and rehabilitation of ground water. Aquifer Protection Areas are created when County legislative authorities resolve to submit a ballot proposition to registered voters within the proposed protection area and voters approve the measure by a simple majority.

**Aquifer** – The underground layer of rock or soil in which groundwater resides capable of yielding a significant amount of water to wells or springs. Aquifers are replenished or recharged by surface water percolating through soil.

**aquitard** – A layer of rock or unconsolidated sediments that will not yield water in a usable quantity, and retards vertical flow.

**arrow arum** – *Peltandra virginica* or duck corn. Arrow arum is emergent vegetation found in freshwater wetlands; its seeds develop in spike-shaped pods.

**artesian wells** – Wells that tap confined aquifers and whose static water level is higher than the level of the aquifer.

**assessment** – An evaluation.

**atmosphere** – The gaseous mass or envelope surrounding the earth.

**attenuation** – The process of reducing the amount and concentration of contaminants in water. Includes physical, chemical, and biological processes as well as dilution.

**autumn-flowering clematis** – *Clematis terniflora*, exotic invasive plant that grows in intermittently flooded lowland forests.

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## B

**bacteria** – (singular bacterium) Phytoplankton; single-celled prokaryotic organisms.

**bald eagle** – *Haliaeetus leucocephalus*, a North American eagle, having a dark body and a white head and tail. The white head develops once they are mature at age 5.

**banded killifish** – *Fundulus diaphanous*, a native fish found in major river drainage areas.

**bank erosion** – The process in which individual soil particles of a stream bank are carried away as the stream channel moves. The amount of erosion is affected by vegetation, soil composition of the bank, flow of water in the stream, and runoff from the land.

**bank slumping** – An indication of the degree of bank erosion. A healthy habitat has gentle bank slopes and no evidence that the stream is undercutting the bank. *See bank erosion*.

**bank vegetation** – Trees, shrubs, grasses, and other vegetation growing on the stream bank.

**bar scalping** – Removal of gravel from river gravel bars to prevent bed aggradation for flood control and/or as a source of commercial gravel.

**basalt** – A fine-grained, dark-colored rock, formed by solidification from a molten or partially molten state.

**base flow** – Regulatory base flow: A level of streamflow established in accordance with provisions of Ch. 90.54 RCW required in perennial streams to preserve wildlife, fish, scenic, aesthetic, and other environmental, or navigational values. (WAC 173-500-050) 2) Hydrologic base flow: That portion of stream flow sustained by ground water seeping into stream rather than directly from storm runoff. (*see hydraulic continuity*)

**basin** – The area of land that drains water, sediment and dissolved materials to a common point along a stream channel.

**bay** – A body of water partly enclosed by land, but having a wide outlet to the sea.

**bedload** – A description of a process whereby stream flows, channel shape, and sediments are in constant interaction working to come to an equilibrium. Sediments moving through the system causing changes in channel shape until they are flushed out of the system or deposited in stable areas are called also called bedload. When additional levels of sediment are put into a stream (i.e, through landslides, road construction), a bedload can mean the amount of material being transported through the system.

**beefsteak plant** – *Perilla frutescens*, an exotic invasive plant, originally from Asia, that grows in a clearing (meadow or field).

**beetle** – An aquatic macroinvertebrate with larvae that have lateral filaments off their sides, a hook at the end of their body, and no wings. Adults have outer wings and are often black in color. The larvae are somewhat sensitive to pollution.

**bend** – A change in the direction of a stream channel and the flow of water in the stream.

**beneficial uses** – Uses of water for domestic, stock watering, industrial, commercial, agricultural, irrigation, hydroelectric power production, mining, fish and wildlife maintenance and enhancement, recreational, and thermal power production purposes, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state. (WAC 173-500-050).

**Benthic Index of Biological Integrity (BIBI) –** is a benthic macroinvertebrate multimetric index designed and calibrated for use in Puget Sound Lowlands.

**benthic plants** – Aquatic plants that grow attached to or rooted to the bottom of the body of water and withdraw nutrients from the sediment.

**benthos** – Organisms that live on or in the bottom sediments of a water body.

**best management practices (BMP)** – Methods, measures, or practices designed to prevent or reduce water pollution. Not limited to structural and nonstructural controls, and procedures for operations and maintenance. Usually, BMPs are applied as a system of practices rather than a single practice.

**biochemical oxygen demand (BOD**) – A measure of the quantity of oxygen used by organisms to decompose organic matter, usually measured at the end of a five-day period.

**biodegradation** – The conversion of organic compounds into simpler compounds through biochemical activity. Toxic compounds can sometimes be converted into non-toxic compounds through biodegradation. Unfortunately, in some cases, complex compounds are first converted into intermediate substances that can be more toxic than the original substance.

**biodiversity** – Refers to variety of organisms, their genetic information and the biological communties where they live.

**biological diversity (biodiversity)** – Variety and variability among living organisms and the ecological complexes in which they occur; encompasses different ecosystems, species, and genes.

**biological treatment**: A wastewater treatment process that uses heavy growth of microorganisms for the purpose of oxidizing, absorbing, and absorbing wastewater impurities, both organic and inorganic. Secondary treatment plants usually provide biological treatment.

**biotic integrity** – Capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of natural habitat of the region; a system's ability to generate and maintain adaptive biotic elements through natural evolutionary processes.

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## C

**caddisflies** – Aquatic macroinvertebrates of the order *Trichoptera*. Larvae have three pairs of legs, hooks on the end of their abdomen, and no wings. Larvae are sensitive to pollution.

**candidate species** – Those plants and animals that are being considered by the USFWS for listing as threatened or endangered under the Endangered Species Act.

**canopy** – Overhanging tree cover.

**carnivore** – A meat eater; a consumer that eats other consumers.

**casing** – A metal or plastic pipe installed in a well to maintain the well opening, especially in loose or unconsolidated formations.

**cattails** – *Typha spp.*, emergent vegetation of freshwater marshes and wetlands; tall perennial plants.

**channel stability** – Tendency of a stream channel to remain within its existing location and alignment.

**channelization** – Straightening the meanders of a river; often accompanied by placing riprap or concrete along banks to stabilize the system.

**channelized stream** – A stream that has been straightened, runs through pipes or revetments, or is otherwise artificially altered from its natural, meandering course.

**check dams** – Series of small dams placed in gullies or small streams in an effort to control erosion, commonly built during the 1900s.

**Chelan Agreement** – An unsigned agreement in 1990 between State government, the Tribes, and other water resource interests outlining a consensus-based approach to water resource issues. The agreement called for the creation of a state-level Water Resources Forum and 2 pilot planning projects to test the approach and was funded by the Washington State Legislature.

**chlorinated** – Water treated with chlorine as a disinfectant.

**cistern** – large, permanent structure designed to catch, filter, and divert rain water into a storage area. Catchments include house, barn, and shed roofs, parking lots, paved surfaces or specially constructed impervious surfaces. Stored water is generally used for irrigation.

**clam** – An aquatic macroinvertebrate of the *phylum Mollusca*, the clam is enclosed within two shells and feeds by filtering stream water through its shells; it is somewhat sensitive to pollution.

**Clarity** – Clearness.

**clay** – Suspended sediment, streambed or soil component material with a particle size of 0.00024-0.004 mm in diameter, smaller than a grain of sand.

**cleanup activities** – ions taken by a public agency or a private party to correct an environmental problem. Activities can include either the prevention of pollution by the treatment or control of contaminants (for example, treatment of wastewater before discharge) or the removal from the environment of contaminants introduced by past practices (for example, digging up and incinerating soil contaminated with dioxin).

**cloud cover** – The amount of sky covered by clouds, usually characterized as: partly cloudy (10 percent to 50 percent of sky covered by clouds); or cloudy (50 percent to 90 percent of sky covered by clouds).

**coagulation** – The process in which chemicals react with suspended particles in a liquid to form a sticky precipitate.

**coliform bacteria** – A type of bacteria which includes many species. Fecal coliform bacteria are those coliform bacteria which are found in the intestinal tracts of mammals. The presence of high numbers of fecal coliform bacteria in a water body can indicate the release of untreated wastewater, and/or the presence of animals, and may indicate the presence of pathogens.

**common reed** – *Phragmites australis*, an exotic invasive plant that grows in intermittently flooded lowland forest.

**community** – Two or more populations of different species living and interacting in the same area.

**community water system distribution structures** – *Group A* water systems have 15 or more service connections or serve an average of 25 or more people per day for 60 or more days a year. *Group B* water systems have less than 15 connections and serve an average of less than 25 people each year. (WAC 246-290) cone of depression: The depression in the water table or potentiometric surface around a pumping well caused by water withdrawal.

**competitors** – Individuals or species that both require the same limited resource to survive.

**compost** – A mixture of decaying organic matter, such as leaves and manure, that can be used as a plant fertilizer.

**confined aquifer** – An aquifer overlain by a confining bed in which the water level in a well drilled into the aquifer stands above the base of the confining bed: A geologic unit with low permeability (hydraulic conductivity) that restricts movement of water into or out of the aquifer.

**confluence** – Joining.

**consumer** – An organism that eats other organisms because it is unable to make its own food; a heterotroph.

**consumptive use** – Use of water where there is diversion or diminishment of the water source. (WAC 173-500-050).

**contaminant** – A substance that is not naturally present in the environment or is present in unnatural concentrations or amounts and which can, in sufficient concentration, adversely alter an environment.

**control** – A condition in a scientific experiment that remains the same.

**coontail** – A submerged aquatic vegetation (SAV), *Ceratophyllum demersum*; abundant in lakes, streams, marshes, and ditches in a depth of up to 18 feet; tolerant of nutrient-rich water and fluctuating water levels. It has leaves in whorls of 5-12 and can form thick masses.

**Coordinated Water System Plan (CWSP)** – A plan for public water systems within a critical water supply service area which identifies the present and future water system concerns and sets forth a means for meeting those concerns in the most efficient manner possible. (Ch. 248-56-200).

**cordillera** – A group of mountain ranges including valleys, plains, rivers, lakes, etc., having one general direction.

**crab** – An aquatic macroinvertebrate of the *phylum Arthropoda*, class *Crustacea*. The crab is a bottom-dwelling predator.

**crane fly** – An aquatic macroinvertebrate of the order *Diptera*, a true fly. The larvae are large and fleshy with short tentacles at one end. Crane flies are somewhat sensitive to pollution.

**crayfish** – An aquatic macroinvertebrate of the *phylum Arthropoda*, class *Crustacea*. Crayfish have more than three pairs of legs and two pairs of antennae, with eyes on stalks and a hard covering on the back; somewhat sensitive to pollution.

**Cretaceous** – pertaining to the Cretaceous Period, the third and latest of the three periods on the geologic time scale comprising the Mesozoic Era. Can also be used to describe rock units formed during the Cretaceous Period.

**critical areas** – A category of land for protection under the Growth Management Act of 1990 including aquifer recharge, critical fish and wildlife habitat, seismic hazard, wetland, and flood hazard areas.

**critical stocks** – Stocks of fish experiencing production levels that are so low that permanent damage to the stock is likely or has already occurred.

**croplands** – Land used for agriculture.

**crustacean** – An aquatic macroinvertebrate of the *phylum Arthropoda*, class *Crustacea*; includes crayfish and crabs. They have more than three pair of legs and two pairs of antennae. *See crayfish*.

**cultivate** – To prepare land for crops by plowing and fertilizing.

**cultural eutrophication** – Human-caused eutrophication; usually a very rapid process that can result in the death of an ecosystem.

**cumulative effects** – Those effects on the environment that result from the incremental effect of the action when added to the past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

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## D

**damselfly** – An aquatic macroinvertebrate of suborder *Zygoptera*. The larvae have three pairs of legs, one pair of antennae, and wing pads with feathery gills protruding from the abdomen. Larvae are somewhat sensitive to pollution.

**daphnia** – Genus *Daphnia*; small freshwater crustaceans.

**data** – Recorded observations and information.

**data analysis** – An evaluation of collected observations and information.

**debris torrent** – Rapid movements of material, including sediment and woody debris, within a stream channel. Debris torrents frequently begin as debris slides on adjacent hillslopes.

**decomposers** – A group of organisms, mainly fungi and bacteria, that digest organic material and release nutrients into the environment.

**decomposition** – The process of decay; the breaking down of organic matter into its component parts.

**degradation** – The lowering of the streambed or widening of the stream channel by erosion. The breakdown and removal of soil, rock and organic debris.

**degrade** – To reduce; to decompose by stages; to wear away by erosion.

**degrees of latitude/longitude** – Angular units defined by circular lines around the Earth; used to measure distance north or south of the Equator (latitude) and east or west of the Prime Meridian (longitude).

**density** – The mass of a substance per unit volume; the number of inhabitants per unit in a geographical region; the degree to which anything is filled or occupied; the degree of thickness.

**dependent variable** – A responding variable; a factor or condition that might change as a result of a change in a manipulated independent variable.

**deposition** – The accumulation of riverborne sediments when energy of the stream decreases below the level required for sediment transport.

**depressed stocks** – A stock of fish whose production levels are below expected levels based on available habitat and natural variation in survival rates, but above the level where permanent damage is likely. (SASSI)

**detention** – The process of collecting and holding back stormwater for later release to receiving waters.

**diatoms** – Phytoplankton of the class *Bacillariophyceae*. Diatoms are minute, unicellular or colonial algae having siliceous cell walls consisting of two overlapping, symmetrical parts.

**dinoflagellates** – A type of protist that includes photosynthetic forms in which two flagella project thorough armor-like plates. Abundant in oceans, these sometimes reproduce rapidly, causing "red tides".

**discharge** – The release of wastewater or contaminants to the environment. Direct discharge of wastewater flows directly into surface waters, while an indirect discharge of wastewater enters a sewer system.

**dissolved load** – Sediment made up of organic and inorganic material carried in solution by moving water.

**dissolved oxygen (DO)** – Oxygen which is present (dissolved) in water and therefore available for fish and other aquatic animals to use. If the amount of DO in the water is too low, marine animals suffer from suffocation. Wastewater often contains oxygen-demanding substances that can consume dissolved oxygen if discharged into the environment. The amount of oxygen dissolved in water; varies with water temperature and pressure; measured in milligrams of oxygen per liter of water, parts per million, or percent saturation.

**distillation** – A process used to clean water. Steam from a sample of boiling water is almost completely free of impurities. In distillation, the steam is collected and allowed to condense back into water.

**diversity** – Variety; difference.

**diving beetle** – Predatory aquatic beetles from the family *Dytiscidae*.

**DNA** – Deoxyribonucleic acid; nucleic acid macromolecule that stores and transmits the genetic information of all living cells from one generation to the next.

**doctrine of prior appropriation** – The right to use water acquired earlier in time is superior to a similar right acquired later in time. "First in time, first in right."

**domestic wastewater** – The wastewater that flows from sinks, toilets, showers, and other facilities that are routinely used by people.

**dragonfly** – An aquatic macroinvertebrate of the suborder Anisoptera. The larvae have three pair of legs, one pair of antennae, and wing pads. Larvae are somewhat sensitive to pollution.

**drainage basin** – A watershed; the land area where precipitation runs into streams, rivers, lakes, and reservoirs. It can be identified by tracing a line along the highest elevations, often a ridge, between two areas on a map. Also called the watershed of the receiving water body.

**drainage divide** – A boundary line along a hilly or mountainous area that separates two adjacent drainage basins.

**drawdown** – A lowering of the water table of an unconfined aquifer or the potentiometric surface of a confined aquifer caused by pumping groundwater from wells.

**dredging** – Any physical digging into the bottom of a water body. Dredging can be done with mechanical or hydraulic machines and either changes the shape and form of the bottom or removes sediment that has been deposited over the bottom.

**dungeness Water Users Association** – Purveyors of agricultural water comprised of 9 representatives from irrigation districts and companies. The association functions by consensus agreement.

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## E

**E. coli** – *Escherichia coli* of the family Enterobacteriaceae; fecal coliform bacteria. E. coli is present in the lower intestine of humans and warm-blooded animals, but rarely present in unpolluted waters.

**ecological restoration –** Involves replacing lost or damaged biological elements (populations, species) and reestablishing ecological processes (dispersal, succession) at historical rates.

**ecology** – The study of the interrelationships of organisms with each other and their nonliving environment.

**ecosystem** – community of living organisms interacting with one another and with their physical environment. A system such as Puget Sound can also be thought of as the sum of many interconnected ecosystems such as the rivers, wetlands, and bays. Ecosystem is thus a concept applied to communities of different scale, signifying the interrelationships that must be considered.

**ecosystem management** – Management that integrates ecological relationships with sociopolitical values toward the general goal of protecting or returning ecosystem integrity over the long term.

**eel grass** – Submerged aquatic vegetation (SAV) of the genus Zostera; found in coastal areas; has narrow, grass-like leaves and grows in dense masses.

**effective impervious surface** – se impervious surfaces that are connected via sheet flow of discrete conveyance to a drainage system.

**effluent** – liquid waste of sewage and industrial processing.

**embayment** – An indentation in a shoreline forming an open bay.

**emergent vegetation** – Benthic plants that grow partly in water and partly emerging from water (i.e. cattails, arrow arum, pond lily, phragmites).

**encroach** – To intrude gradually upon the area of another; to advance beyond proper limits.

**endangered species** – Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register. Means any species which is in endanger of extinction throughout all or a significant portion of its range other than a species of the Class *Insecta* as determined by the Secretary to constitute a pest whose protection under would provide an overwhelming and overriding risk to man.

**Endangered Species Act (ESA)** – A 1973 Act of Congress that mandated that endangered and threatened species of fish, wildlife, and plants be protected and restored.

**english ivy** – *Hedera helix*, an exotic invasive plant, originally from Europe, that grows at the wood's edge.

**english plantain** – *Plantago lanceolata*, an exotic invasive plant, originally from Europe, which grows in a clearing (meadow or field).

**Environmental Impact Statement (EIS)** – A document that discusses the likely significant impacts of a development, project, or a planning proposal, ways to lessen the impacts, and alternatives to the project or proposal. EISs are required by the National and Washington State Environmental Policy Acts.

**environs** – Surroundings; environment.

**eocene** – Second geologic epoch of the Tertiary Period, 37-54 million years ago. The series of strata deposited during that epoch.

**eradicate** – To remove all traces of; to erase.

**erosion** – Process by which earth material is transported from one area to another by an agent such as water or wind.

**erosion** – Wearing away of rock or soil by the gradual detachment of soil or rock fragments by flowing water, wind, freeze/thaw cycles, landslides, bedrock decomposition, and other weathering.

**escapement** – The number of adult fish that survive or "escape" fishing gear to migrate upstream to spawning grounds.

**esker** – Eskers or kames are rudely stratified accumulations of gravel, sand, and waterworn stones which occur in long ridges, mounds, and hummocks. Serpentine ridges of gravel and sand, believed to mark channels in the decaying ice sheet through which streams washed much of the finer drift, leaving the coarser gravel between the ice walls.

**estuarine** – A partly enclosed coastal body of water that has free connection to open sea, and within which seawater is measurably diluted by fresh river water.

**estuary** – A coastal water body where ocean water is diluted by out-flowing fresh water.

**eutrophic** – Water body rich in dissolved nutrients, photosynthetically productive, and often deficient in oxygen during warm periods. Compare *oligotrophic.*

**eutrophication** – A natural process in which there is an enrichment of water by nutrients, causing accelerated growth of algae and higher forms of plant life.

**evapotranspiration** – That portion of the precipitation returned to the air through direct evaporation and by transpiration of plants.

**evolution** – Any change in the overall genetic composition of a population of organisms from one generation to the next.

**Evolutionary Significant Unit (ESU)** – A definition of a species used by National Marine Fisheries Service (NMFS) in administering the Endangered Species Act (ESA). An ESU is a population (or group of populations) that (1) is reproductively isolated from other nonspecific population units, and (2) represents an important component of the evolutionary legacy of the species.

**exceedance** – failure to meet a numeric water quality criteria or guideline. Values may be above a threshold (e.g., temperature), or below the recommended criteria (dissolved oxygen). In this report, both would be considered an exceedance of the criteria.

**exempt wells** – Domestic water wells not requiring a water right from a state department of ecology. Under current law use from one well must be less than 5000 gpd and used for domestic purposes and/or the irrigation of no more than one-half acre of lawn or non-commercial garden.

**exoskeleton** – A hard, external body covering that provides support for tissues and organs and protects the organism from predators. Arthropods have exoskeletons.

**exotic species** – Non-native plants and animals living in the wild in areas outside their native boundaries.

**extinct** – A species with no living members. All members of a species are dead; the end of a species.

**extinct stock** – A stock of fish that is no longer present in its original range, or as a distinct stock elsewhere. Individuals of the same species, but different stock, may be observed in very low numbers in the extinct stock range, consistent with straying from other stocks. (SASSI)

**extirpation** – The elimination of a species from a particular local area.

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## F

**fish-bearing streams** – Any stream containing any species of fish for any period of time.

**fisheries enhancement** – Fisheries enhancement is an action taken to create conditions in the biological environment that optimizes survivorship of the fish population in question.

**flood** – An abrupt increase in water discharge; typically flows that overtop streambanks.

**flood plain** – Land bordering a stream or river and subject to flooding.

**floodway** – The channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment, such as artificial fill, in order that the 100-year flood be carried without substantial increases in flood heights.

**flow line** – The theoretical path followed by groundwater.

**flow rate** – The volume of flow per time (e.g., gallons per minute/gpm, or cubic feet per second/cfs).

**fluvial** – Of or belonging to rivers.

**forest practice** – Any activity conducted on or directly pertaining to forest land and relating to growing, harvesting, or processing timber. These activities include but are not limited to road and train construction; final and intermediate harvesting; precommercial thinning: reforestation; fertilization, prevention and suppression of disease and insects; salvage of trees: and brush control.

**fecal coliform** – *Escherichia coli, E. Coli*; of the family *Enterobacteriaceae*; bacteria naturally abundant in the lower intestine of humans and other warm-blooded animals, but rare in unpolluted waters.

**fertilizer** – Natural or synthetic materials used to increase the fertility of soil. A significant ingredient in urban and agricultural runoff that stimulates the growth of algae and other aquatic plants.

**filtration** – The process of removing suspended particles from untreated water by passing the water through porous substances; part of the process to convert raw water into higher quality water.

**fishfly** – An aquatic macroinvertebrate of the order *Megaloptera;* larvae have many filamentous appendages on each side of the abdomen, two hooked tails, six jointed legs, and large pinchers for mouth parts; somewhat sensitive to pollution.

**flocculation** – Part of a water-cleaning process in which small sticky particles clump together to make larger and heavier particles (floc). The larger particles eventually sink to the bottom of a containment area and can then be removed.

**fluoridation** – Part of the water treatment process in which hydrofluorosilicic acid is added to untreated water. The presence of fluoride in water reduces tooth decay.

**folding** – the bending of rock layers (stratigraphic units) due to deviatoric stresses such as tectonic forces or subsidence.

**food chain** – A series of steps from producers to consumers to decomposers; one possible way food and energy are transferred through an ecosystem.

**food web** – All feeding relationships of organisms in an ecosystem.

**forage** – The act of searching for food or provisions.

**forest** – A dense growth of trees, together with other plants, covering a large area.

**fossil** – The preserved remains or evidence of ancient organisms. Impressions of body forms or markings made by organisms may be preserved in rock, petrified bones, or wood.

**fossil fuel** – Substances derived from the decomposition of prehistoric plants an animals that can be burned to produce energy (i.e. coal, oil, and natural gas).

**freshwater** – Water that is not saline or brackish. Water that is low in salts, containing less than 1,000 mg/L of dissolved solids.

**fungus (plural fungi)** – A type of phytoplankton; made of eukaryotic cells with cell walls; obtain food by absorbing organic substances.

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## G

**geologic map** – A map showing the aerial distribution of geologic units and the attitude or structure of those units.

**geomorphic** – Pertaining to the form or shape of those processes that affect the surface of the earth.

**GIS** – Geographic Information System.

**glaciation** – Alteration of the earth's solid surface through erosion and deposition by glacier ice.

**glacier** – A mass of ice with definite lateral limits, with motion in a definite direction, and originating from the compaction of snow.

**graben** – n elongate crustal block that is relatively depressed (downdropped) between two fault systems.

**granitic** – pertaining to a plutonic igneous rock consisting essentially of alkali feldspar and quartz.

**gravel trap** – Holes of almost any size dug along side the river during a low flow period in areas of excessive bedload movement. In times of high water the holes fill with sediment moving down stream, thereby lessening bed aggradation.

**grey water** – Waste water from clothes washers, dish water, and bathing.

**groundwater** – All waters that exist beneath the land surface or beneath the bed of any stream, lake, or reservoir, or other body of surface water, whatever may be the geologic formation or structure in which such water stands or flows, percolates, or otherwise moves. (Ch. 173-100 WAC) Ground water is created by rain which soaks into the ground and flows down until it is collected and stored at a point where the ground is not permeable, forming natural underground water supplies. Ground water then usually flows laterally toward a river, lake, or the ocean, where it discharges.

**groundwater advisory committee** – A committee appointed by the Department of Ecology to assist in the development of a ground water management program. (Ch. 173-100 WAC)

**groundwater divide** – A line separating two regions of diverging flow.

**groundwater flow** – The movement of water through openings in sediment and rock.

**groundwater management** – comprehensive program designed to protect ground water quality, to assure ground water quantity, and to provide for efficient management of water resources while recognizing existing ground water rights and meeting future needs consistent with local and state objectives, policies, and authorities within a designated ground water management area or subarea and developed pursuant to Ch. 173-100

**groundwater management zone** – Any depth or stratigraphic zone separately designated by the Department of Ecology in cooperation with local government for ground water management purposes within a ground water management area. Ground water management zones may consist of a specific geologic formation or formations or other reasonable bounds determined by Ecology consistent with Ch. 173-100 WAC. Also known as groundwater management area.

## H

**habitat** – The specific area or environment in which a particular type of plant or animal lives. An organism's habitat must provide all of the basic requirements for life and should be free of harmful contaminants. It is the physical template upon which communities express themselves and the distribution of species and communities across the landscape is a direct response to the distribution of habitat types.

**habitat assessment** – Habitat assessment is a problem analysis process to develop and document a scientifically based understanding of the processes and interactions occurring within a watershed which affect fish habitat.

**habitat enhancement** – Habitat enhancement is an action taken to create conditions in the physical environment that optimize survivorship of the population in question.

**habitat protection** – Habitat protection means an action taken or a decision made that protects the physical and/or biological environment in a watershed.

**habitat restoration** – Habitat restoration means an action taken to correct specific problems identified through watershed analysis or other full watershed inventory processes.

**hardness** – A measure of the amount of calcium, magnesium, and iron dissolved in the water.

**harvesting** – The process of gathering a crop.

**hazardous waste** – Any solid, liquid, or gaseous substance which, because of its source or measurable characteristics, is classified under state or federal law as hazardous and subject to special handling shipping storage, and disposal requirements. Washington state law identifies two categories, dangerous and extremely hazardous. The latter category is more hazardous and requires greater precautions.

**head, total** – The sum of the elevation head, the pressure head, and the velocity head at a given point in an aquifer.

**healthy stock** – A stock of fish experiencing production levels consistent with its available habitat and within the natural variations in survival for the stock. (SASSI)

**hellgrammite** – An aquatic macroinvertebrate of the order *Megaloptera*; also called dobsonfly. Larvae have three pair of segmented legs and four terminal hooks on their abdomen; sensitive to pollution.

**herbicide** – A pesticide which is usually toxic used to destroy or inhibit growth of vegetation.

**herbivore** – An organism that eats only plants; a primary consumer.

**heterogeneous aquifer** – An aquifer having different characteristics in different locations. A synonym is nonuniform.

**homogeneous aquifer** – An aquifer having identical characteristics everywhere. A synonym is uniform.

**humus** – Decayed remains of organisms. The addition of humus to soil enriches it with organic material and increases the capacity of the soil to hold air and water.

**hybridization** – The interbreeding of fish from two or more different stocks.

**hydraulic conductivity** – A measure of the rate at which water will move through soil or a rock layer.

**hydraulic continuity** – The natural interconnections between groundwater and surface waters.

**hydraulic gradient**: Change in head between two points divided by the distance between the points (i.e., slope).

**Hydraulic Project Approval (HPA)** – Under the Hydraulic Code Rules, approval is required from WDFW for certain activities in state waters that support fish life. A project approval is required for such activities affecting state waters such as certain forest practices; culvert construction, bridge, pier, and piling construction; bulkheads; boat launches; dredging; and gravel traps.

**hydrilla** – Submerged aquatic vegetation (SAV), *Hydrilla verticillata*; non-native invasive plant with branched stems up to 25 feet long; found in all types of water bodies.

**hydrogeology** – The study of the interrelationships of geologic materials and processes with water, especially ground water.

**hydrograph** – Chart of water levels over time.

**hydrologic base flow** – See *base flow*.

**hydrologic cycle** – The continual cycling of water between the land, the sea, and the atmosphere through evaporation, condensation, precipitation, absorption into the soil, and stream runoff.

**hydrologic unit code (HUC)** – A hydrologic unit is a reference to the area of land upstream from a specific point on a surface waterbody and is defined by a hydrologic boundary that includes the area draining to that point; it is a delineation of a catchment or watershed. Hydrologic Unit Codes reference the scale of watershed delineation (hydrologic boundary), and are conventionally described at 'field' levels. Increasing HUC numbers define more discrete areas. Subbasins in the Okanogan (e.g., Joseph Subbasin) are mapped at the fifth-field (HUC-5) scale, and capture within them several HUC-6 tributaries.

**hydrostratigraphic unit** – A formation, part of a formation, or a group of formations in which there are similar hydrologic characteristics allowing for grouping into aquifers or confining layers.

**hypothesis** – A possible, testable explanation, based on an educated guess and previous observations; a proposed solution to a scientific problem.

**hypsithermal period** – Postglacial warm interval extending from about 7000 to 600 BC responsible for the last 6-foot rise of world-wide sea level.

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## I

**immiscible** – Incapable of blending or mixing. In part of the process of converting untreated water into drinkable water, the water must be held undisturbed for a period of time to allow the immiscible pollutants to separate from the water.

**impervious** – Not capable of being passed through, damaged, or disturbed. (Water is not able to flow through asphalt roads, concrete sidewalks, etc.)

**Inchoate water right** – a water right that has been permitted but not yet perfected in use and thus not certificated (only municipal water rights may be held in inchoate status without relinquishment).

**incinerator** – An apparatus used for burning waste at very high temperatures; a furnace.

**independent variable** – A manipulated variable; a factor or condition that changes naturally or is intentionally manipulated by the investigator to observe the effect.

**Index of Biological Integrity (IBI)** – is a synthesis of diverse biological information which numerically depicts associations between human influence and biological attributes. It is composed of several biological attributes or 'metrics' that are sensitive to changes in biological integrity caused by human activities. The multi-metric (a compilation of metrics) approach compares what is found at a monitoring site to what is expected using a regional baseline condition that reflects little or no human impact.

**indicator** – Any of a variety of substances used to demonstrate the presence, absence, or concentration of a substance.

**industrial** – Related to the commercial production of goods.

**inorganic** – Compounds derived from non-living things that do not contain carbon.

**instream flow** – A base flow adopted into Washington State regulations used to condition water rights. A water right for instream resources such as fish, wildlife, recreation, esthetics, navigation, stock watering, and water quality with a priority date set when the instream flow rule was adopted.

**Instream Flow Incremental Methodology (IFIM)** – A method of quantitatively relating stream flow to fish or wildlife habitat area. The IFIM combines curves describing the suitability of certain velocities and water depths for selected species and life stages, with measurements of current, depth, and wetted channel width in the area of study, to produce a table relating usable habitat area to stream flow.

**interbed** – A typically thin bed of rock material alternating with contrasting thicker beds of rock.

**interdependent** – Organisms that need each other for survival.

**intermittent stream** – Any non-permanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet both criteria.

**intrusions** – bodies of igneous rock that invade older rock, either as plastic rock masses or as magma.

**invasive species** – Organisms that spread, encroach upon, and take over the habitat of native species.

**invertebrates** – Animals that do not have a backbone.

**Ions** – An atom or group of atoms carrying a positive or negative charge as a result of having gained or lost one or more electrons.

**irrigation** – The application of water to soil for crop production or for turf, shrubbery, or wildlife food and habitat. Provides water requirements of plants not satisfied by rainfall.

**irrigation district** – A cooperative, self-governing public corporation set up as a subdivision of the state, with definite geographic boundaries, organized to obtain and distribute water for irrigation of lands within the district; created under authority of the state legislature with the consent of a designated fraction of the landowners or citizens and having taxing power.

**irrigation return flow** – The part of applied water that is not consumed by evapotranspiration and that migrates to an aquifer or surface water body.

**isohyetal** – Marking the amounts of rainfall.

**isotropy** – The condition in which hydraulic properties of the aquifer are equal in all directions.

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## J

**Jackson turbidity unit (JTU)** – A unit of measure for turbidity (derived from the original "Jackson Tube"). Turbidity is measured by determining the amount of light that is reflected off particles suspended in water.

**Japanese honeysuckle** – *Lonicera japonica*, an exotic invasive plant, originally from East Asia, which grows at the wood's edge.

**junior right** – A water right that is more recent in relation to other water rights, and in times of limited water is legally able to be satisfied only after other senior rights have been fulfilled.

**Jurassic** – pertaining to the Jurassic Period, the middle of three periods on the geologic time scale comprising the Mesozoic Era. Can also be used to describe rock units formed during the Jurassic Period.

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## K

**key watershed** – As defined by USFS and BLM fish biologists, a watershed containing: 1) habitat for potentially threatened stocks of anadromoussalmonids or other fish, or 2) greater than 6 square miles with high-quality water and fish habitat.

**kilogram** – Metric unit of weight equal to 1000 grams or 2.2 pounds.

**kilometer** – Metric unit of measure equal to 1000 meters or 0.62 miles (a square kilometer equals 0.4 square miles or 2.47 acres).

**kudzu** – *Pueraria thunbergiana*, an exotic invasive bean-like vine, originally from China and Japan.

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## L

**lacustrine** – pertaining to sediments deposited in fresh water lake environments, or anything else that is associated with fresh water lakes.

**lake** – A large inland body of salt or fresh water.

**land use** – The way land is developed and used in terms of the types of activities allowed (agriculture, residences, industries, etc.) and the size of buildings and structures permitted. Certain types of pollution problems are often associated with particular land use practices, such as sedimentation from construction activities.

**landfill** – A huge pit in the ground that is lined with clay or plastic and filled with garbage. Layers of garbage are spread out and alternated with layers of dirt or plastic.

**large woody debris (LWD)** – Large woody material that has fallen to the ground or into a stream. An important part of the structural diversity of streams. Usually refers to pieces at least 20 inches (51 cm) in diameter.

**larva (plural larvae)** – The immature stage of an organism that usually looks different than the adult form of the organism.

**latitude** – The angular distance on Earth's surface north or south of the Equator, expressed in degrees, minutes, and seconds.

**leachate** – A soluble material, such as organic and mineral salts, which is washed out of a layer of soil or debris.

**leeches** – An aquatic macroinvertebrate of the *phylum Annelida*, class *Hirudinea*; aquatic worms that do not have legs; tolerant of pollution.

**leopard frog** – *Rana pipiens*. Found all over the United States; lives in scrub, desert, ponds, rivers, and meadows, but prefers swamps in the summer; brown or green with small spots on the side; usually 2-3.5 inches long.

**limiting factor** – Single factor that limits a system or population from reaching its highest potential.

**liter** – A metric unit of volume equal to 1000 cubic centimeters or 1.06 quarts.

**lithology** –The study and description of rocks. Also the physical character of a rock as determined by observations made with the naked eye or with the aid of a low-power magnifier.

**longitude** – The angular distance on Earth's surface east or west of the Prime Meridian at expressed in degrees, minutes, and seconds.

**low flow** – Stream flow level limitations appearing as provisions on permits and certificates issued by the Department of Ecology or its predecessors. (WAC 173-500-050)

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## M

**macroinvertebrates** – Invertebrates (organisms) lacking a backbone and are large enough to be seen with the naked eye (e.g., most aquatic insects, snails, and amphipods).

**marsh** – A wetland with few trees and woody shrubs.

**mass failure** – Movement of aggregates of soil, rock and vegetation down slope in response to gravity.

**maximum habitat flow** – See *optimum instream flow*.

**mayfly** – An aquatic macroinvertebrate of the order Ephemeroptera; larvae have three pair of legs, one pair of antennae, three long tail filaments, and feathery or plate-like gills on their abdomen; sensitive to pollution.

**mean annual flow** – The average of all flows measurable in a river system over the course of a calendar year, or hydrologic year.

**medium, media** – In pollution control programs, media are the components of the environment that may be contaminated with a substance. A program that handles lead contamination in all media is a cross-media program. Thus, lead can be discharged to the air, to the water, or on the land.

**metals** – Elements, such as mercury, lead, nickel, zinc, and cadmium, that are of environmental concern because they do not degrade overtime. Although many are necessary nutrients, they are sometimes magnified in the food chain, and they can be toxic to life in high enough concentrations.

**metamorphosed sedimentary rock** – sedimentary rock that has been changed (metamorphosed) through either heat or pressure or a combination of both.

**meter** – A metric unit of length equal to 3.28 feet or 1.09 yards (a square meter equals 10.7 square feet; a cubic meter equals 35.3 cubic feet or 1.3 cubic yards).

**microbe** – A microorganism; a minute life form.

**microgram**: A metric unit of weight equal to 1,000,000th of a gram.

**microorganism** – An organism of microscopic size; especially a bacterium or protozoan.

**midge** – An aquatic macroinvertebrate of the order *Diptera*; a true fly; larvae are very small, often C-shaped and have a spastic, squirming movement; attach themselves to debris with tiny legs; larvae are tolerant of pollution.

**milligram** – A metric unit of weight equal to 1000th of a gram.

**minute of latitude/longitude** – A unit of measurement equal to 1/60 of a degree. One minute equals 60 seconds latitude/longitude.

**mixed stock** – A fish stock whose individuals originated from commingled native and non-native parents, and/or by mating between native and nonnative fish (hybridization); or a previously native stock that has undergone substantial genetic alteration.

**moisture content** – Amount of wetness.

**moiety** – a molecule of similar structure, but with different atomic substitutions.

**monitor** – To systematically and repeatedly measure something in order to track changes. For example, nitrates in an aquifer might be *monitored* over a period of several years to identify any trends in concentration.

**moratorium** – A delay of action; a suspension.

**municipal discharge** – Effluent from a sewage treatment plant that is usually publicly owned.

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## N

**native stock** – An indigenous stock of fish that has not been substantially impacted by genetic interactions with non-native stocks or by other factors, and is still present in all or part of its original range. In limited cases, a native stock may also exist outside of its original habitat (i.e. captive broodstock programs).

**native** – Occurring naturally in a habitat or region; not introduced by humans.

**nephelometric turbidity unit (NTU)** – A unit of measure for turbidity (as measured by a nephelometer). Turbidity is measured by determining the amount of light that is reflected off particles in the water.

**niche** – The unique role of an organism in an ecosystem.

**nitrate** – A stable form of nitrogen, which is a chemical element that is a major component of proteins, and is essential to all forms of life. Ingestion of water with high concentrations of nitrate causes methemoglobanemia in infants, and may be carcinogenic to adults. One form of nitrogen plants use as a nutrient. One ion of nitrate is composed of one nitrogen atom and three oxygen atoms.

**nitrogen** – An non-metallic element designated with the chemical symbol N. All organisms need nitrogen to build protein.

**nonconsumptive use** – A type of water use where either there is no diversion from a source body, or where there is no diminishment of the water source. (WAC 173-500-050)

**non-native species** – A species that has been imported or brought into an area.

**nonpoint source pollution** – Pollution that enters water from dispersed and uncontrolled sources, such as surface runoff, rather than through pipes. Nonpoint sources, such as forest practices, agricultural practices, on-site sewage disposal, and recreational boats, may contribute pathogens, suspended solids, and toxicants.

**noxious weed** – A plant that is undesirable because it is harmful to other plants.

**NPDES** – National Pollutant Discharge Elimination System. A part of the General Clean Water Act which requires point source dischargers to obtain permits. These permits are referred to as NPDES permits and are administered by the Washington State Department of Ecology.

**nutrients** – Essential chemicals needed by plants or animals for growth, primarily nitrogen and phosphorus. Excessive amounts of nutrients in water can lead to degradation of water quality and the growth of excessive numbers of algae. Some nutrients can be toxic at high concentrations. *See nitrogen*

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## O

**observation** – The use of the five senses to note a phenomenon.

**odor** – The smell or scent of something. Chemicals from waste discharges, microbial activity, or natural sources may cause a body of water to have an odor.

**off-channel habitat** – Channels or ponds in a floodplain, at least seasonally connected to the primary channel, that are in addition to and frequently parallel the primary flowing channel. These generally occur in unconstrained reaches.

**omnivore** – An organism that eats both plants and animals.

**one-half acre rule** – No water right permit is required for the withdrawal of up to 5000 gallons per day from a well when the water is being used for one of several uses including the irrigation of no more than one half acre of lawn or noncommercial garden.

**on-site sewage disposal system** – A sewage treatment system where waste is treated on the owner's property, generally by means of bacterial breakdown in an underground septic tank and disposal of wastewater through a drainfield.

**optimum instream flow** – The amount of stream flow determined by IFIM to be needed to provide maximum usable fish habitat. What is optimum instream flow in any given month also depends upon the

species in question. Also called maximum habitat flow. If Toe Width Method is used instead of IFIM, optimum instream flow represents spawning habitat only.

**organic matter** – Plant and animal residues; substances made by living organisms; contains carbon.

**organic** – Pertaining to or derived from a living organism; a chemical containing a carbon complex.

**organism** – An individual living thing.

**orthophosphate** – Chemistry-based term that refers to an organic phosphate where the phosphate is attached on the ortho position in a benzene ring.

**outcrop** – The exposure of bedrock or strata projecting through the overlying cover of weathering rocks and soil.

**outwash** – Rock material transported by a glacier and deposited by melt-water streams beyond active glacier ice.

**overwintering ponds** – Off-channel ponds linked to the river or slow-moving side channels, either naturally occurring or artificially created. Overwintering ponds offer protection from floods or any juvenile salmonids that winter over before migrating out to sea, spawning, and for primary rearing areas.

**oxidation** – Process by which an atom becomes more positively charged. Reactions with oxygen are the most common (e.g., formation of rust on iron).

**oxygen demand** – The amount of molecular oxygen required for biological and chemical processes in water.

**oxygen saturation** – The maximum amount of oxygen that will dissolve in water at a given temperature. Oxygen saturation is determined by pairing the temperature of the water with the dissolved oxygen value, after first correcting the dissolved oxygen measurement for the effects of atmospheric pressure.

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## P

**PAH** – Polycyclic (polynuclear) aromatic hydrocarbon. A class of complex organic compounds, some of which are persistent and cancer-causing. These compounds are formed from the combustion of organic material and are ubiquitous to the environment. PAHs are found in fossil fuels such as coal and oil and are formed by incomplete combustion of organic fuels like gasoline, wood, and oil. They are commonly formed by forest fires, wood stoves, and internal combustion engines. They often reach the aquatic environment through atmosphere fallout and highway runoff.

**palustrine** – A geologic term pertaining to material deposited in a wetland environment.

**parameter** – A characteristic substance or factor that is measured in order to describe a system. Numerous parameters, such as pH and electrical conductivity, are measured in order to gain an understanding of water quality in streams and aquifers.

**parasite** – An organism that lives in or on another organism, causing it harm.

**pathogen** – A disease-producing agent, usually applied to a living organism, especially microorganisms such as viruses, bacteria, or fungi which can be present in municipal, industrial, or nonpoint source discharges into the Sound.

**PCB** – Polychlorinated biphenyls including about 70 different, but closely related, man-made compounds made up of carbon, hydrogen, and chlorine. They persist in the environment and can biomagnify in food chains because they are not water soluble. PCBs are suspected of causing cancer.

**peak flow** – The highest amount of stream or river flow occurring in a year or from a single storm event.

**penetrate** – To enter or force a way into; to spread or flow throughout an area.

**perched groundwater** – The water in an isolated, saturated area located in the unsaturated zone. It is the result of the presence of a layer of material of low hydraulic conductivity, called a perching bed. A perched aquifer will have a perched water table.

**percolation test** – A test which measures the rate of movement of water into the soil and helps determine the ability of the soil to absorb waste.

**perennial stream** – A stream that typically has running water on a year-round basis.

**perfected water right** – A water right to which the owner has applied for and obtained a permit, has complied with the conditions of the permit, and has obtained a water right certificate.

**permeability** – The ability of a material to allow a liquid to pass through it. Permeable materials, such as gravel and sand, allow water to move quickly through them.

**persistent** – Compounds which are not readily degraded by natural, physical, chemical, or biological processes.

**pesticide** – A general term used to describe any substance-usually chemical-used to destroy or control organisms. Pesticides include herbicides, insecticides, fungicides, insecticides, and others.

**pH** – A scale from 0 to 14 used to measure relative acidity or alkalinity. A pH measurement less than 7 is “acidic”, 7 is neutral, and greater than 7 is “basic” or “alkaline”.

**phosphate** – A form of phosphorous; an essential nutrient for plants and animals; usually present in natural waters as phosphate. Phosphate is an ion composed of one phosphorus atom and four oxygen atoms.

**phosphorous** – A non-metallic element designated with the chemical symbol P; an essential nutrient for plants and animals; usually present in natural waters as phosphate.

**photosynthesis** – A series of chemical reactions in producers, usually plants, in which light energy is used to make chemical energy in the form of food.

**phytoplankton** – Microscopic photosynthetic protists (i.e. bacteria and algae); form the basis of freshwater and marine food webs; the main producers in the open ocean.

**pile wall** – Metal sheets driven into the ground to provide structural stability.

**plankton** – Microscopic organisms that drift freely with water currents; phytoplankton are producers; zooplankton are animals.

**plume** – A contaminated portion of an aquifer extending from the original contaminant source.

**pod** – A seed vessel or fruit of a plant.

**point source pollution** – Pollution coming from a single point (e.g., sewage-outflow pipe).

**point source** – A source of pollutants from a specific pipe. Generally, any pipe which is regulated by NPDES is considered to be a point source.

**pollination** – Sexual reproduction in plants in which pollen is transferred from anther to stigma of either the same plant or another plant.

**pollutant** – A contaminant that adversely alters the physical, chemical, or biological properties of the environment. The term includes pathogens, toxic metal, carcinogens, oxygen-demanding materials, and all other harmful substances. Particularly with reference to nonpoint sources, the term is sometimes used to apply to contaminants arising in low concentrations from many activities which collectively degrade water quality.

**pollution** – Contamination of air, water, or soil by toxic organic or inorganic substances (e.g., industrial or agricultural waste by-products, engine exhausts, factory emissions, or human waste). Pollution can come from a single source (point-source) or be discharged over a wide area from many sources (non-point source).

**pond lily** – An emergent vegetation; water lily of the genus *Nymphaea*; has floating leaves.

**pond snails** – Aquatic macroinvertebrate; *phylum Mollusca*, order *Gastropda*; organism is enclosed within one shell; tolerant of pollution.

**pool** – A deeper area of water in a stream; usually quiet and often with no visible flow.

**population** – A group of organisms of the same species living in the same area.

**porcelain-berry** – *Ampelopsis brevipedunculata*; an exotic invasive plant that grows in intermittently flooded lowland forest.

**porosity** – The percent of space or pores between sediment particles; indicates the amount of water the sediment can hold.

**potable** – Ability to be used as drinking water.

**potentiometric surface** – An imaginary surface representing the total head of an aquifer. The total head consists of the elevation head and pressure head.

**PPB** – Parts per billion; one part per billion by weight or one milligram per metric ton.

**PPM** – Parts per million; one part per million, or one gram per metric ton.

**precipitation** – Condensed water vapor that falls to or forms on the surface as rain, snow, hail, sleet, dew, and frost.

**predator** – An organism that kills and eats other organisms.

**pretreatment** – The treatment of wastes to remove contaminants prior to discharge into municipal sewage systems.

**prey** – A creature hunted or caught for food.

**primary consumer** – An organism that feeds on producers; an herbivore.

**primary productivity** – The amount of energy trapped by photosynthesis. This quantity determines how much life a region will support.

**primary treatment** – A wastewater treatment method that uses settling, skimming, and chlorination to remove solids, floating materials, and pathogens from wastewater. Primary treatment removes about 35 percent of BOD and less that half of the metals and toxic organic substances.

**priority pollutants** – Substances listed by the EPA under the Clean Water Act as toxic and having priority for regulatory controls. The list includes toxic metals, inorganic contaminants such as cyanide and arsenic, and a broad range of both natural and artificial organic compounds. The list of priority pollutants probably includes substances which are not of concern in Puget Sound and does not include all known harmful compounds.

**pristine environment** – An environment remaining in a pure or uncorrupted state.

**producer** – An organism that makes its own food; a photosynthetic organism; an autotroph.

**production type** – The method of spawning and rearing that produced the fish that constitute a stock.

**production zone** – The depth interval in a water supply well from which water is being obtained.

**propagation** – Increased or spread by natural reproduction.

**Public Benefit Rating System** – A point system to determine the current use value of lands classified as open space lands in the Jefferson County Open Space Tax Program. The system considers prioritization of resources, access, transfer of development rights, and fulfillment of County policy goals.

**Public Trust Doctrine** – A judicial doctrine under which the state holds its navigable waters and underlying beds in trust for the public and is required or authorized to protect the public interest in such waters. All water rights issued by the state are subject to the overriding interest of the public and the exercise of the public trust by state administrative agencies.

**pumping test** – A test made by pumping a well for a period of time and observing the change in hydraulic head in the aquifer. A pumping test may be used to determine the capacity of the well and the hydraulic characteristics of the aquifer. Also called aquifer test.

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## Q

**Q factor** – A rating scale that translates water quality test results to a number from 0-100.

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## R

**random** – Having no particular pattern or order.

**rapids** – An extremely fast-moving part of a river, caused by a steep descent in the riverbed.

**reach** – The length of stream channel from a riffle into a pool, usually 1 to 1 1/2 times the width of the channel. (See figure I.7)

**rearing habitat** – Areas required for the successful survival to adulthood by young animals.

**recharge** – Surface water which enters into a ground-water system. This can be natural recharge, such as from precipitation or artificial recharge, such as from irrigation or dry wells.

**recovery** – The return of an ecosystem to a defined condition after a disturbance.

**recurved spit** – A spit with the end strongly curved inward.

**recycling** – The process by which wastes can be reused or converted into other materials or products. The process by which materials and substances are reused.

**redd** – The spawning area or nest of salmonids. The nest is dug into stream gravel to allow water to provide oxygen to the developing embryos and flush out biological wastes.

**Referendum 38** – (Ch. 43.99E RCW and Ch. 173-170 WAC) Approved by voters in 1980, this measure provides financial assistance to public bodies operating agricultural water supply facilities to assist in improving their efficiency of water use beyond current levels. Before implementation of a conservation project the public body must develop a Comprehensive Water Conservation Plan, which evaluates the current system for alternative managerial or structural water conservation improvements. Planning and implementation grants and loans are administered through the Dept. of Ecology.

**refuse** – Waste products, including both wet and dry materials.

**regulatory base flow** – See *base flow*.

**relinquishment** – Water rights reverting to the State for reappropriation because of failure to beneficially use all or part of the right for a five-year period. (see RCW 90.14.160)

**resident fish**: Fish species that complete their entire life cycle in freshwater.

**residential** – Land used for human dwellings and activities.

**respiration** – The process that involves the transfer of oxygen to cells and the breakdown of food to release energy. In complex animals, respiration involves the intake of oxygen and the discharge of carbon dioxide.

**resting / holding pools** – Slow-water off-channel pools which adult salmonids use to rest while migrating upstream to spawn. Resting pools occur naturally or are artificially created as a temporary measure during habitat restoration.

**restoration** – The act of putting something back to a prior condition.

**return flows** – That part of diverted water which returns to the source through seepage, spills, deep percolation, or discharge.

**riffle** – A rapid, turbulent flow of water over a shallow area in a stream. Riffles add oxygen to the water as water is churned, and provide habitat for many invertebrates.

**riffle beetle** – An aquatic macroinvertebrate of the order Coleoptera; larvae are specially adapted to cling to smooth rocks in fast-flowing water (riffles); sensitive to pollution.

**riffle** – A segment of the river channel which has moderate to steep gradient, shallow depth, and has higher flows.

**riparian area** – The land adjacent to streams, rivers, or other bodies of water that directly affects, or is affected by, the water. A unique habitat that exists in mutual balance with the river channel.

**riparian area (1)** – The area between a stream or other body of water and adjacent upland identified by soil characteristics and distinctive vegetation. It includes wetlands and those portions of floodplains which support riparian vegetation.

**riparian area (2)** – The terrestrial areas immediately adjacent to a stream or river where the vegetation complex and microclimate conditions are products of the presence and influence of water. Riparian areas can vary in width from as little as 20 feet to more than 300 feet from the water.

**riparian doctrine** – The system of law dominant in Great Britain and the eastern United States, in which owners of lands along the banks of a stream or water body have the right to reasonable use of the waters and correlative right protecting against unreasonable use by others that substantially diminishes the quantity or quality of water. The right is appurtenant to the land and does not depend on prior use.

**riparian** – Pertaining to the banks and other adjacent, terrestrial (as opposed to aquatic) environs of freshwater bodies, watercourses, and surface-emergent aquifers, whose imported waters provide soil moisture significantly in excess of that otherwise available through local precipitation – soil moisture to potentially support a mesic vegetation distinguishable from that of the adjacent more xeric upland.

**riprap** – Large rocks, broken concrete, or other structure used to stabilize streambanks and other slopes.

**river** – A large natural stream of water emptying into an ocean, lake, or other body of water, and usually fed along its course by converging tributaries.

**river basin** – The land area drained by a river and its tributaries; a watershed.

**river mile (RM)** – a measurement of river corridor length beginning at the mouth of the river.

**rubbish** – Refuse, trash, waste.

**run (a)** – An area of swiftly flowing water, without surface agitation or waves, which approximates uniform flow and in which the slope of the water surface is roughly parallel to the overall gradient of the stream reach.

**run (b)** – Fish stocks grouped together on the basis of similar migration times.

**runoff** –That part of the precipitation, snow melt, or irrigation water that appears in uncontrolled surface streams, rivers, drains, or sewers. Runoff may be classified according to speed of appearance after rainfall or melting snow (direct or base runoff) or according to source (surface runoff, storm interflow, or ground-water runoff).

**runoff** – The portion of precipitation or irrigation water that moves across land as surface flow and enters streams, ditches, drains, or other surface receiving waters. Runoff occurs when the precipitation rate exceeds the infiltration rate.

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## S

**salinity** – Concentration of dissolved salts in water or soil water.

**salmonid** – A fish belonging to the family Salmonidae, including salmon, trout, char, and allied freshwater and anadromous fishes.

**sediment** – Materials in streams or other bodies of water including boulders, cobbles, gravel, sand, silt, and clay. Sediment may suspended in water, transported by water, or settling to the bottom of the water.

**senior right** – A water right that is older in relation to other water rights, and is legally able to be satisfied before others in times of limited water.

**secondary treatment**: A wastewater treatment method that usually involves the addition of biological treatment to the settling, skimming, and disinfection provided by primary treatment. Secondary treatment may remove up to 90 percent of BOD and significantly more metals and toxic organics than primary treatment.

**siltation** – The process by which a river, lake, or other water body becomes clogged with sediment. Silt can clog gravel beds and prevent successful salmonid spawning.

**sinuosity** – Degree to which a stream channel curves or meanders laterally across the land surface.

**sludge** – Precipitated or settled solid matter produced by sewage treatment processes.

**soil permeability** – The ease with which gasses, liquids, or plant roots penetrate or pass through a layer of soil.

**sorption** – The process whereby dissolved substances physically or chemically bind to the surface of particles.

**smolt** – A seaward migrating juvenile salmonid, silvery in color, that has become thinner in body form and is physiologically prepared for the transition from fresh to saltwater.

**spawning population** – Synonymous with the term "stock."

**species** – Includes any subspecies of fish, wildlife or plants, and any distinct population segments which interbreeds when mature. Sec. 3 (15) Endangered Species Act (as amended by the 100th Congress).

**specific capacity** – An expression of the productivity of a well, obtained by dividing the rate of discharge of water from the well by the drawdown of the water level in the well.

**specific conductance** – The ability of water to transmit an electrical current. It is related to the concentration and charge of ions present in the water.

**stock** – The fish spawning in a particular lake or stream(s) at a particular season, which fish to a substantial degree do not interbreed with any group spawning in a different place, or in the same place at a different season.

**stock origin** – The genetic history of a stock.

**stock status** – The current condition of a stock, which may be based on escapement, run-size, survival, or fitness level.

**storm water** – Water that is generated by rainfall and is often routed into drain systems or irrigation ditches to prevent flooding.

**streambed** – That part of the channel usually not occupied by perennial terrestrial plants, but including gravel bars, and lying between the base or toe of the banks.

**subduct** – In plate tectonics, the depressing and passing of one plate margin of the earth under another plate.

**subduction** – The process of descent of one tectonic unit under another.

**subduction zone** – An elongated region along which a crustal block descends relative to another crustal block. Deep oceanic trenches occur along subduction zones.

**sample** – A portion, piece, or segment regarded as representative of a whole.

**sand** – Suspended sediment or bed material with a particle-size of 0.062-2.0 mm in diameter.

**scrubland** – A growth or tract of stunted vegetation.

**scrup-shrub** – A plant community dominated by drought-tolerant sage and ponderosa pine communities.

**secondary consumer** – An organism that feeds on primary consumers; a carnivore.

**second of latitude/longitude** – A unit of measure equal to 1/60 of a minute latitude/longitude.

**sediment** – Loose materials such as rock fragments and mineral grains that have been transported by wind, water, or glaciers.

**sediment load** – Total sediment in a sample of water. There are three categories of sediment: suspended load, dissolved load, and bed load.

**sediment particle size** – The diameter, in millimeters, of sediment. Particle-size classifications are: 0.00024-0.004 mm (clay); 0.004-0.062 mm (silt); 0.062-2.0 mm (sand); 2.0-64.0 mm (gravel).

**sedimentation** – The action or process of forming or depositing sediment.

**sensitive to pollution** – Organisms that are easily harmed by low levels of pollutants. They are good indicators of clean water because they cannot survive in polluted water.

**sewage** – Solid and liquid human and animal wastes.

**shellfish** – An aquatic animal having a shell or shell-like exoskeleton (i.e. mollusk, crustacean).

**silt** – Suspended sediment or bed material with a particle-size of 0.004-0.062 mm in diameter.

**siltation** - To become choked or obstructed with silt.

**soil compaction** – A process that occurs as soil is squeezed repeatedly, decreasing the air spaces between soil particles and making the soil very hard.

**sow bugs** – An aquatic macroinvertebrate; an isopod of the *phylum Arthropoda*, class *Crustacea*; somewhat sensitive to pollution.

**spawn** – To produce or deposit eggs.

**species** – A group of organisms that share similar characteristics and can interbreed with one another to produce fertile offspring.

**spring peeper** – *Hyla crucifer*. A small brownish tree frog, found in eastern North America, having a shrill high-pitched call.

**speed** – The rate that water flows. *See stream.*

**stewardship** – To be responsible for managing property or resources; the individual's responsibility to manage his/her life and property with proper regard for the rights of others.

**stonefly** – Aquatic macroinvertebrate; order Plecoptera; nymphs have three pair of legs, a pair of antennae, and two long tail filaments; typically found on or near stones in the stream; sensitive to pollution.

**stream** – A body of water flowing in a natural channel and containing water at least part of the year.

**striped bass** – *Roccus saxatilis*. A food and game fish of North American coastal waters, having dark longitudinal stripes along the sides.

**submerged aquatic vegetation (SAV)** – Benthic plants that grow totally under water. (e.g., hydrilla, coon tail, wild celery, eel grass).

**suburban** – The area or communities surrounding a major city.

**suspended load** – Sediment that contains organic and inorganic particulate matter suspended in and carried by moving water.

**suspended sediment (solids) –** Very fine soil particles that remain in suspension in water for a considerable period of time without contact with the bottom, due to the upward components of turbulence and currents.

**swamp** – A wetland that contains trees and woody shrubs.

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## T

**taxa** – Categories in the biological classification system for all living organisms. They are used to help organize information about the natural world.

**tectonic** – Pertaining to, or designating the rock structure and external forms resulting from the deformation of the earth's crust. As applied to earthquakes, it is used to describe shocks not due to volcanic action or to collapse of caverns or landslides.

**tertiary consumer** – A carnivore that feeds on other carnivores.

**thalweg** – The deepest part or middle of the river or stream channel. The thalweg remains constant through both low and high flows, until it is changed by gravel movement in high flows.

**threatened species** – Those plant or animal species likely to become endangered species throughout all or a significant portion of their range within the foreseeable future. A plant or animal identified and defined in accordance with the 1973 Endangered Species Act and published in the Federal Register.

**thrust faulting** – a type of rock faulting wherein the hanging wall of the fault is moved upward, in contrast to normal faulting wherein the hanging wall goes downward.

**Timber/Fish/Wildlife Agreement** – A 1987 cooperative agreement between Tribal, Forestry, and State interests. The agreement establishes a natural resource management process for forest practices on state and private lands in Washington State.

**toe width** – A method used to estimate instream flows necessary to provide habitat for salmon and steelhead. It was developed in the 1970s in western Washington by the U.S. Geological Survey (USGS), in cooperation with the Washington Department of Fisheries (WDF) and the Washington Department of Game (WDG). The method is based on statistical regressions of habitat, as measured in pilot studies based on actual fish habitat selection, on stream channel widths measured between the toes of the banks. Toes of the bank in riffle areas are indicated by change in cross-section slope, change in

substrate, and sometimes by vegetation change. The toe width (usually an average of multiple measurements) is plugged into formulas for juveniles and spawners of different species of salmon and steelhead.]

**tolerance** – The ability to endure; resistance to toxic substances or other pollutants.

**topographic** – refers to physical relief features or surface configuration of land.

**topsoil** – The surface layer of soil, usually rich in humus.

**total dissolved solids (TDS)** – total dissolved materials in the water column; material left behind after a water sample is filtered and evaporated. Rainwater will have TDS less than 10ppm; municipal water systems will have TDS less than 500 ppm.

**total phosphorus** – A test that measures all the forms of phosphorus in a sample.

**total suspended solids (TSS)** – The total concentration of dissolved and suspended solids in water (see *suspended solids*).

**toxic** – A substance that is harmful or, in some cases, poisonous, if ingested or touched. A substance that damages the pristine state of the environment.

**transect** – A long, narrow sample study area.

**transfer** – A movement of water or water rights that involves a change in point of diversion, a change in type of use, or a change in location of use.

**trash** – Dry waste material, such as boxes and cans.

**tributary** – A smaller river or stream that flows into a larger river or stream. Usually, a number of smaller tributaries merge to form a river.

**Trust Water Right program (TWR)** – A Dept. of Ecology program created by the Washington State legislature in 1991 to facilitate the voluntary transfer of water and water rights, including conserved water, to provide water for presently unmet and emerging needs. Possible methods for transfer include dry year lease options, temporary or permanent changes in the place or type of use of a water right (i.e. from off-stream uses to instream flows), water banking managed by the state, the transfer of water conserved by a water conservation project or by gift.

**turbidity** – The amount of solid particles suspended in water that cause light rays shining through the water to scatter. It is a surrogate measure to TSS for the amount of material suspended in the water column. Increasing the turbidity of the water decreases the amount of light that penetrates the water column. High levels of turbidity may be harmful to aquatic life and fail federal water quality standards. Turbidity is measured in nephelometric turbidity units (NTUs) or Jackson turbidity units (JTUs).

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## U

**unbiased** – Impartial; without prejudice.

**unconsolidated sediments** – sediments that have not become firm and coherent through a variety of earth processes. Sediments consolidate through processes that include compression, dewatering, interstitial cementing, deep burial and associated heating, and deviatoric pressure.

**unknown stock** – This description is applied to stocks where there is insufficient information to identify stock origin or stock status with confidence. (SASSI)

**urban** – Pertaining to or constituting a city.

**usual and accustomed area** – A provision of the treaties between Indian Tribes and Isaac Stevens, Washington Territorial Governor, which allowed the Tribes the continuing right to take "fish at usual and accustomed" areas "in common with all citizens of the United States." These areas were further delineated based on historical information for each Tribe in 1974 after State Supreme Court Judge Boldt reaffirmed and clarified the treaty rights.

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## V

**variable** – A condition in a scientific experiment or observation that is subject to change. A variable factor in which change occurs naturally or is made to occur by the investigator is called the independent variable; a variable that changes as a result of change in the independent variable factor is called the dependent variable.

**vegetation** – Plants or plant life, in general. The condition of the vegetation around a stream is a good indication of the health of the aquatic environment.

**velocity of a stream** – The speed and direction of the water flowing in a stream, an important factor in determining what organisms can live in the stream. Measured in units such as feet/sec or meters/sec.

**verge vegetation** – Vegetation that starts at the top of the stream bank and extends from the bank to the next major vegetation or land use change.

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## W

**Watershed Assessment Unit (WAU)** – Watershed areas delineated by Ecology for the purpose of watershed planning. WAU's in the Okanogan are generally consistent with a fifth field HUC delineation (i.e., HUC-5).

**water penny** – Aquatic macroinvertebrate of the family *Psepheridae*; larvae are very flat oval or round shapes and are tan, brown, or black in color; have six small legs and cling to the undersides of rocks; sensitive to pollution.

**water quality index (WQI)** – A method for measuring water quality in rivers. Nine parameters are measured and weighted to develop the index: dissolved oxygen, fecal coliform, pH, biochemical oxygen demand, temperature change, total phosphates, nitrates, turbidity, and total solids.

**Water Resource Inventory Areas (WRIA)** – In the early 1970's Washington State was divided by Dept. of Fisheries into 62 watershed areas which have since been used by state agencies to organize water-related information and define planning projects. Eastern Jefferson County (WRIA 17), and Eastern Clallam County (WRIA 18) comprise the DQ Project area.

**Water Resources Forum (WRF)** – Designed by the 1990 Chelan Agreement and funded by the Washington State Legislature, the Water Resources Forum is a planning group representing the Statewide interests of agriculture, business, the environment, fisheries, local government, recreational users, state government, and the tribes. The Forum's task was to address the issues groundwater recharge, instream flow, and hydraulic continuity and write policy applicable State-wide.

**water right application** – An application by a prospective water user to the Department of Ecology for a water right permit. It is required to divert any amount of surface water or withdraw ground water in amounts greater than 5000 gallons per day or to irrigate more than a half acre of land. The application requires publication of legal notice to announce application, a 30-day public protest period, and a field examination by Ecology recommending approval or denial of the permit.

**water right certificate** – The final stage in establishment of a water right under state law after filing an application, receiving a development permit, and putting the water to a beneficial use. The certificate states the quantitative and locational parameters of the water right. Certificates are also issued at the conclusion of an adjudication. Once a certificate is issued or perfected, no further expansion is allowed under that water right.

**water right claim** – A water right claim is not a water right. It is a registration with the State by the property owner regarding water use not authorized by a permit or certificate. A claim may represent a valid water right if it describes a water use existing prior to water codes: 1917 for surface water and 1945 for ground water. Claims registered are evaluated for sufficient evidence to satisfy the Dept. of Ecology that a valid water right would be confirmed if the claim were adjudicated.

**water right permit** – An approval of an application by the Dept. of Ecology, allowing construction of a water system and use of water.

**water right** – The legal right to use a specific quantity of water on a specific time schedule, at a specific place and for a specific purpose. In 1917 legislation was passed providing that all surface water (and in 1945 all ground water) within the State belonged to the State, and any right to use the water could be obtained by filing an application and being granted a permit for the development of the water system.

**water snipe** – Aquatic macroinvertebrate; family *Athericidae*; pale green tapered body with many caterpillar-like legs, conical head, feathery "horns" and back end; somewhat sensitive to pollution.

**water table** – The upper surface of ground water, or the level below which the soil is saturated with water.

**waterfowl** – Birds whose primary habitat is aquatic.

**watershed** – The geographic region within which water drains into a particular river, stream, or body of water. A watershed includes hills, lowlands, and the body of water into which the land drains. Watershed boundaries are defined by the ridges of separating watersheds.

**weed** – A plant considered unattractive, undesirable, or troublesome.

**wetland** – A lowland habitat, such as a marsh, swamp, or bog where the influence of surface or ground water has resulted in development of plant or animal communities adapted to aquatic or intermittent wet conditions. Wetlands generally require the following three conditions: hydric plants, hydric soils, and hydrology. Wetlands generally include, but are not limited to, swamps, marshes, bogs, and similar areas.

**wild celery** – A native SAV, *Vallisneria americana*. It is found in freshwater rivers and tributaries of the Chesapeake Bay. It has linear ribbon-like leaves, 1.5 m long and 1 cm wide, emerging from the base of the plant.

**wild stock / fish** – A stock that is sustained by natural spawning and rearing in the natural habitat, regardless of parentage (includes natives).

**wildlife / wildlife resources** – Birds, fishes, mammals, and all other classes of wild animals and all types of aquatic and land vegetarian upon which wildlife depend. (Fish and Wildlife Coordination Act)

**wildlife habitat** – Waters of the State used by fish, other aquatic life, and wildlife of any life history, stage, or activity. (see WAC 173-205-025)

**wildlife** – Species of the animal kingdom whose members exist in the wild state. This includes mammals, birds, reptiles, amphibians, fish and invertebrates. (see RCW 77.12.020 / RCW 77.16.120 for classifications on predatory and game birds and protected wildlife.)

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## Z

**zooplankton** – A diverse group of small protists and animals, such as tiny crustaceans, that serve as food for larger freshwater and marine invertebrates.

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# EXECUTIVE SUMMARY

## INTRODUCTION

The Level 1 Watershed Technical Data Assessment for WRIA 49 (Okanogan) provides the Planning Unit with a survey and compilation of existing information that may be useful in watershed planning. It is a tool intended to summarize the extent and quality of existing data, identify data gaps, and help the Planning Unit bring issues of concern into focus and decide on next steps in the watershed planning process.

The Level 1 Report is available on CD and can be downloaded from the Lotus QuickPlace website established for the Planning Unit. It includes a summary report intended to be user friendly, an Atlas of Maps, and a set of appendices (available only on CD) which provide the detailed information and data from which the Level 1 summary is drawn.

Chapter 1 of the Level 1 report provides an overview of the watershed planning process and the history of watershed planning in WRIA 49. Chapter 2 provides an overview of information at a watershed scale to develop a water balance. Chapters 3 through 6 address water quantity, water storage, water quality, and aquatic habitat, respectively. Chapter 7 very briefly summarizes data gaps and recommendations.

The Level 1 Report appendices include information and data files on water quantity (Appendix A); water quality (Appendix B); water storage (Appendix C); climate, water temperature and streamflow (Appendix D); and methods used in compiling the Level 1 Report (Appendix E). Appendix F contains the full bibliography of resources considered for the Level 1 Report. Many of the reports listed in this bibliography, while topical to the basin, provided essentially no information of applicability to the current Level 1 assessment and were not reviewed. We have attempted to reflect the usefulness of the information identified from the basin obtainable from these reports, including data quality and reliability, in the file provided in this Appendix. However, a thorough quality assurance and control audit of the hundreds of reference sources with some information and/or data about the Okanogan basin was well beyond the scope of the current effort. As will be seen from reviewing the extensive bibliography, very few of the data sources actually provided or contained original data of applicability to tasks such as water quality, habitat, water quantity and/or flow assessment. Our review focused on these sources, as well as more recent data sources and/or data repositories, some of which have yet to be released to the public domain.

The five major watershed assessment unit (WAU) subbasins delineated for WRIA 49 by Ecology and used in this report include: (1) Joseph, Salmon, Omak, Sinlahekin, and Osoyoos basins. Smaller scale subbasin delineations are possible using hydrological unit criteria (HUC) that delineate specific tributaries captured within the broader subbasins, and these are reflected in the GIS maps provided with the report. In this

Level 1 report, data are collected and presented at the lowest level of detail appropriate and available.

## WATERSHED OVERVIEW AND WATER BALANCE (CHAPTER 2)

This section highlights key findings identified from the review of existing information regarding the physical presence and availability of surface and ground water in WRIA 49, and the overall water balance of the watershed.

WRIA 49 is comprised of five major subbasins (Sinlahekin, Osoyoos, Salmon, Omak, and Joseph). These subbasins are defined by hydrology, using a scale called "hydrologic unit criteria, or HUC." They collectively comprise 33 smaller individual drainage basins that either discharge directly into the Okanogan River or discharge into a major stream that drains to the Okanogan or Columbia Rivers. Data compilation and review were organized based first on the five major subbasins and second on individual drainage basins.

Precipitation data indicate that the Sinlahekin and Salmon Subbasins receive significantly more water (124 to 166 percent more) than do the other three subbasins. Over the past 100 years, significant long-term dry periods occurred in the 1920's and 1960's and have had a significant effect on cumulative surface water storage and/or groundwater storage.

Although the Similkameen River is considered a major tributary to the Okanogan River, its flow, on average, is actually more than 4.4 times the flow of the Okanogan. The Sinlahekin streams have the greatest average annual streamflows and have flows approximately three to four times greater than those in the Omak subbasin, which have the lowest annual average. This is due to such factors as higher overall elevation, greater precipitation (including snowmelt), and more favorable rocktypes in the Sinlahekin subbasin.

In general, throughout WRIA 49 peak discharges occur during the period from April through July and reflect primarily snowmelt or snow on rain events, when streams contribute about 70 to 80 percent of their average annual discharge. Low flows occur from August to October and reflect the relatively low summer rainfalls and depleted groundwater storage, which occurs primarily in unconsolidated sediments of the major stream valleys throughout the Okanogan Watershed.

Water balances were computed for each major subbasin using precipitation map data, mean annual streamflow data, and assumptions regarding evapotranspiration and recharge processes. In general, the calculations indicate that, depending on subbasin location, 82 percent to 98 percent of precipitation is returned to the atmosphere via evapotranspiration. Because the Sinlahekin and Salmon subbasins not only receive more total water per unit area but also have lower evapotranspiration rates, more water is available to recharge groundwater and support higher streamflows in these subbasins. Thus, mean annual streamflow is signficantly higher in the Sinlahekin

subbasin – an order of magnitude higher than in the Osoyoos and Omak subbasins, and two orders of magnitude higher than in the Joseph subbasin.

Throughout the Okanogan Watershed, the availability of groundwater in the Omak subbasin is limited to unconsolidated sediments of the major stream valleys. Groundwater recharge is roughly estimated to ranges from a low of 1.5 percent of precipitation in the Joseph subbasin to a high of 5 percent of precipitation in the Salmon and Sinlahekin subbasins. Similarly, the percentage of runoff as precipitation is roughly estimated to range from a low 0.2 percent in the Joseph subbasin to a high of 12.8 percent in the Sinlahekin subbasin. Calculations of water balance and water availability are presented in Chapter 2.

## WATER QUANTITY ASSESSMENT (CHAPTER 3)

This section highlights key concerns identified from the review of existing information concerning water rights and water use. They include concerns related to subbasins, water systems, the City of Oroville water supply, agricultural water supply, rivers and creeks in the WRIA, and Canadian water issues.

### Subbasins of Concern

WRIA 49 Subbasins of Concern are defined as areas where current demands or projections of future demand equal or exceed the supply of water.

Level 1 assessment suggests that several WRIA 49 subbasins may be overappropriated in both surface and ground water (that is, more water rights may have been issued than can be sustainably supported). However, preliminary water use information suggests that while these waters may be overappropriated, they may not be overused. Appropriation data by subbasin are summarized in Appendix A-1.2b.

Figures ES-1 and ES-2 compare net runoff to streams (defined as described in Chapter 2 and Appendix E) to surface water appropriations. The Joseph and Osoyoos subbasins appear to be overappropriated for both surface and ground water, while the Salmon subbasin appears to be overappropriated only for ground water. Projecting appropriations to meet water demand to 2026, the Salmon subbasin would also become overapproriated for surface water in 20 years, but appropriations in the Sinlahehin and Omak subbasins would remain well below the available surface and ground water.

### Water Systems of Concern

WRIA 49 Water Systems of Concern are defined as those which are experiencing deficits in ability to meet peak or annual water demand, or which do not have sufficient water rights to serve these demands. These concerns may exist now, or may be projected to occur within the next 20 years.

**Figure ES-1: Current Appropriation of Surface Water (AFY)**

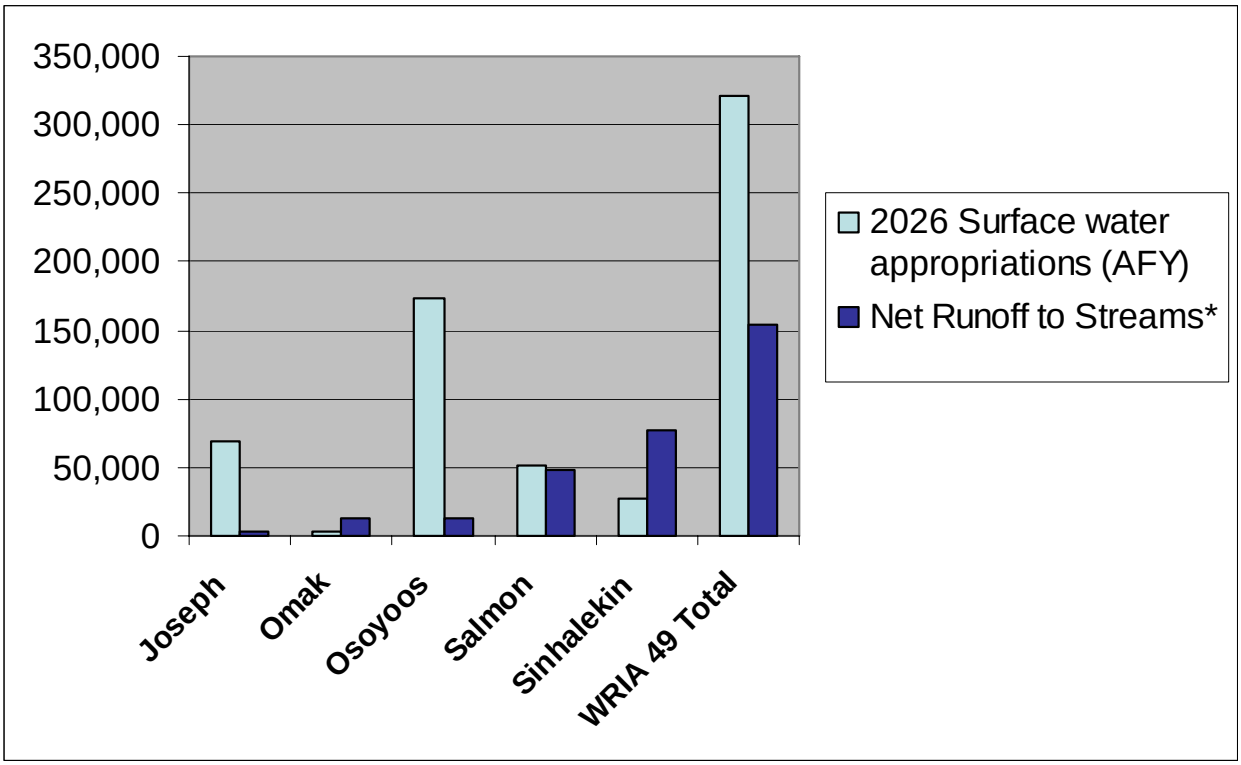
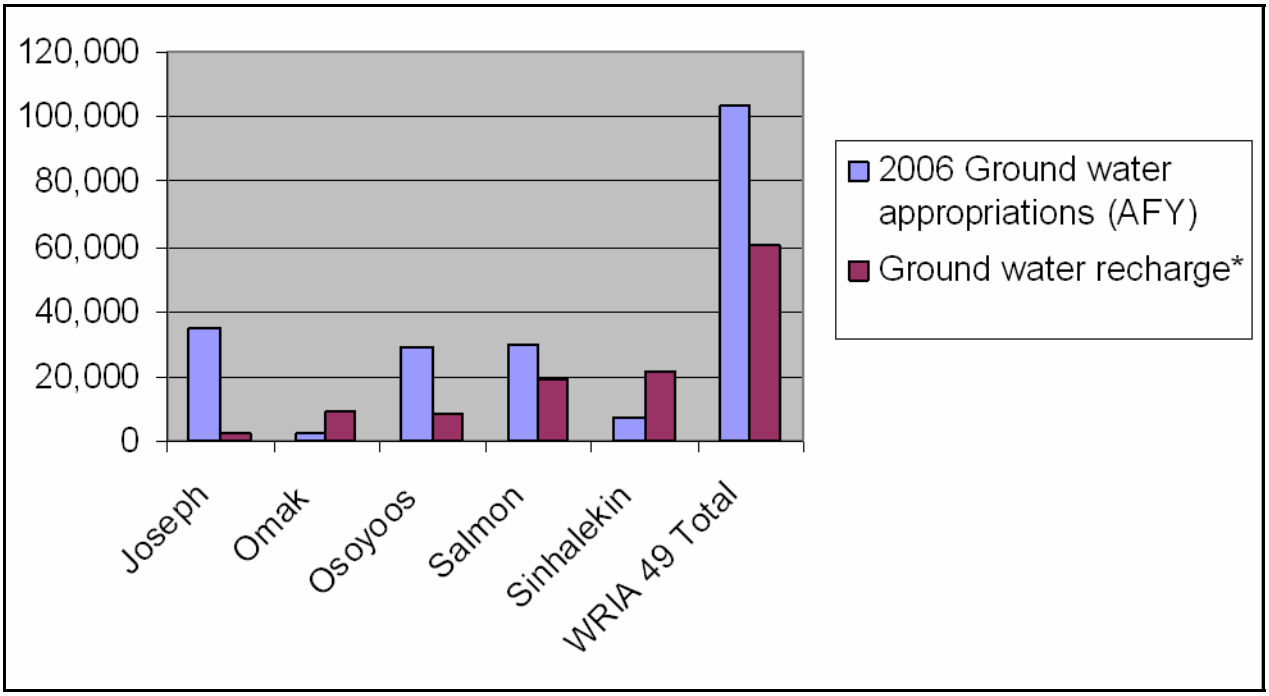



**Figure ES-2: Current Appropriation of Groundwater**



Comprehensive Water System Plans were reviewed for the six major Group A water systems in WRIA 49 (Brewster, Okanogan, Omak, Oroville, Riverside, and Tonasket). Data are summarized in Appendices A-3.1 and A-3.2. All of these systems currently have adequate source capacity and water rights to meet current demand on both an annual and a peak basis. Projecting to 2026, all seven systems have adequate source capacity to meet annual demand, but Brewster, Okanogan, Oroville, and Riverside would need to develop additional pumping capacity (Figure ES-3).

Turning to water rights, by 2026 Okanogan would have nearly fully used its instantaneous water rights, and both Brewster and Riverside would need additional instantaneous water rights (Figure ES-4). Brewster's deficit would be small (45 gpm), but Riverside, with an existing 650 gpm in water rights, would need to add an additional 433 gpm.

The greatest concern lies with the water systems' annual water rights. Brewster has already fully used its existing water right of 1,205 acre-feet per year (AFY), and by 2026 is projected to need an additional water right of 887 AFY (Figure ES-5). Oroville (279 AFY), Riverside (227 AFY), Okanogan (137 AFY), and Tonasket (78 AFY) would also need additional annual water rights. The City of Oroville water system, serving the high-growth north end Lake Osoyoos area, is of particular concern and is addressed in more detail below.

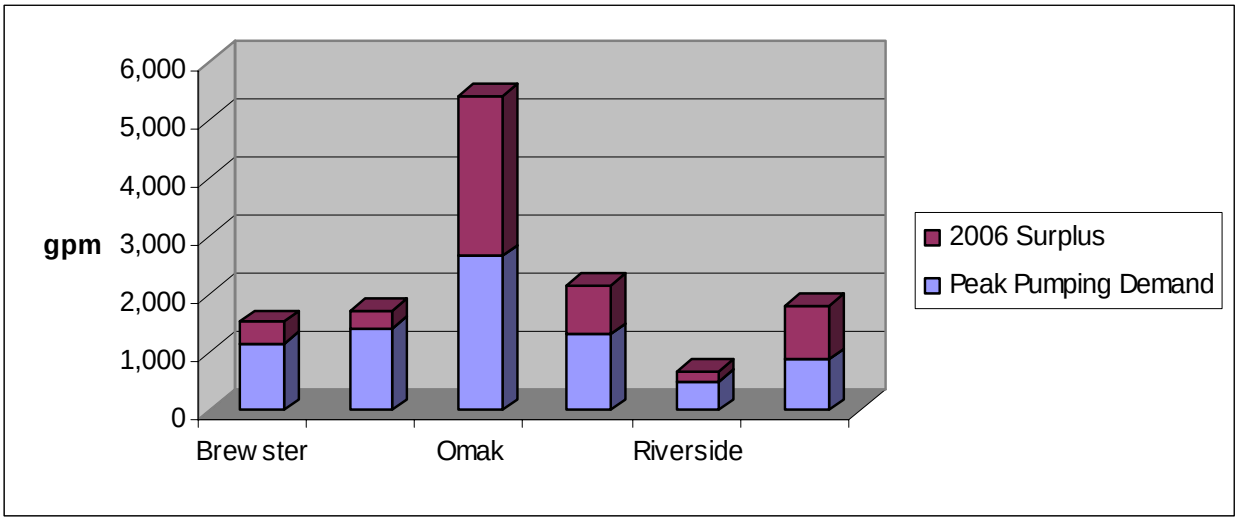
### City of Oroville

The City of Oroville is located at the south shore of Lake Osoyoos, just north of the confluence of the Okanogan and Similkameen Rivers. A summary of the City's water system and water supply capacity is provided in Appendix A-3.4. The City draws its municipal water supply through four wells, all tapping an aquifer that is recharged by the Similkameen River. Combined, the City's wells can pump up to 2,700 gpm out of the Similkameen aquifer.

The City's water rights currently total 1,095 AFY and 2,775 gpm. Anticipating future growth around Lake Osoyoos, in 1985-86 the City applied to the Washington Department of Ecology for primary and supplemental water rights from the Similkameen Aquifer. Ecology has not acted on these applications, and they are among the oldest pending applications in the State.

The City has entered into an agreement with Legend Resorts to provide water to the Veranda Beach resort development on Lake Osoyoos in exchange for an unperfected water permit intended to serve the development. However, Ecology determined that this source is in continuity with Lake Osoyoos and denied the transfer. Developing new sources within the permitted area of withdrawal has proven difficult due to the requirement for expensive water treatment. (By contrast, the City is not required to treat its withdrawals from the Similkameen Aquifer at all.)

## Figure ES-3: Source Capacity Pumping Surplus/Deficit (2026)




## Figure ES-4: Instantaneous Water Rights Surplus/Deficit (2026)

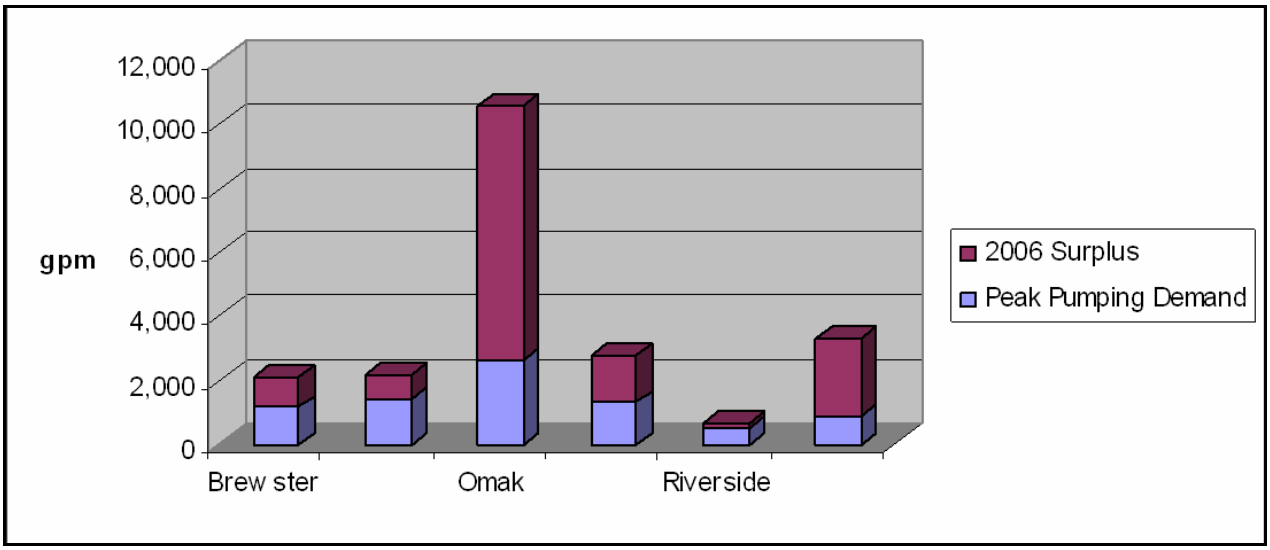
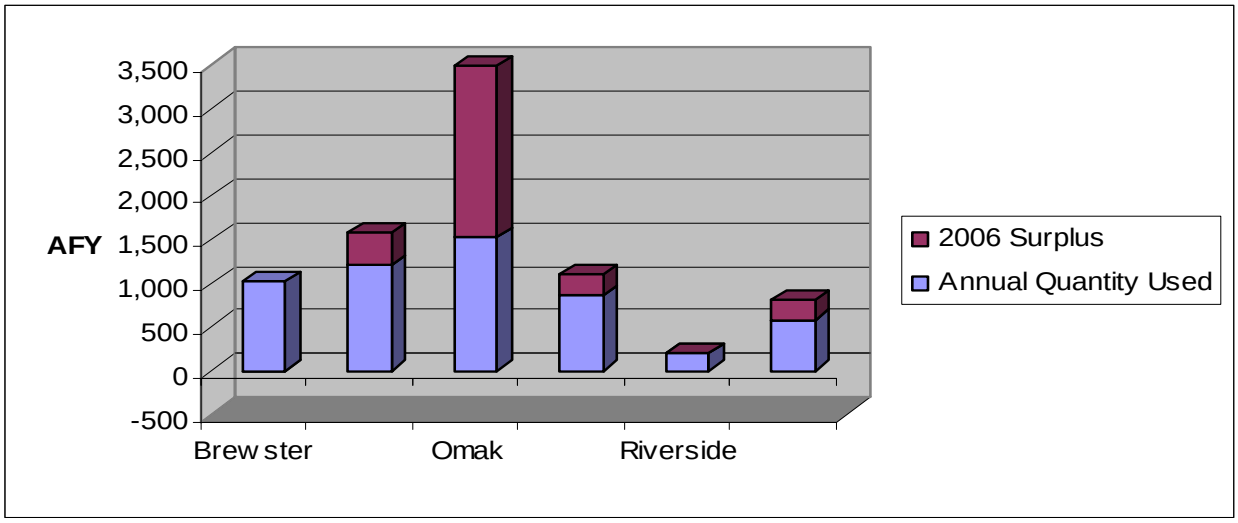


**Figure ES-5: Annual Water Rights Surplus/Deficit (2006)**




Interest in additional development around the Lake has rapidly increased, driven in part by the planned construction of a 12-inch water line and 10-inch sewer line on the east shore. Additionally, the Okanogan Valley in British Columbia has experienced rapid growth, and Canadian developers are looking for opportunities to purchase water from American sources. The City has long anticipated the economic boost of this development, as agriculture and timber production decline.

The City had ample source and water rights capacity to serve its projected 20-year population growth only a few years ago. Growth on East Lake Osoyoos was projected in the City's water plan at 3 percent, but recent trends indicate that this projection is probably considerably understated. Recent inquiries made to the City regarding annexation indicate that this rate could double within the next year or two. This, coupled with the Veranda Beach development, indicates that demand in the urban growth area and related service area can be expected to increase substantially.

The City's water rights could be consumed by new demand outside the City limits, affecting economic development opportunities and leaving property owners within the City unable to access water for development. Responding to this concern, the Oroville City Council has invoked a moratorium on additional connections outside the City until the uncertainty concerning water rights addressed. Currently, there are 30 pending applications for water connections in the service area outside the City that are subject to the moratorium. In the meantime, several short plats have been approved that will result in exempt wells, and the City has been advised by Okanogan County that at least one long plat application has been vested that will require a community system or similar arrangement within their water service area.

In summary, within 20 years the City is projected to have a 200 gpm deficit in their ability to pump water to meet peak-hour capacity under their existing water rights. This projection does not consider the acceleration of growth and development interest within

the past year for the Lake Osoyoos area, which could double new demand and substantially increase the projected deficit.

### Agricultural Water Supply Concerns

WRIA 49 agricultural water supply concerns are related to the adequacy and reliability of water supply for agricultural purposes.

No concerns regarding the adequacy of the agricultural water supply were highlighted by the Level 1 assessment, for two reasons: (1) it appears that farmland conversion is occurring, taking land out of production and reducing the overall future water demand for agriculture; and (2) in-depth analyses of WRIA 49 irrigation districts' water balances are available only for Okanogan Irrigation District. However, the conversion of agricultural land into other uses does not eliminate the demand for water on those lands, and could even increase it. Chapter 6 identifies data gaps and recommendations for Planning Unit consideration to assess the rate of agricultural land conversion, estimate water demand for lands converted from farm use, and develop water balances for the major irrigation districts.

### Rivers and Creeks of Concern

WRIA 49 Rivers and Creeks of Concern are defined as those which are overappropriated (water rights exceed mean annual flow or low flow), or which exceed key water quality parameters making their waters unsuitable for human consumption or for habitat.

Appropriation of surface flow was used to identify rivers and creeks of concern in the Level 1 assessment. The evaluation of concern is based on the comparison of appropriated flow with mean annual flow or, better, low flows (fish habitat and other concerns are better reflected by the proportion of flow appropriated during the low flow season). Level 1 assessment identified important gaps in our ability to identify streams from which water has been appropriated. About 28 percent of WRIA 49 water rights to divert from streams do not name the stream from which water is diverted. A total of 126 streams are named in water rights. ENTRIX summarized data for the 23 named streams that have more than 1 cfs of flow appropriated (Appendix A-1.2b); of these we have flow data for only 13. Flow data for 9 of the 13 suggest that these streams may be overappropriated (Table ES-1), and part of a tenth stream (Lower Salmon Creek) is dewatered by irrigation diversions every summer. In addition, unquantified water claims could affect a much longer list of streams.

### Canadian Water Issues

Water tension has risen between Canada and U.S. as population growth puts more pressure on shared resources. Statistics Canada has identified the Okanagan-Similkameen region as having the lowest amount of water available per person in Canada (Alexander et. al. 2005). Rapid development in Canada and the drive to

increase orchard yields in the U.S. have discovered the basin's limiting factor: water. The Canadian Water Resource Association suggests that, at present rates, the water resources of the basin will be completely allocated in fewer than 25 years. Several Okanogan communities are already experiencing shortages in drought years and are taking steps toward demand management. On the US side, minimum instream flow targets have not been met for some years (Plan of Study for Renewal of the International Joint Commission Osoyoos Lake, January 29, 2006 Glenfir Resources).

**Table ES-1: Rivers and Creeks of Concern**

| STREAM | APPROPRIATED FLOW (CFS) | MEAN ANNUAL FLOW (CFS) | PERCENT APPROPRIATED | LOW MONTHLY SUMMER FLOW | PERCENT APPROPRIATED |
|---|---|---|---|---|---|
| ANTOINE CREEK | 8.87 | no data | no data | 0.01 | 88700% |
| BONAPARTE CREEK | 16.475 | 5 | 330% | 0.04 | 41188% |
| JOHNSON CREEK | 23.30 | 5.00 | 466% | 0.8 | 2913% |
| LOUP LOUP CREEK | 3.13 | 1.60 | 195% | 0.01 | 31250% |
| PEONY CREEK | 2.56 | 2 | 128% | 0.5 | 512% |
| SALMON CREEK | 15.97 | 30 | 53% | 2 | 799% |
| SINLAHEKIN CREEK | 364.77 | 53.5 | 682% | 12.1 | 3015% |
| TOATS COULEE CREEK | 115.55 | 45.8 | 252% | 9.6 | 1204% |
| TONASKET CREEK | 379 | 3.22 | 11770% | 0.7 | 54143% |
| TUNK CREEK | 1.3 | 3.1 | 42% | 0.1 | 1300% |

**Note:** does not include water claims; all flows below the OID Diversion Dam are normally appropriated.

Although the Okanagan serves as an ecological corridor, human use of the basin is anything but continuous. The basin simply looks different on either side of the border. To the North, the Okanagan region is one of British Columbia's most densely populated regions, with one of the fastest growing populations in Canada, exploding from 195,000 in 1976 to almost 400,000 today. On the American side of the border, Washington's Okanogan has been called on of the last outposts of frontier life and its population is as disparate as that image connotes – all of Okanogan County (of which the basin comprises about 67 percent) has only 38,000 residents.

Osoyoos Lake is an international water body located on the Okanogan River, with its upper portion in Canada and lower portion, including the structure that controls lake outflow, in the United States. Both the City of Oroville on the south side of the Lake and Osoyoos in the Canadian mid-lake region are experiencing rapid growth in population centers around the lake. Growth is leading to concerns on both sides of the border about the future availability of water, and about the effects of actions on each side on water supply for the other side. The situation appears to be ripe for collaborative development of future water supplies.

## INTERNATIONAL COOPERATION ON WATER

An International Joint Commission was established under the 1909 Boundary Waters Treaty to prevent and resolve disputes between the United States of America and Canada. Among other functions, the Commission rules upon applications for approval of projects affecting boundary or transboundary waters and may regulate the operation of these projects. Cooperation continued with the formation of the International Pacific Salmon Fisheries Commission in 1937 for the protection and preservation of sockeye and pink salmon in the Fraser River system (renamed and extended in 1985 to include Washington, Oregon, Idaho, British Columbia and southeast Alaska). In 1964 Columbia River Treaty (CRT) addressed declining sockeye population, and in 1969 the Canadian federal government and the Province of B.C. begin study to develop framework for management of water resources in the Okanagan Basin. In 1996 Douglas County approached Canadian resource managers about potential collaboration and 1997 the Okanagan Basin Technical Working Group formed. The Canadian Okanagan Basin Technical Working Group is a tri-partite working group dealing with technical issues associated with management of salmon and resident fish stocks and their associated habitat requirements in the Canadian portions of the Okanagan River basin. In 2000 the South Okanagan-Similkameen Conservation Program (SOSCP), was created by the Ministry of Environment Lands & Parks, and Environment Canada.

## WATER STORAGE ASSESSMENT (CHAPTER 4)

Two previous studies of potential water storage opportunities were identified, one in the Salmon Subbasin and the other on the Similkameen River. The Salmon Creek study was completed in 1998-1999 and provided a “fatal flaw” level of screening considering the timing and amount of water potentially available at each storage site, the cost and timeframe to develop storage at the site, engineering feasibility, regulatory requirements, and environmental costs and benefits. This study was completed for a Joint Committee comprised of the Colville Confederated Tribes (CCT) and Okanogan Irrigation Districts (OID). It was particularly sensitive to environmental conflicts, because environmental restoration (of Salmon Creek) was the goal of the project. This study considered aquifer storage and recovery (ASR), and several specific surface sites, as well as a new reregulating reservoir for OID. Brown Lake and a high dam at Salmon Lake were considered the most feasible among the surface storage sites. Data for evaluating groundwater storage (ASR) were quite limited, but was considered capable of producing a firm yield of 800 AFY at a cost of approximately $2.5 million.

Storage opportunities on the Similkameen River have been studied historically by the Army Corps of Engineers (USACE), OTID, and have been more recently considered by the Okanogan PUD. Storage using flashboards at Enloe Dam remains under consideration as part of the FERC License Application for the project, but has not been

decided. The WRIA 49 Planning Unit endorsed studying this concept, but the grant application to do so was not funded by Ecology.

OTID and its predecessor (West Okanogan Valley Irrigation District) studied and obtain rights to storage at Palmer Lake. The projects appeared feasible; it is not clear why they did not move forward.

In 1948, the Corps issued a study of major storage and hydro opportunities on the Columbia River and its tributaries. A high dam at Shanker's Bend was included in that study, but was not constructed (although most, if not all, of the other projects were). The site continued to be studied in the 1950's, 1970's and 1980's. The site appears to offer potentially regional storage benefits, providing hydroelectric generation, water storage, and flood control, as well as potential improvements to fish habitat in the Okanogan. Various configurations of the project have entailed as much as 1.6 MAF of flood storage, 84 MW of electric power generation, and 162,000 AF of usable water storage.

## WATER QUALITY ASSESSMENT (CHAPTER 5)

The water quality assessment provided in Chapter 5 summarizes existing water quality monitoring data collected from the Okanogan River and its tributaries by the Colville CCT, the OCD, the US Geological Survey (USGS), and the Washington State Department of Ecology (Ecology). Where data were available, the source water quality data from the mainstem Okanogan and each of its tributaries were examined and compared against existing water quality criteria promulgated (made into law) by the State of Washington. Other relevant biological or physical metrics were used in cases where no specific criteria have been promulgated.

Previous studies that have attempted to synthesize existing water quality information for the entire basin (e.g., Montgomery Water Group et al. 1995, Golder and ENTRIX 2001, NWPPC 2004, OCD 2005), were limited in their conclusions by the availability of quantitative data. However, consistent with the objectives of the Okanogan Water Quality Management Plan (OCD 2005) recent efforts over the past five years have produced baseline water quality measurements in most of the major tributaries in the basin from which to gauge conditions. The type of information available for any given location in the basin is highly variable and depends on land ownership patterns, resource status, and study objectives. Although various data sets were collected using different methods, this information, they can be used in conjunction to form a comprehensive understanding of baseline water quality conditions in the Okanogan basin.

Water quality data reviewed for this assessment were primarily recorded at the individual tributary scale, consistent with the HUC-6 level. Principal findings of the assessment follow.

Dissolved oxygen did not meet water quality criteria in more than 10 percent of samples analyzed in lower Tunk Creek, Salmon Creek, Johnson Creek, Bonaparte Creek,

Antoine Creek, Tonasket Creek, and Ninemile Creek. That so large a number of tributary systems failed to meet Class A DO criteria could be problematic, as oxygen deficits severely limit the functional value of aquatic systems to support aquatic life.

Class A temperature standards were exceeded in the Okanogan mainstem and in multiple monitoring stations in Omak, Tunk, Salmon Creek, and Wannacut creeks, and at the lower Sinlahekin, Bonaparte, Antoine, and middle Tonasket creek monitoring stations. This essentially basin-wide finding is not new. In part, it relects natural conditions of WRIA 49. The potential to enhanced riparian cover in tributary systems to provide shade and lower temperatures could be explored through additional habitat analysis. The degree to which temperature affects fish use and other aquatic life has been poorly explored in the past.

The Okanogan mainstem and tributaries are almost uniformly alkaline (well above neutral readings of 7). The degree to which pH is affected by land use activities is unknown, but could be explored in subsequent analyses.

Fecal coliform exceeded water quality criteria relatively often in the mainstem and in some tributaries (e.g., Bonaparte). This appears to be a consistent and chronic problem. Exceedances may arise from multiple sources, and are likely most easily addressed at the tributary scale. Many tributaries have not been sampled for this parameter, so identifying sources will require more sampling. However, sampling in the mainstem in particular exhibited seasonal trends, with counts highest between May and October. This seasonal pattern may reflect greater direct contact with the water by livestock and wildlife during the late spring to early fall months.

Dichlorodiphenyltrichloroethane (DDT) and related compounds (DDE, DDD, etc.,) and PCBs appear to remain a problem in some isolated areas. However, current evidence does not suggest these persistent organic pollutants, for which Total Maximum Daily Limit (TMDL) studies have been conducted, are a problem basin-wide. Other organic pollutants, such as pesticides typically persistent in historic agricultural areas (e.g., chlordane) have not been sampled to the same degree throughout the basin.

Collectively, the results of the metals sampling conducted by Ecology and the OCD do not suggest there are basin-wide issues with metal contamination. Detectable metals have only been found in Tunk Creek sampling. However, sampling has not been conducted in many tributary basins, including some with a mining legacy.

## AQUATIC HABITAT ASSESSMENT (CHAPTER 6)

Data-driven aquatic habitat assessments from the Okanogan basin are largely lacking from past research and reports of the Okanogan basin. Limited studies were done in some tributaries by the USFS, WDNR, and CCT on lands they manage (e.g., USFS 1998, USFS 1999, WDNR 1996, CCT 1995). These studies provide some empirical data on aquatic and/or riparian conditions from which to gauge the functionality of the

habitat in select watersheds (e.g., Siwash, Tonasket, Bonaparte creeks) and will be useful for further consideration in the final watershed plan.

No new studies were identified or brought forward from these agencies to allow for an expanded review over that which was conducted in these previous reports. These and other references were previously reviewed for the Okanogan Limiting Factors Assessment (LFA) (ENTRIX and Golder 2001). Because of data limitations, the habitat factors of concern identified in the LFA were often based on professional judgment of the attainability of "properly functioning conditions" (PFC's).

The term ***properly functioning conditions (PFCs)*** is used by NOAA/NMFS to characterize how physical and chemical characteristics measurable within surface water or adjacent riparian habitat may affect salmonid fishes. These factors are not formal criteria, but rather "guidelines" that have a strong basis in the fisheries and water quality literature, and reflect the current understanding of the physiological limitations and preferences of salmonid fishes. They do not necessarily account for localized acclimation of salmonid stocks to naturally extreme conditions, such as may occur within portions of the Okanogan basin. The interpretation of properly functioning habitat used for the LFA, and the principal habitat assessment conclusions in that report, are tabulated in Attachment 3 of this report.

Due to the limitations discussed above, this section summarizes preliminary findings and analysis of habitat data collected recently from the mainstem Okanogan and portions of the basin, by the CCT in 2004 and 2005. A full integration of this new analysis with past findings could be considered under Level 2 assessment.

Based on the CCT data, and related water quality and flow data, impacts to aquatic habitats of importance to fish, wildlife and human recreation appear to be interrelated to flow and water demand — consistent with 'Rivers and Creeks of Concern' summary above. Habitat is affected by reduced and/or absent flow in several tributaries where flow may have been over-allocated. This affects not only the tributaries, but also the quality of the mainstem Okanogan habitat where cooler water entering from tributaries no longer is available to buffer mainstem temperatures.

Only a limited portion of the data collected by the CCT in 2004-2005 were recorded in a form that allows comparison to previously collected data, or to synthesized expert opinions. Level 2 work may consider normalizing this data into forms that can be more useful in characterizing existing habitat quality. Data from several tributaries on the western side of the Okanogan basin are lacking, as these systems have not as yet been a major focus of the current efforts of the CCT.

The Okanogan Limiting Factors Assessment (ENTRIX and Golder 2001) indicated that some level of habitat impairment can be found in most tributaries of the Okanogan watershed. On the positive side, however, much of the mainstem habitat and several tributaries are sufficiently intact to support self-sustaining populations of salmon and

steelhead trout, particularly if access barriers, including artificially depressed flows, are removed.

The tributaries identified in the Okanogan LFA that were of primary importance to recovery included: Omak Creek, Salmon Creek, and the Similkameen River. These tributaries were previously identified as central foci for salmon recovery efforts. Nothing has changed since the publication of the LFA document to alter that conclusion, although additional tributaries have been found to support significant steelhead spawning (please refer to Attachment 2 — Fish Distribution Maps). Tributaries found to support spawning include Ninemile Creek and Bonaparte Creek, if only in the small reaches accessible to them (Arterburn et al. 2005).

Omak Creek is the only tributary of the Okanogan River that historically contained steelhead and that is currently not blocked by man-made barriers or access-limited by low flows resultant from water withdrawals. Other tributaries of importance to salmon recovery with significant historical salmonid use and potential include: Salmon Creek, Tonasket Creek, Tunk Creek, Bonaparte Creek, Antoine Creek, Siwash Creek, and Loup Loup Creeks. Many of these tributaries currently have either natural barriers close to their confluence, flows that are severely reduced from irrigation diversions or nearby wells, and/or substantial habitat issues such as sedimentation (e.g., Bonaparte Creek.) that preclude significant numbers of salmonids from effectively using the habitat available.

## DATA GAPS & RECOMMENDATIONS (CHAPTER 7)

Data gaps and recommendations are organized in Chapter 7 following the above outline (water quantity, water storage, water quality, and aquatic habitat). The gaps and recommendations listed in Chapter 7 are intended to provide a beginning point for Planning Unit consideration as possible options for Level 2 work and as possible foci for watershed planning. They are not listed in any order of priority.

# Chapter 1.0: Introduction and Planning Framework

This section introduces watershed planning and describes its framework. It describes Level 1 work within that framework, and identifies the role and use of the Level 1 Report in the watershed planning process.

## 1.1 OVERVIEW OF WATERSHED PLANNING

### 1.1.1 Enabling Legislation

Watershed planning occurs under enabling legislation passed in 1998, and is closely tied to planning for other water and watershed resources, including salmon recovery, local land use planning, water system planning, stormwater management, and a host of other federal, state, regional and local laws, regulations, and planning initiatives.

In 1998 the Washington State Legislature passed Engrossed Substitute House Bill 2514, the Watershed Planning Act (Revised Code of Washington (RCW) 90.82) to provide a framework for locally-based watershed planning and resource management. The primary goals of local watershed planning are to assess the status of water resources within Washington's WRIA 62 and determine how to address competing demands for water within each WRIA. A stated purpose of the statute is "...*to develop a more thorough and cooperative method of determining the current water situation in each water resource inventory area of the state and to provide local citizens with the maximum possible input concerning their goals and objectives for water resources management and development*."

The Watershed Planning Act mandates certain steps for the watershed planning process, particularly in organizing and adopting the plans. The law also sets forth certain questions and broad parameters to be addressed in the plans. However, the legislature chose to leave local watershed groups with a great deal of flexibility in carrying out their work, and does not mandate a particular approach to watershed planning.

### 1.1.2 Planning Unit

The Watershed Planning Act establishes a process to create local "Planning Units," which carry out the planning process. A WRIA 49 Planning Unit was established in 2005, facilitated by the Okanogan Conservation District. Its membership represents Okanogan County, major cities (Okanogan, Omak, Oroville, Tonasket, Conconully), Okanogan PUD No. 1, well drillers, irrigation districts and irrigators outside districts, the business community, Grange, sportsmen, environmental community, Cattleman's Association, Horticulture Association, Central Okanogan County Farmers, north and

south county landowners, recreation, Okanogan Resource Council, Okanogan Farm Bureau, mining and logging, Osoyoos Lake Water Quality Society (B.C.), and a member at large. Advisory state and federal agencies include USFS, BLM, and WDFW.

### 1.1.3 Plan Elements

Watershed Plans may assess current and future water supply and water use, address water quality and habitat issues, and recommend instream flows for streams and rivers in each WRIA. These four – water quantity, water quality, habitat, and instream flows – are the basic elements of 2514 watershed planning. As salmonid stocks occupying large areas of Washington habitat have come under the protection of the Endangered Species Act (ESA), watershed plans may incorporate salmon recovery and develop strategies to address these listings.

While watershed planning itself is not mandatory, once a decision is made to undertake planning the Act requires some elements and allows Planning Units discretion in undertaking others. Watershed Plans must address water quantity and strategies for water supply; water quality, habitat and instream flows are optional. Instream flows may be referred to the Washington Department of Ecology (Ecology) for action, if desired. By unanimous vote, Ecology may be requested to change an existing instream flow. With unanimous agreement of governmental members and majority support of non-governmental members of a Planning Unit, Ecology will adopt a rule to implement an instream flow on a stream where a minimum flow has not yet been set (RCW 90.82.080).

### 1.1.4 Initiation

Watershed planning may be initiated only by counties with jurisdiction within a WRIA, by the largest city or town located within the WRIA, and/or by the water purveyor that obtains the largest quantity of water from the WRIA. These “initiating governments” must invite Native American Tribes with reservation lands within the WRIA to join them. The Colville Confederated Tribes were invited to join the WRIA 49 Planning Unit, but declined by Council Resolution. Other affected tribes must also be invited, including those with federal fisheries resource rights in the WRIA, federally reserved water rights claims on WRIA resources, or federally-approved water quality standards in the WRIA or affected by waters of the WRIA. If Tribes choose to join, they too become initiating governments.

The initiating governments choose a lead agency (Okanogan Conservation District, in the case of WRIA 49), and undertake an organizing phase (Phase 1), which includes developing a planning process; determining a scope of work; convening a Planning Unit broadly representative of water resource interests in the WRIA; developing necessary interlocal agreements; and applying for watershed assessment (Phase 2) and watershed planning (Phase 3) grants. The initiating governments, Tribes, and other members of the planning unit have considerable flexibility to set the planning process,

focus watershed inventories and plans on key issues of local importance, assess water resources and needs, and recommend management strategies. Planning generally must be complete within four years after receipt of Phase 2 grant funds.

### 1.1.5 Limitations and Obligations

The Watershed Planning Act also imposes certain restrictions on what a watershed plan may do. Among them, watershed plans may not:

- Conflict with law or tribal treaty rights;
- Impair or diminish a water right;
- Affect or interfere with water rights adjudication; and
- Modify habitat restoration or enhancement projects under the Salmon Recovery Act (SRA).

Plans may recommend changes in state, regional, or local regulations, policies or plans; however, they may not themselves change existing local ordinances or state rules. Entities that participate in the planning process and agree to be obligated by a watershed plan are bound by it. Existing law or regulation may be changed only where Planning Unit participants (including federal agencies that participate in an advisory capacity) agree to be obligated by a watershed plan and to take appropriate action in accordance with plan provisions.

### 1.1.6 Expanded Planning Funds

Under legislation enacted in 2001, Planning Units became eligible for additional funding to finance further Phase 2 assessment activities in the areas of instream flows, water quality, and detailed assessments of water storage. WRIA 49 is eligible to receive additional funding in all three categories.

### 1.1.7 Approval

Approval of a watershed plan requires, at a minimum, the unanimous agreement of the local, State and tribal governmental members and a majority vote of non-governmental members of a Planning Unit. If approved, the Plan is submitted to the county governments with territory in the WRIA for ratification by majority vote of each elected governing body in joint session.

The Watershed Planning Act directs Planning Units to review planning, projects, and activities already completed or underway regarding natural resource management or enhancement in the area and incorporate their products as appropriate so as not to duplicate work already performed or underway.

### 1.1.8 Implementation

Watershed management will require a substantial public investment to accomplish the goals established in state law. The Watershed Planning Act was amended in 2003 to provided funding for a Phase 4, Implementation. This phase requires a ten percent match requirement for the grant recipient (this may include financial contributions or in-kind goods and services directly related to coordination and oversight functions). The match can be provided by the planning unit or by the combined commitment from federal agencies, tribal governments, local governments, special districts, or other local organizations. The phase four grant may be up to $100,000 for each planning unit for each of the first three years of implementation. At the end of the three-year period, a two-year extension may be available for up to $50,000 each year.

RCWs 90.82.043 and 048 (Attachment A) lay out the requirements for Watershed Implementation Plans. Under Section 043, requirements include strategies to provide sufficient water; clear definition of coordination and oversight responsibilities, requirements for interlocal agreements, rules, ordinances, or permits; consultation to assure eliminate duplication or inconsistencies. Under Section 048, they deal with the planned use of inchoate municipal water rights. Implementation planning should use and build on the strategies developed in the watershed plan and should be tied directly to the Watershed Plan recommendations.

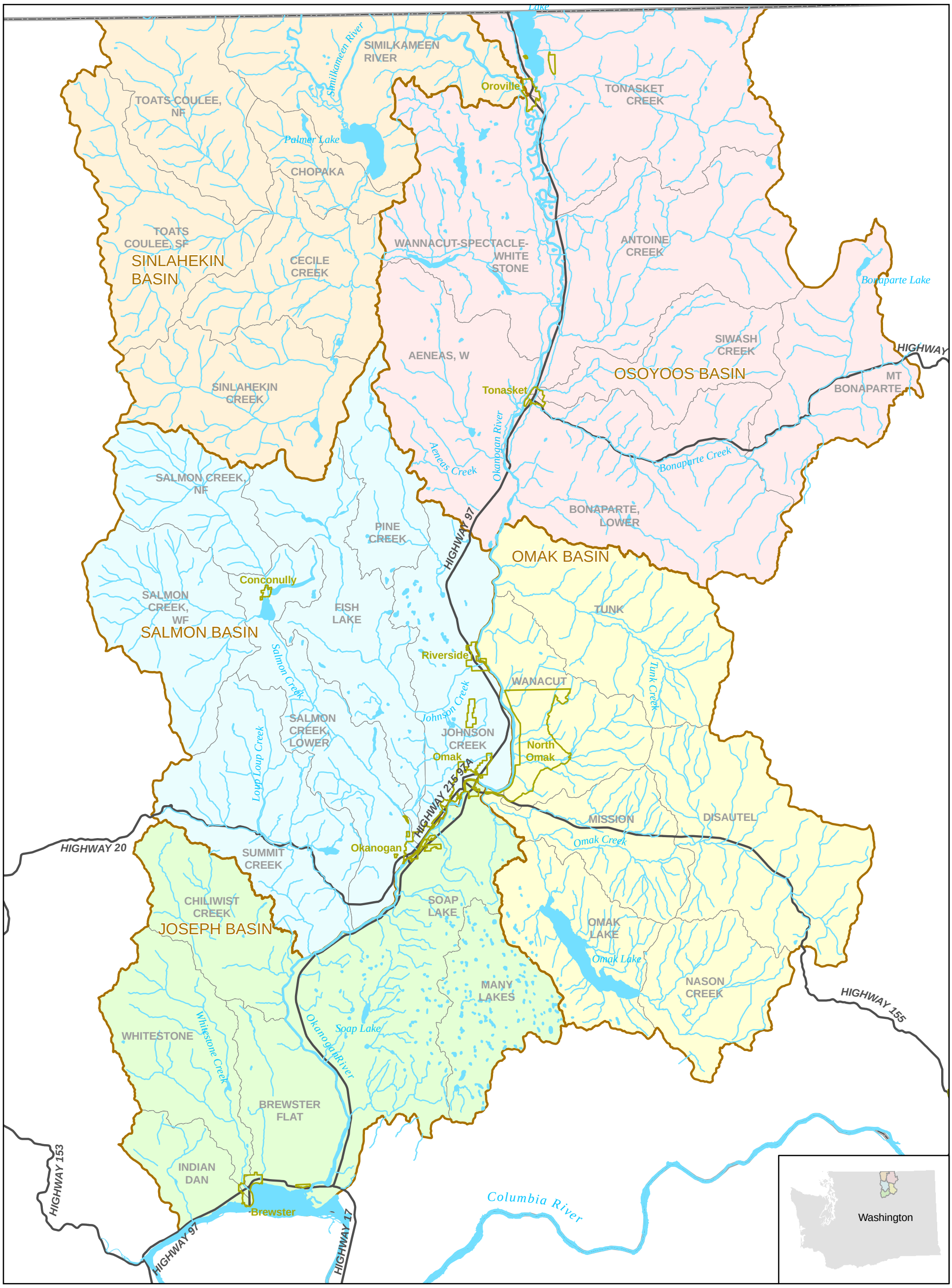
## THE LEVEL 1 REPORT

This Level 1 Report summarizes existing information for WRIA 49, the Okanogan River Basin (Figure 1.1-1). Level 1 is the first step in Phase 2 of the watershed planning process, which focuses on an assessment and inventory of watershed resources. During Level 1, Planning Units gather and review existing information, to determine its reliability and adequacy for characterizing the WRIA and analyzing priority issues. An outcome of Level 1 should be an identification of data gaps and recommendations to guide new studies and research. These new studies and research activities comprise Level 2, the second step of Phase 2 watershed planning. Together, Levels 1 and 2 provide the basis for the development of the watershed plan itself (Phase 3).

The Level 1 Report is a “way station,” a product that is used in developing a watershed plan; it is not an end in itself. The WRIA 49 watershed planning unit has chosen to address water quantity, water quality, habitat and instream flows. The report is prefaced by an Executive Summary, which includes a Summary of Concerns covering Subbasins of Concern, Water Systems of Concern, Agricultural Water Supply Concerns, Rivers & Creeks of Concern, Habitats of Concern, and Canadian Water Issues.

Several scales of subbasins or subwatersheds have been defined for WRIA 49 (Figure 1.1-2). As characterized by the Washington State Department of Ecology, the five major or “watershed assessment units” (WAU’s) of the WRIA are the Joseph, Salmon, Omak, Sinlahekin, and Osoyoos subbasins.

# WRIA 49




Okanogan County
City Boundary
Stream
Lake/Reservoir
Highway
Basin Boundary
WAU Boundary

N

5 2.5 0 5 10 Miles

Stateplane 4601 NAD27 Feet

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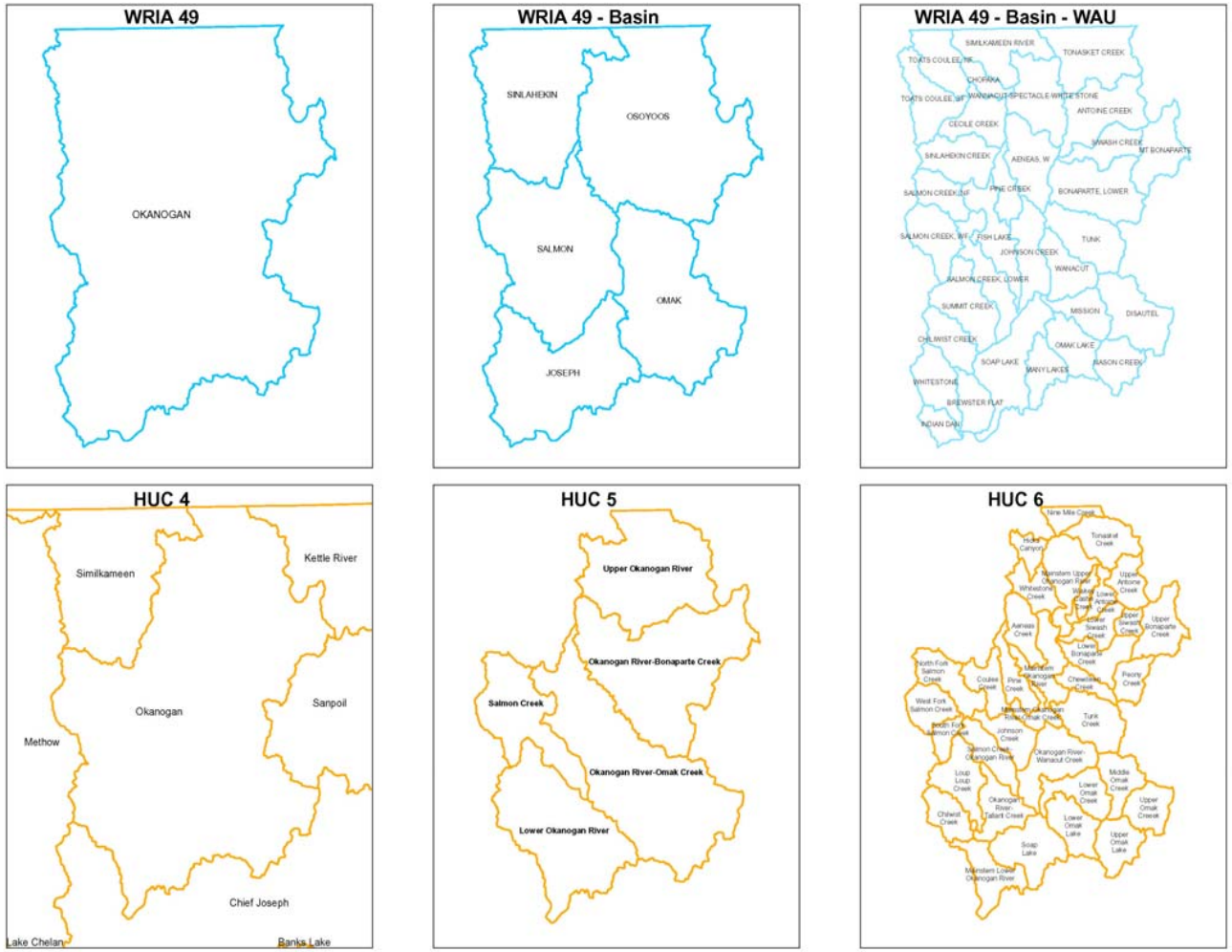
## Figure 1.1-2 WRIA 49 Subbasins Comparison

WRIA Data Source: WADOE




HUC Dataset Source: PNW Hydrography Project

These subbasins are representative of the fifth-field hydrologic unit criteria scale (HUC-5) and generally combine several independent tributaries within the geographic scale addressed. However, in the Level 1 report, information has been gathered and analyzed at the smallest appropriate scale at which data exist, and, where possible, was evaluated at the finer HUC-6 scale which corresponded to the Generally, for water quality, habitat, and instream flows, this is at the smallest hydrologic scale, the individual stream, or tributary. In each of these topical areas, the subbasin or subwatershed information is discussed comparatively.

For water quantity, the appropriate scale depends upon the nature and use of the information. Water rights, for example, are tied as closely as possible to the individual water source. For surface water sources, this means the individual stream, lake or spring. (However, many water rights records do not name the source, which may be identified as “unnamed stream” or “spring,” etc.) However, public water systems and irrigation districts, the two largest sectors of water user in WRIA 49, do not normally either develop or supply water on a HUC-6 or WAU basis. Service areas may have little to do with hydrologic boundaries. Groundwater aquifers may extend beneath a number of HUC or WAU units. For these elements of water quantity, analysis is provided at the WRIA or major subbasin scale.

Because voluminous data exist in these areas, the Level 1 Report consists of two parts: an overview narrative report and a CD data appendix. Data appendices are provided, so that those who wish to follow up with a more detailed exploration of the data should be able to find their way quickly and easily from the discussion to the data. It should be recognized, however, that many of the data files contained in these appendices are working files used by (and in use by) the analysts who have prepared this report. Thus, the contents contained in each differ broadly dependent on subject matter, and they may not represent the ‘final word’ on the analysis of the subject matter. They are provided simply to ensure that all readers can have access to the data and data management exercises that were performed, and with the thought they would be revisited for subsequent Level 2 watershed planning efforts.

# Chapter 2.0: Watershed Overview and Water Balance

This section summarizes existing information at a watershed scale, building a basis for understanding data and issues related to water quantity, water quality, habitat and flows. The section first discusses climate and physiography, which provide the groundwork for subsequent consideration of surface and ground water. Flow data is combined in the discussion of physiography due to the influence of land form on surface flows, and the discussion geology and hydrogeology and combined for similar reasons. These data lead into the estimation of an initial (and very preliminary) WRIA 49 water balance.

Three sources of precipitation data from individual stations in WRIA 49 were obtained and reviewed, including annual and monthly totals available from the National Climate Data Center (NCDC) and the Western Region Climate Center (WRCC), and a contour map of mean annual precipitation available from the National Resource Conservation Service (NRCS) website.

The NRCS precipitation contour map is based on NOAA Cooperative Station normals (1961-1990), NRCS SNOTEL station normals, and supplemental data provided by regional and state climatologists and designated reviewers (e.g., elevation-precipitation trends, other factors including statistical treatments for reducing bias). Thus, the NRCS contour map was the best source of data for computing water balances on a watershed scale. Individual station precipitation data is compiled in Appendix D-1 (Climate Data). The locations of the individual stations and a WRIA-wide precipitation contour map are provided in Figure 2.1-1.

Streamflow data for 68 separate gaging stations were obtained and compiled from four principal sources including the OCD, CCT, USGS, and Washington Department of Ecology (Ecology). For some of these stations, however, the exact gage location was not available or may have been reported by more than one source, so may actually be a duplicate or partial record. As a result, the quality of the data records ranges from poor to good; from the available data, however, only the USGS has rated the quality of data.

USGS, Ecology, Okanogan County NRCS and WDNR reports, maps and websites were reviewed to obtain up-to-date physiographic and hydrogeologic descriptions and conditions of WRIA 49.

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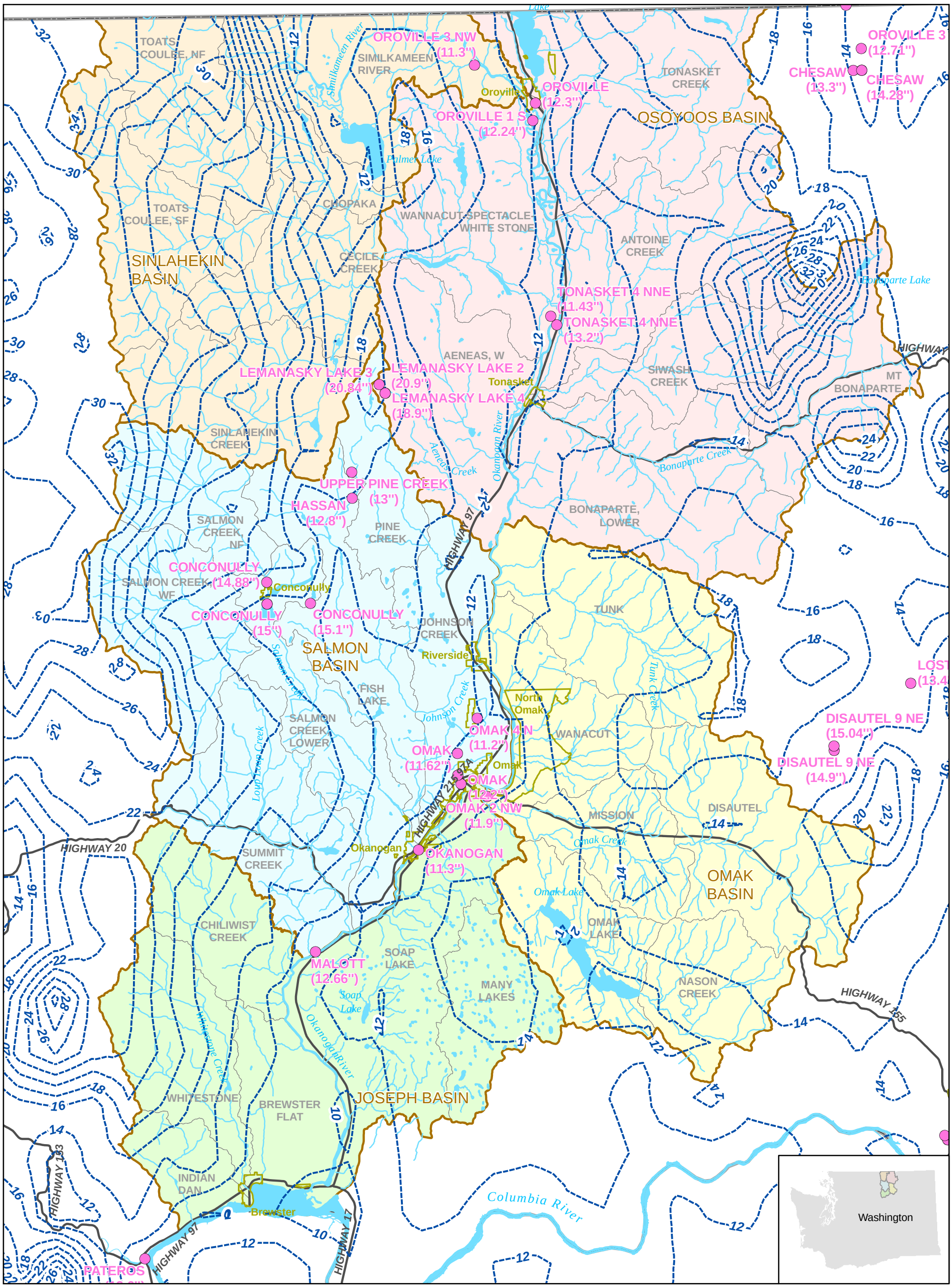
# WRIA 49 Precipitation Map




Okanogan County
City Boundary
Stream
Lake/Reservoir
Highway
Basin Boundary
WAU Boundary
Isopluvial Contour
Precipitation Station
(14.1") Mean Annual Precipitation in Inches

N

5 2.5 0 5 10 Miles

Stateplane 4601 NAD27 Feet

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## 2.1 CLIMATE

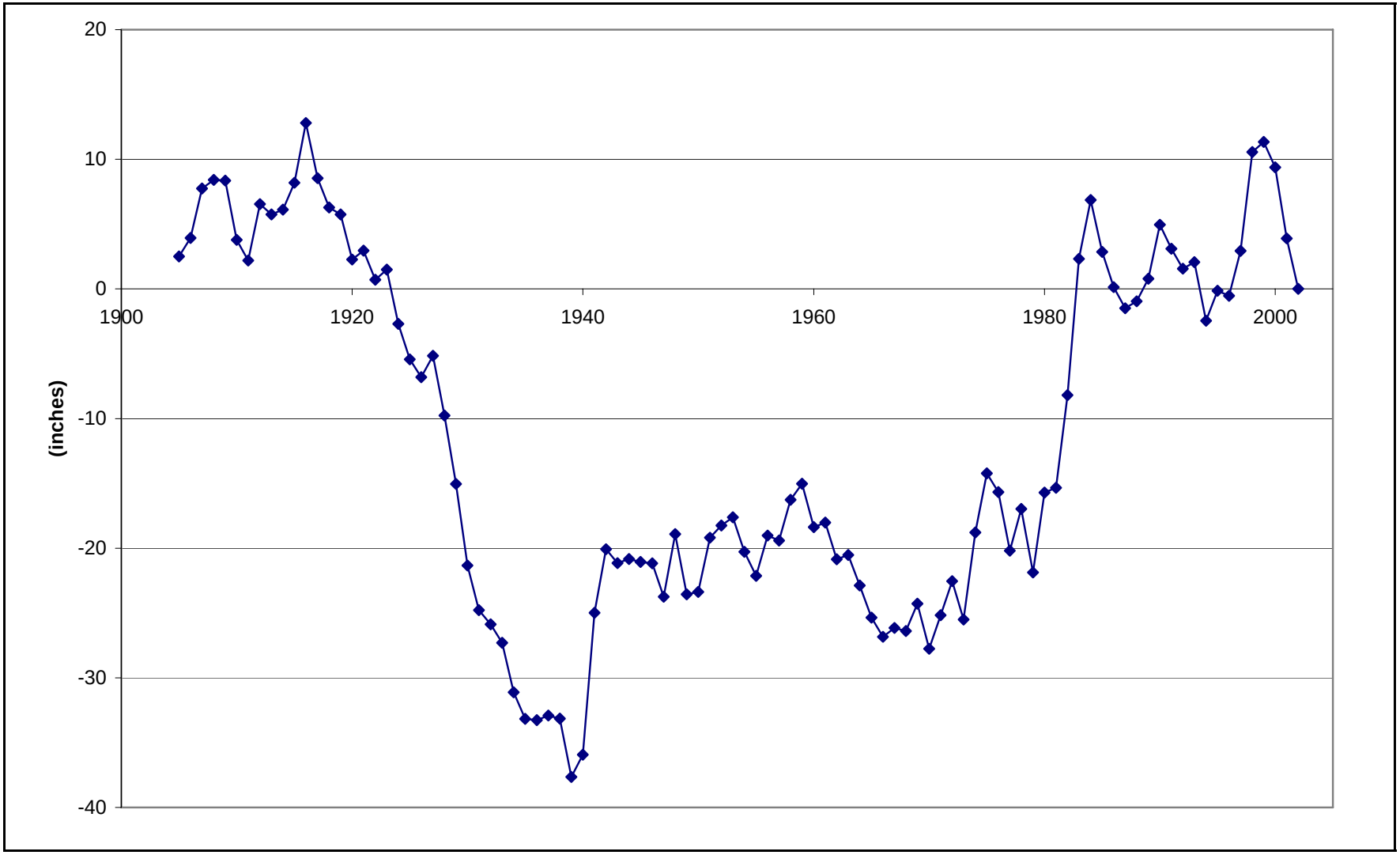
The climate of the Okanogan River valley is semiarid in the lower valleys and subhumid in the mountains. Depending on location, daily temperature extremes can be substantial. At higher elevations, temperatures are lower and precipitation is usually greater (Walters 1974:7).

Mean annual precipitation (MAP) ranges from 11 inches per year at lower elevations in the Okanogan River valley to approximately 30 inches at higher elevations within the Sinlahekin and Salmon Creek Subbasins. Winter season snowfall varies from 30 to 70 inches. Snow can be expected after the first of November and remains on the ground from the first of December until March or April. Snow accumulates to a depth of about 10 to 20 inches in the valley, and up to 40 inches at higher elevations. Precipitation data for weather stations located in the WRIA are provided in Appendix D.1. The locations of the stations and a WRIA-wide precipitation contour map are included Appendix D-1 (Climate Data). Maps provided in the Map Atlas (Attachment 2) show climate stations at the HUC-5 subbasin level.

Significant trends in wet or dry periods have been observed over the past 100 years, and the effects of these trends on water availability should be considered in watershed planning. For example, the long-term MAP at Omak is 11.8 inches, but during a 23-year period from 1917 through 1939, MAP averaged 9.6 inches (or 2.2 inches below average per year). For a four-year period within that same timeframe (1928 to 1931), MAP averaged only 6.9 inches. These long-term dry periods have a significant effect on cumulative water storage. This is depicted in Figure 2.1-2 which shows the cumulative departure from average precipitation (CDAP) for Omak. The ‘zero’ line reflects the average, hence the date is reflected here. Points above this line reflect above average precipitation, and those below reflect below average precipitation for the year indicated.

In general, shallow (e.g., < 50 ft below ground surface) groundwater levels and groundwater storage are somewhat related to the rise and fall of CDAP. When CDAP is increasing more water is available to recharge groundwater, so that water tables rise (i.e., assuming no well withdrawals); similarly, water tables decline when CDAP decreases. For example, CDAP decreased about 50 inches over the 23-year period noted above, indicating reduced recharge over this time period, which probably resulted in low water tables (although no data were available to support this inference).

**Figure 2.1-2: Cumulative Departure from Average Precipitation – Omak (1904-2002)**



The average January maximum temperature is between 28° and 32° F, and the minimum temperature varies from 15° to 20° F. Minimum temperatures from 0° to -15° F occasionally occur in the winter, and readings as low as -30° F have been recorded in the colder locations. In July, the average maximum temperature ranges from 85° to 90° F, and the minimum temperatures are in the lower 50's. Maximum temperatures sometimes reach 100° F or higher in the summer (113° F is the maximum recorded). Weather station temperature data are included in Appendix D.

In some cases station location data are inconsistent or multiple locations have been identified for an individual station. The data sources also at times provide varying values for the same statistic (e.g., mean annual precipitation). This is likely because these statistics have been calculated for different periods of record. If better precipitation data (i.e., refining water balance calculations or establishing trends for wet and dry periods) are desired, the Planning Unit may consider establishing weather monitoring stations at accurately known locations and taking the data for comparable periods of record.

## 2.2 PHYSIOGRAPHY AND SURFACE WATER

The Okanogan River basin originates in British Columbia and flows through four lakes (Okanogan, Skaha, Vaseaux and Osoyoos) before crossing into the State of Washington. The watershed encompasses about 2,600 square miles in the State of Washington, and 6,300 square miles within British Columbia (Ecology 1995). From its confluence in the Columbia River (Col. River mile 533.5) to Lake Osoyoos, the river stretches approximately 79 miles (ENTRIX, Inc. and Golder 2001) The eastern and western boundaries of the basin are steep, ranging in elevation from 1,500 to 5,000 feet above the basin floor. Some individual peaks are 7,000 to 8,000 feet above sea level. Lateral ridges extend toward the valley floor and taper to more gently sloped hills at lower elevations.

Runoff fed streams from rain and snow flow between the lateral ridges to the valley floor. The average width of the drainage area of the mainstem is 35 miles (ENTRIX and Golder 2001). The Okanogan River floodplain is about one mile wide. The floodplain descends from 920 feet at the Canadian border to approximately 780 feet at the confluence with the Columbia River. The northernmost four miles of the valley floor is occupied by Lake Osoyoos, which also extends into Canada. Glacially formed natural terraces are present at 500 feet above the valley floor and at the base of and in between lateral ridges (Walters 1974:7).

WRIA 49 is comprised of five major subbasins (Sinlahekin, Osoyoos, Salmon, Omak, and Joseph) that are comprised of the individual drainage basins as summarized in Table 2.2-1. These subbasins were originally outlined as Watershed Assessment Units (WAU) by Ecology for administrative purposes and represent watershed delineations at the fifth field HUC (i.e., HUC-5).

Although the Similkameen River is considered a major tributary to the Okanogan River, its flow is, on average, is actually more than 4.4 times the flow of the Okanogan where

the two rivers join at Oroville (Figure 2.2-1). About 90 percent of the Similkameen River drainage basin is in Canada; only the last approximately 10 percent of the drainage basin (or the last approximately 24 miles) (occur in the Sinlahekin subbasin. The Similkameen River receives almost all of its incremental flow within Washington from the Sinlahekin Creek and its primary tributary Toats Coulee Creek, as well as from other streams (Paysaten and Ashnola) that lie outside WRIA 49 boundaries. Sinlahekin Creek drains into Palmer Lake, which empties into the Similkameen River through Palmer Creek.

**Table 2.2-1 Primary Subbasin and Drainage Basin Breakdown**

| PRIMARY SUBBASIN | DRAINAGE BASIN | TRIBUTARY TO: | AREA (SQ MI) |
|---|---|---|---|
| **Sinlahekin** | Sinlahekin Creek | Similkameen River | 127.2 |
| | Similkameen River | Okanogan River - Middle | 91.9 |
| | Toats Coulee Creek | Sinlahekin Creek | 134.6 |
| | Chopaka Lake | Sinlahekin Creek | 16.8 |
| | | **subtotal** | **370.5** |
| **Osoyoos** | Nine Mile Creek | Okanogan River - Upper | 14.8 |
| | Tonasket Creek | Okanogan River - Upper | 60.3 |
| | Antoine/Whiskey Cache Creek | Okanogan River - Middle | 75.8 |
| | Siwash Creek | Okanogan River - Middle | 44.6 |
| | Bonaparte Creek | Okanogan River - Middle | 146.4 |
| | Chewilken Creek | Okanogan River - Lower | 26.7 |
| | Okanogan River - Upper | Okanogan River - Middle | 16.5 |
| | Horse Springs Coulee | Okanogan River - Middle | 38.7 |
| | Mosquito Creek | Okanogan River - Middle | 7.5 |
| | Whitestone Lake | Okanogan River - Middle | 54.7 |
| | Whitestone Coulee | Okanogan River - Middle | 11.5 |
| | Aeneas Creek | Okanogan River - Middle | 8.6 |
| | Baker Creek | Canada | 7.0 |
| | | **subtotal** | **513.1** |
| **Salmon** | Loup Loup Creek (Summit Creek) | Okanogan River - Lower | 62.5 |
| | Tallant Creek | Okanogan River - Lower | 12.8 |
| | Salmon Creek | Okanogan River - Lower | 167.4 |
| | Johnson/Scotch Creek | Okanogan River - Lower | 77.5 |
| | Pine Creek/Wa on Road Coulee | Okanogan River - Lower | 69.5 |
| | Duck Lake | Johnson Creek | 5.3 |

**Table 2.2-1 Primary Subbasin and Drainage Basin Breakdown, continued**

| PRIMARY SUBBASIN | DRAINAGE BASIN | TRIBUTARY TO: | AREA (SQ MI) |
|---|---|---|---|
| | Okanogan River - Middle | Okanogan River - Lower | 82.0 |
| | | **subtotal** | **477.0** |
| **Omak** | Tunk Creek | Okanogan River - Lower | 71.0 |
| | Wannacut Creek (CIR) | Okanogan River - Lower | 19.0 |
| | Omak Creek (CIR) | Okanogan River - Lower | 133.2 |
| | Omak Lake (CIR) | Okanogan River - Lower | 229.9 |
| | | **subtotal** | **453.1** |
| **Joseph** | Chiliwist Creek | Okanogan River - Lower | 40.8 |
| | Whitestone (Swamp) Creek | Columbia River | 57.0 |
| | Indian Dan Canon | Columbia River | 17.1 |
| | Okanogan River - Lower | Columbia River | 155.2 |
| | Starzman Lake | Okanogan River - Lower | 17.4 |
| | | **subtotal** | **287.5** |
| | | **TOTAL** | **2101.2** |

There are numerous other important tributaries that drain directly into the Okanogan River and these were examined as distinct HUC units in previous planning efforts focused on salmon recovery (ENTRIX and Golder 2004). Some of the more significant and larger ones draining from the west are Johnson, Salmon, Loup Loup, and Chiliwist Creeks. Dams impound Salmon Creek in Conconully Lake and Conconnuly Reservoir for irrigation. Important tributaries from the east include Tonasket, Antoine, Siwash, Bonaparte, Tunk, and Omak Creeks.

Most lakes in the basin are small except for Omak Lake, which has no direct surface water outlet to the Okanogan River and drains its own basin (it is a “terminal” basin). Omak Lake has a larger surface area than any other lake on the U.S. side of the Okanogan except Osoyoos Lake (which straddles the US-Canadian border). East of the Okanogan River, Bonaparte Lake drains into Bonaparte Creek, and water from Sidley Lake near the Canadian border enters the Tonasket Creek system. West of the Okanogan River, in addition to Palmer Lake, Blue Lake drains into Sinlahekin Creek.

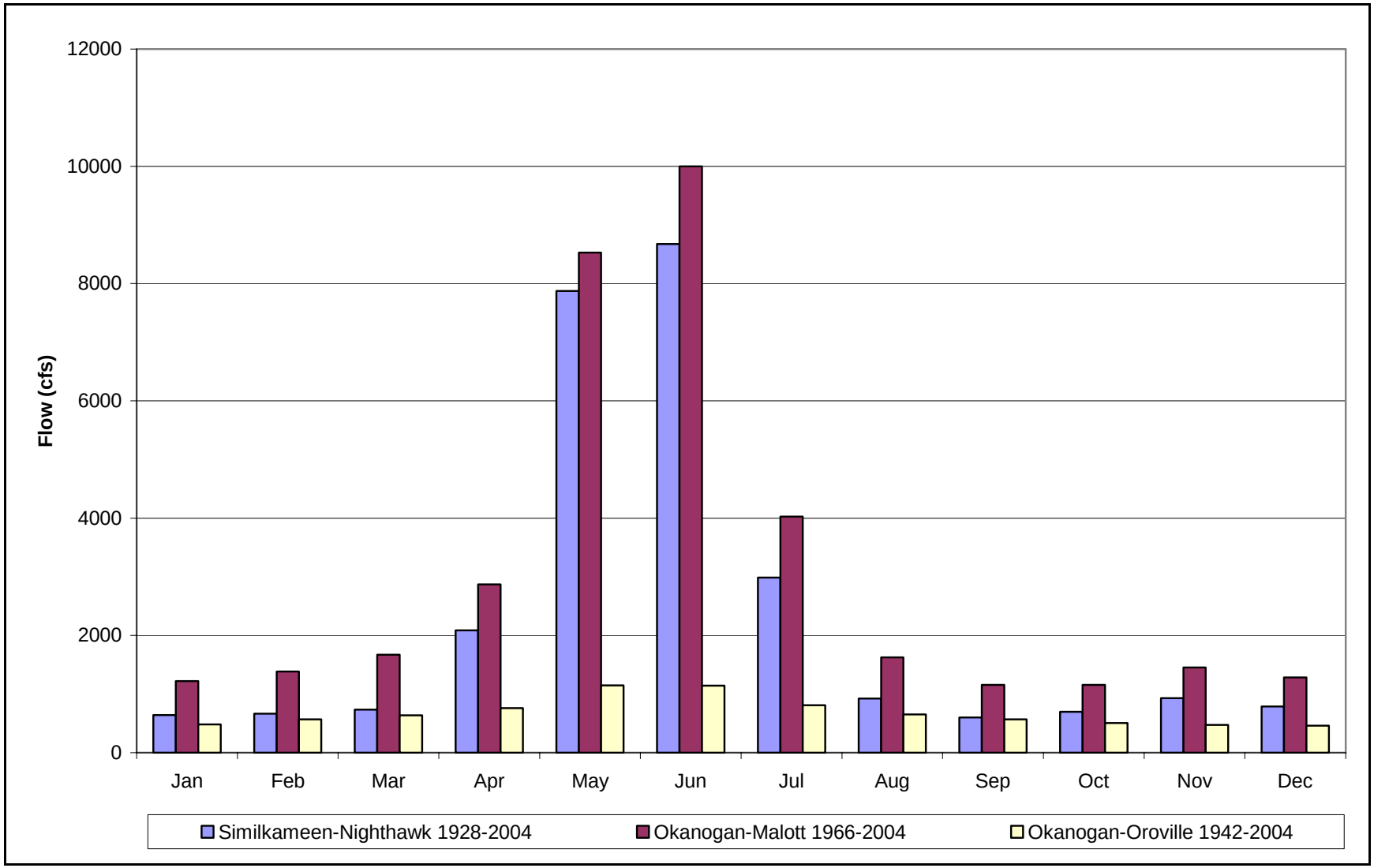
There are several data sets with long-term continuous records (continuous hydrographs of more than 10 years), short-term continuous records, individual point data from throughout the year, or only very short-term seasonal data. Specifically, Ecology began collecting point and continuous flow data on the Similkameen River near Oroville in 1996, and then at six other locations in 2002. The OCD began collecting point data in 2000. OCD has 25 stations in all (many of them upper and lower on the same creek); these OCD stations also double as water quality sampling stations. Subbasin

summaries of the continuous recorded data are provided in Table 2.2-2, and other streamflow data (individual point measurements) in Table 2.2-3. A compilation of streamflow data for the stations listed in Tables 2.2-2 and 2.2-3 is included in Appendices D-2 and D-3.

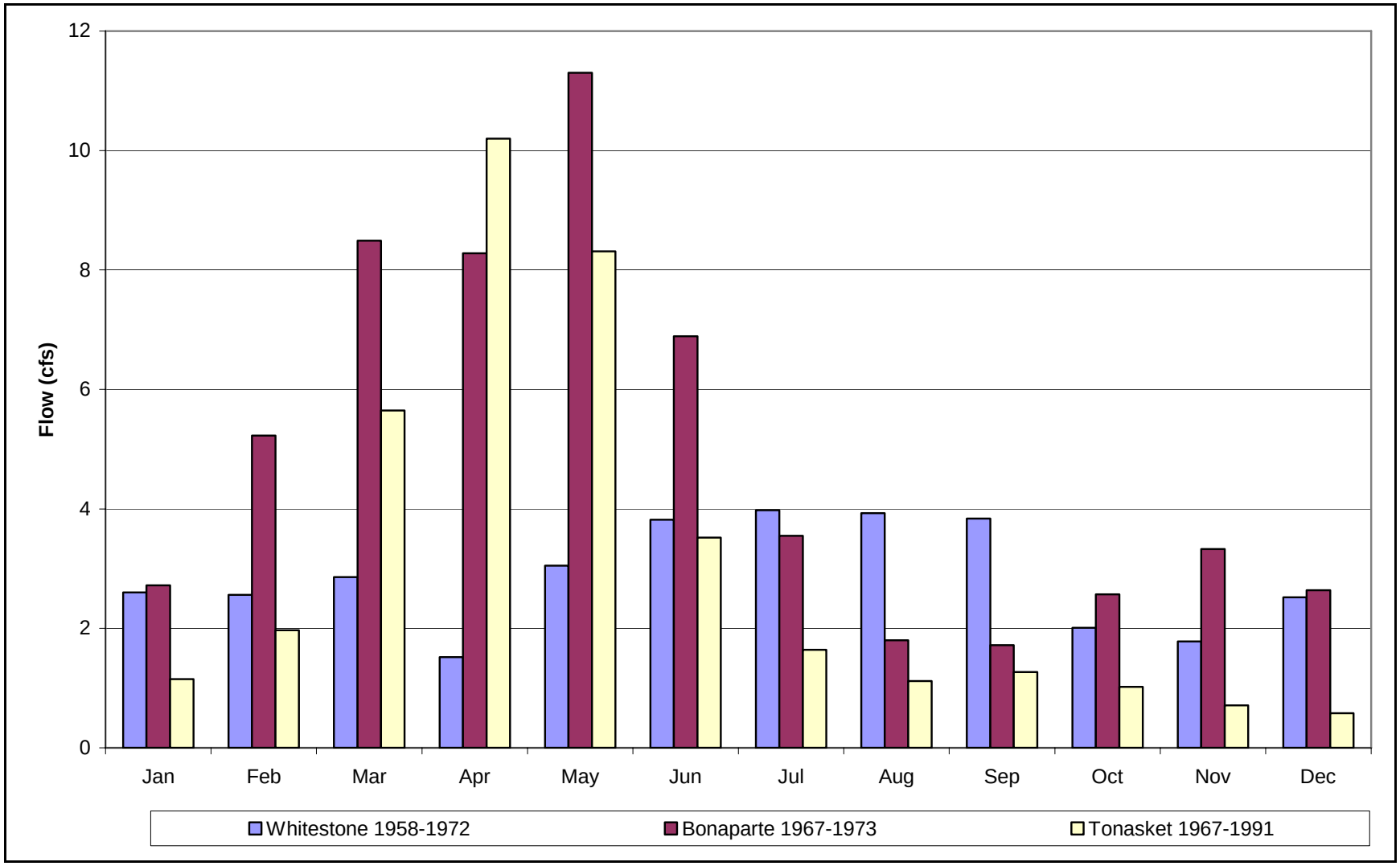
In addition to the Ecology and OCD data, flow data have been collected by the CCT, the BOR and the USGS. The CCT began collecting continuous flow data on the Okanogan River in 1977. A number of other gaging stations were added in 2002. CCT has ten stations in all. BOR also has a record of mean monthly flows for one station on Johnson Creek from 1903 to 1962. The USGS has records for 25 stations, but most of these records cover only a short time period. Only ten stations have more than 10 years of record. USGS began recording in 1903 with two stations but only a few years of data were collected. From 1911 to 1930 there were up to four stations. Some long-term records began in 1928 on the Similkameen River, in 1911 on the Okanogan at Tonasket, and in 1942 on the Okanogan River at Oroville to present. Five other stations were active during 1957 to 1971. Only four USGS stations are currently operating today. One is located on the Similkameen and three others on the Okanogan (at Malott, Tonasket and Oroville). Only one station not on the mainstem, Tonasket Creek, has more than 20 years of record from 1967 to 1991. Because many of the flow sampling locations were also used for water quality sampling, these stations are depicted in the map showing those locations in Chapter 5 (Figure 5.1-1). The quality of the source data cannot be ascertained from the data reviewed, as such quality control would require cross-sectional and velocity profiles used to measure flow. We assumed flows were measured using these standard practices and were therefore reliable. These data allow for interpretation of flow changes over time, at least to some extent.

For those streams for which data are available, the estimated mean annual flows per square mile are highest in the Sinlahekin (160 to 478 ac-ft/sq mi) and Salmon (50 to 491 ac-ft/sq mi) subbasins and lowest in the Osoyoos (21 to 39 ac-ft/sq mi) and Omak (21 to 66 ac-ft/sq mi) subbasins (excluding flow in the mainstem Okanogan). There are no mean annual flow data for streams in the Joseph Subbasin, but it is likely that flows per unit area are also very low there (Table 2.2-4). Peak discharges typically occur during the 4-month period from April through July (Figures 2.2-1 to 2.2-4), reflecting primarily snowmelt or snow on rain events, when streams contribute about 70-80 percent of their average annual discharge. Low flows generally occur from August (e.g., Johnson Creek) to October (e.g., Okanogan River) depending on the stream, but prior to the beginning of autumn rainy periods. In some cases, the streamflow hydrographs are influenced by upstream diversions or regulation (e.g., Whitestone Creek on Figure 2.2-2). Some smaller streams freeze up during winter and have no flow until the spring flaw.

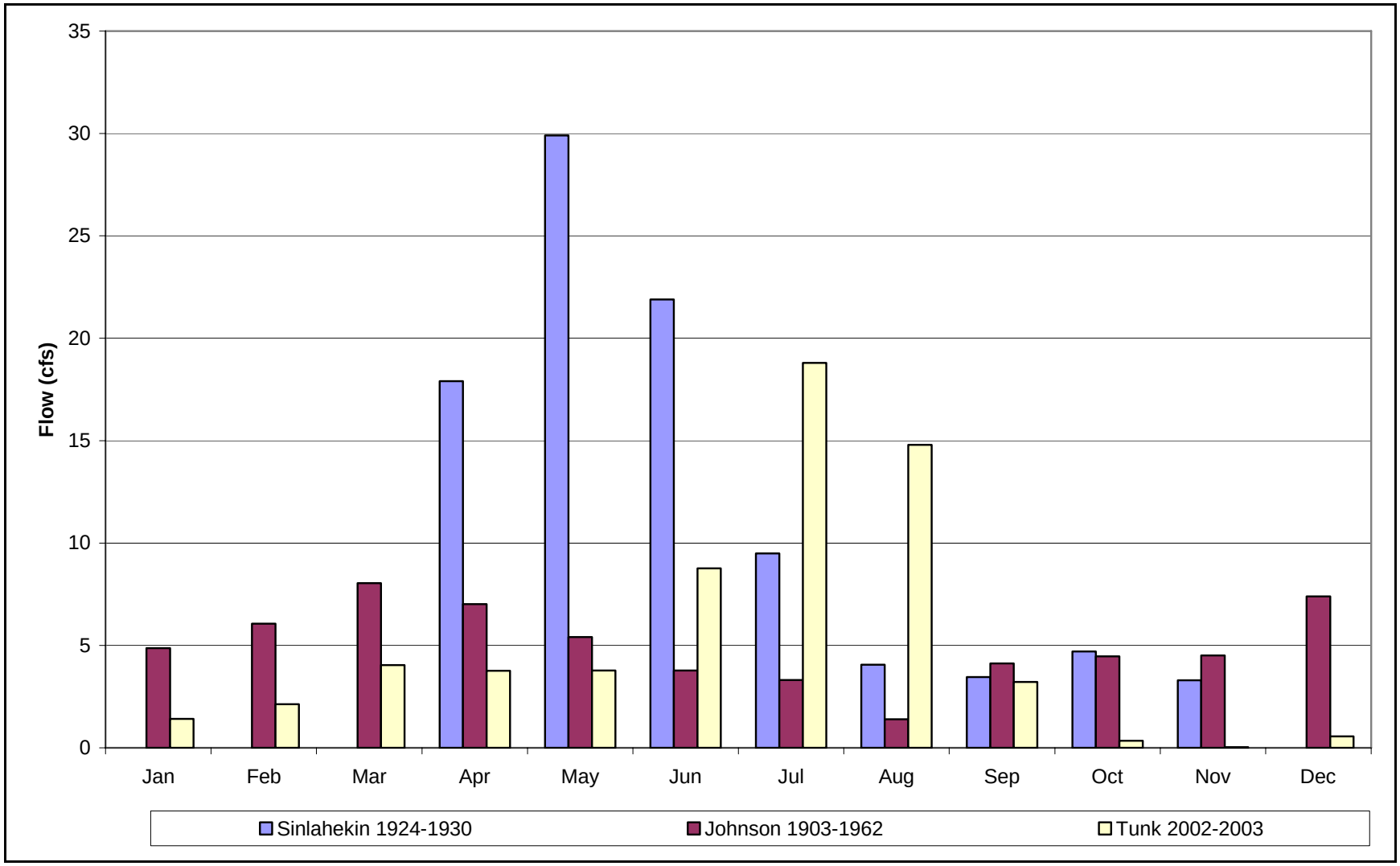
## Figure 2.2-1: Okanogan and Similkameen Rivers – Monthly Mean Flows



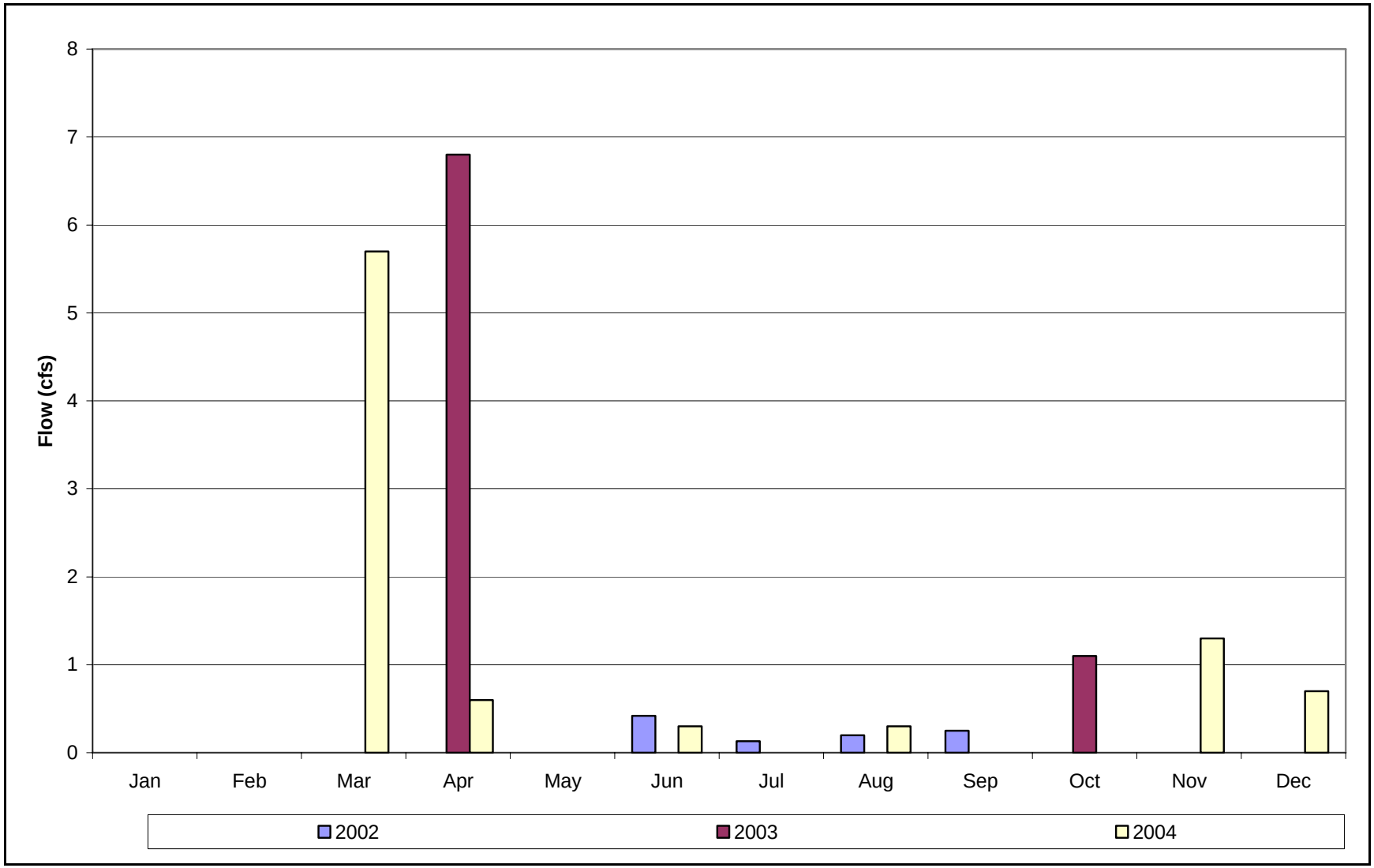
## Figure 2.2-2: Whitestone, Bonaparte and Tonasket Creeks – Monthly Mean Flows



## Figure 2.2-3: Sinalhekin, Johnson and Tunk Creeks – Monthly Mean Flows



## Figure 2.2.4: Ninemile Creek – Monthly Mean Flows



## Table 2.2-2: Summary of Continuous Data – WRIA 49 Streams

| STREAM NAME | SOURCE OF DATA | GAUGE ID | PERIOD OF RECORD | ANNUAL MEAN FLOW (CFS) | MAX | MIN | RANGE | YEARS OF RECORD |
|---|---|---|---|---|---|---|---|---|
| **Sinlahekin Subbasin** | | | | | | | | |
| Similkameen River, Nighthawk | USGS | 12442500 | 10/28-9/2004 | 2308 | 4840 | 1100 | 3740 | 75 |
| Similkameen River Near Oroville | USGS | 12443500 | 6/1911-9/28 | 2,121 | 3138 | 871 | 2267 | 16 |
| Similkameen River at Oroville | Ecology | 49B070 | 2001/02 | 265 | | | | |
| | | | 2003/04 | 2440B | | | | |
| | | | 2004/05 | 901 | | | | |
| Toats Coulee Creek Near Loomis | USGS | 12442000 | 10/20 to 7/26 | 45.8 | 67.4 | 24.2 | 43.2 | 12 |
| Toats Coulee Creek Near Loomis | Ecology | 49K090 | 2001/02 | 6.45 | | | | |
| | | | 2002/03 | 57.5J | | | | |
| | | | 2003/04 | 56.5J | | | | |
| | | | 2004/05 | 42.6J | | | | |
| Sinlahekin Creek Near Loomis | Ecology | 49L100 | 2001/02 | 6.02B | | | | |
| | | | 2002/03 | 16.5J | | | | |
| | | | 2003/04 | 9.50B | | | | |
| | | | 2004/05 | 25.0! | | | | |
| Sinlahekin Creek above Blue Lake Near Loomis | USGS | 12440000 | 5/24-9/30 | ND | | | | 6.3 |
| Sinlahekin Creek Near Loomis | USGS | 12441500 | 6/1903-3/1905 | 53.5 | 53.5 | 53.5 | 0.0 | 1.8 |
| Sinlahekin Creek at Twin Bridge Near Loomis | USGS | 12441000 | 5/1921-10/1921 | 2.8 | | | | 0.4 |
| Sinlahekin Creek AB Chopaka Creek Near Loomis | USGS | 12442300 | 5/57-10/65 | 56.6 | 96.6 | 23.3 | 73.3 | 7 |
| **Joseph Subbasin** | | | | | | | | |
| Okanogan River (Okanogan) | USGS | 12446000 | 6/1911-9/25 | 2907 | 4018 | 2148 | 1870 | 12 |
| Okanogan River (Malott) | USGS | 12447200 | 1/66-9/2004 | 3049 | 6337 | 1438 | 4899 | 38 |
| Okanogan River (Near Malott) | USGS | 12447300 | 4/58-7/67 | 3005 | 4663 | 1981 | 2682 | 8 |

## Table 2.2-2: Summary of Continuous Data – WRIA 49 Streams, continued

| STREAM NAME | SOURCE OF DATA | GAUGE ID | PERIOD OF RECORD | ANNUAL MEAN FLOW | MAX | MIN | RANGE | YEARS OF RECORD |
|---|---|---|---|---|---|---|---|---|
| **Osoyoos Subbasin** | | | | | | | | |
| Tonasket Creek at Oroville | USGS | 12439300 | 4/67 to 9/91 | 3.22 | 11.3 | 0.57 | 10.7 | 23 |
| Bonaparte Creek Near Wauconda | USGS | 12444490 | 12/67-6/73 | 4.99 | | | | 5.6 |
| Bonaparte Creek at Tonasket | Ecology | 49F070 | 2001/02 | 1.26 | | | | |
| | | | 2002/03 | 6.98U | | | | |
| | | | 2003/04 | 4.17U | | | | |
| | | | 2004/05 | 4.93U | | | | |
| Okanogan River (Oroville) | USGS | 12439500 | 10/42 to 9/2004 | 683.0 | 1407 | 194 | 1213 | 60 |
| Okanogan River (Tonasket) | USGS | 12445000 | 6/1911-9/25 | 2,942 | 6042 | 1149 | 4893 | 86 |
| Whitestone Irrigation Canal Near Loomis | USGS | 12442200 | 5/57-10/57 | 13.9 | 16.2 | 11.0 | 5.2 | 11 |
| Whitestone Creek Near Tonasket | USGS | 12444100 | 10/58-9/72 | 2.86 | 4.08 | 2.31 | 1.77 | 13 |
| **Salmon Subbasin** | | | | | | | | |
| N.F. Salmon Creek near Conconully | Ecology | 49M100 | 2001/02 | 2.85B | | | | |
| | | | 2002/03 | 22.8J | | | | |
| | | | 2003/04 | 23.7J | | | | |
| | | | 2004/05 | 22.2J | | | | |
| Johnson Creek near Riverside | BOR | NA | 1903-62 | 3593 | | | | |
| | | | 1918-62 | 3419 | | | | |
| | | | 1903-17 | 4114 | | | | |
| Salmon Creek near Okanogan | USGS | 12447000 | 10/1903-6/1910 | 51.5 | 78.3 | 34.0 | 44.3 | 5 |
| Salmon Creek near Conconully | USGS | 12446500 | 10/1911-9/22 | 32.8 | 67.3 | 11.0 | 56.3 | 10 |
| | | | 2004/05 | 2.01 | | | | |

## Table 2.2-2: Summary of Continuous Data – WRIA 49 Streams, continued

| STREAM NAME | SOURCE OF DATA | GAUGE ID | PERIOD OF RECORD | ANNUAL MEAN FLOW | MAX | MIN | RANGE | YEARS OF RECORD |
|---|---|---|---|---|---|---|---|---|
| **Omak Subbasin** | | | | | | | | |
| Tunk Creek near Riverside | Ecology | 49E080 | 2001/02 | 0.22U | | | | |
| | | | 2002/03 | 5.14* | | | | |
| | | | 2003/04 | 2.40F | | | | |
| Omak Creek near St. Mary's Mission | Ecology | 49C100 | 2001/02 | 2.48* | | | | |
| | | | 2002/03 | 28.2J | | | | |
| | | | 2003/04 | 8.17B | | | | |
| | | | 2004/05 | 5.29! | | | | |
| Omak Creek Near Omak | USGS | 12445900 | 3/72-10/78 | 10.9 | 10.9 | 10.9 | 0.0 | 1 |
| No Name Creek Diversion Near Omak | USGS | 12445940 | 9/76-9/87 | 0.18 | 0.18 | 0.18 | 0.0 | 1 |
| No Name Creek Diversion Return Near Omak | USGS | 12445942 | 9/76-10/78 | 0.006 | 0.006 | 0.006 | 0.000 | 2.1 |

**Notes** for Ecology values:

!: Data not yet checked

[]: Data not recorded

A: Above rating, reliable extrapolation

B: Below rating, reliable extrapolation.

I: Ice-impacted data

J: Estimated data

U: Unknow flow, less than value shown

F: Filtered data to remove excess noise

~ : Provisional data

Ecology = Department of Ecology

USGS = U.S. Geological Survey

BOR = Bureau of Reclamation

## Table 2.2-3: Data Summary of Point Flow Data

| STREAM NAME | GAUGE ID | DATA SOURCE | PERIOD OF RECORD | TOTAL NUMBER OF MEASUREMENTS | MEDIAN FLOW (CFS) | MAXIMUM FLOW (CFS) | MINIMUM FLOW (CFS) | MEAN FLOW (CFS) |
|---|---|---|---|---|---|---|---|---|
| **Sinlahekin Subbasin** | | | | | | | | |
| Similkameen River at Oroville | 49B070 | DOE | 10/96-9/97 | 11 | 1310 | 15900 | 0 | 3841 |
| | | | 10/97-9/98 | 18 | 1165 | 12500 | 299 | 2659 |
| | | | 10/98-9/99 | 19 | 961 | 19100 | 378 | 3768 |
| | | | 10/99-9/00 | 13 | 970 | 10000 | 603 | 2296 |
| Upper Sinlahekin | NA | OCD | 5/00-4/03 | 36 | 7.3 | 24.7 | 0.0 | 7.7 |
| Lower Sinlahekin | NA | OCD | 5/00-4/03 | 36 | 12.0 | 83.2 | 0.0 | 13.4 |
| **Joseph Subbasin** | | | | | | | | |
| Johnson Creek at Riverside | 49D080 | DOE | 6/02-7/02 | 5 | 0.4 | 0.2 | 0.7 | 0.44 |
| | | | 4/03-6/03 | 4 | 1 | 0.1 | 8.1 | 2.55 |
| | | | 10/03-8/04 | 7 | 0.3 | 0.1 | 0.9 | 0.4 |
| | | | 11/04-9/05 | 14 | 0.5 | 0.0 | 1.6 | 0.4 |
| Lower Johnson Creek | NA | OCD | 5/00-4/03 | 36 | 1.6 | 5.9 | 0.0 | 1.7 |
| Upper Johnson Creek | NA | OCD | 5/00-4/03 | 36 | 6.1 | 16.6 | 0.0 | 6.2 |
| **Osoyoos Subbasin** | | | | | | | | |
| Antoine Creek North Mouth | 49G060 | DOE | 6/02-8/02 | 8 | 1.3 | 4.0 | 0.0 | 1.5 |
| | | | 2/04-8/04 | 8 | 0.9 | 1.5 | 0.0 | 0.9 |
| | | | 11/04-9/05 | 15 | 0.7 | 2.8 | 0.0 | 1.1 |
| Lower Antoine Creek | NA | OCD | 5/00-4/03 | 36 | 1.0 | 6.1 | 0.0 | 1.2 |
| Upper Antoine Creek | NA | OCD | 5/00-4/03 | 36 | 0.0 | 6.9 | 0.0 | 0.5 |
| Upper Chiliwist | NA | OCD | 5/00-4/03 | 36 | 0.0 | 1.7 | 0.0 | 0.2 |
| Lower Chiliwist | NA | OCD | 5/00-4/03 | 36 | 1.2 | 8.5 | 0.0 | 1.5 |
| Bonaparte Creek @ Aeneas Valley Rd | 49F150 | DOE | 6/02-9/02 | 5 | 2.4 | 3.8 | 0.3 | 2.1 |
| | | | 4/03-7/03 | 3 | 4.2 | 10.0 | 0.9 | 5.0 |
| | | | 10/03-8/04 | 9 | 4.1 | 6.3 | 0.6 | 3.5 |
| | | | 11/04-9/05 | 17 | 3.9 | 6.7 | 0.0 | 3.4 |
| Lower Bonaparte Creek | NA | OCD | 5/00-4/03 | 36 | 3.9 | 14.7 | 0.0 | 4.3 |
| Upper Bonaparte Creek | NA | OCD | 5/00-4/03 | 36 | 1.2 | 14.5 | 0.0 | 2.3 |
| Upper K Bonaparte Creek | NA | OCD | 5/00-4/03 | 36 | 0.0 | 1.4 | 0.0 | 0.2 |
| Lower Siwash Creek | NA | OCD | 5/00-4/03 | 36 | 0.0 | 2.0 | 0.0 | 0.2 |
| Upper Siwash Creek | NA | OCD | 5/00-4/03 | 36 | 0.9 | 4.3 | 0.0 | 1.2 |
| Tonasket Creek Near Oroville | 49H080 | DOE | 6/02-7/02 | 7 | 0.4 | 2.0 | 0.0 | 0.6 |

## Table 2.2-3: Data Summary of Point Flow Data, continued

| STREAM NAME | GAUGE ID | DATA SOURCE | PERIOD OF RECORD | TOTAL NUMBER OF MEASUREMENTS | MEDIAN FLOW (CFS) | MAXIMUM FLOW (CFS) | MINIMUM FLOW (CFS) | MEAN FLOW (CFS) |
|---|---|---|---|---|---|---|---|---|
| | | | 4/03-7/03 | 3 | 5.8 | 12.7 | 0.2 | 6.2 |
| | | | 3/04-5/04 | 5 | 0.3 | 1.3 | 0.0 | 0.6 |
| | | | 11/04-8/05 | 14 | 2.1 | 7.6 | 0.0 | 2.4 |
| Lower Tonasket Creek | NA | OCD | 5/00-4/03 | 36 | 0.0 | 10.7 | 0.0 | 1.1 |
| Upper Tonasket Creek | NA | OCD | 5/00-4/03 | 36 | 0.1 | 7.9 | 0.0 | 1.1 |
| Ninemile Creek Near Oroville | 49J060 | DOE | 6/02-9/02 | 11 | 0.3 | 0.5 | 0.1 | 0.3 |
| | | | 4/03-4/03 | 2 | 6.8 | 10.7 | 2.9 | 6.8 |
| | | | 10/03-8/04 | 9 | 0.6 | 5.7 | 0.0 | 1.2 |
| | | | 11/04-9/05 | 18 | 1.3 | 2.9 | 0.0 | 1.3 |
| Upper Ninemile Creek | NA | OCD | 5/00-4/03 | 36 | 0.6 | 6.9 | 0.0 | 1.5 |
| Lower Ninemile Creek | NA | OCD | 5/00-4/03 | 36 | 0.6 | 8.7 | 0.0 | 1.3 |
| **Salmon Subbasin** | | | | | | | | |
| Johnson Creek at Riverside | 49D080 | DOE | 6/02-7/02 | 5 | 0.4 | 0.7 | 0.2 | 0.44 |
| | | | 4/03-6/03 | 4 | 1 | 8.1 | 0.1 | 2.55 |
| | | | 10/03-8/04 | 7 | 0.3 | 0.9 | 0.1 | 0.4 |
| | | | 11/04-9/05 | 14 | 0.5 | 1.6 | 0.0 | 0.4 |
| Lower Johnson Creek | NA | OCD | 5/00-4/03 | 36 | 1.6 | 5.9 | 0.0 | 1.7 |
| Upper Johnson Creek | NA | OCD | 5/00-4/03 | 36 | 6.1 | 16.6 | 0.0 | 6.2 |
| W.F. Salmon Creek @ Mouth | 49N050 | DOE | 9/02-9/02 | 2 | 3.8 | 3.8 | 3.7 | 3.8 |
| | | | 4/03-7/03 | 5 | 15.2 | 35.1 | 5.5 | 19.4 |
| Lower Loup Loup | NA | OCD | 5/00-4/03 | 36 | 0.0 | 20.7 | 0.0 | 1.6 |
| Upper Loup Loup | NA | OCD | 5/00-4/03 | 36 | 0.3 | 20.0 | 0.0 | 1.7 |
| Upper Talant | NA | OCD | 5/00-4/03 | 36 | 0.0 | 17.5 | 0.0 | 3.3 |
| Lower Talant | NA | OCD | 5/00-4/03 | 36 | 0.0 | 1.3 | 0.0 | 0.1 |
| **Omak Subbasin** | | | | | | | | |
| Upper Tunk Creek | NA | OCD | 5/00-4/03 | 36 | 1.1 | 9.3 | 0.0 | 2.0 |
| Lower Tunk Creek | NA | OCD | 5/00-4/03 | 36 | 1.2 | 15.3 | 0.0 | 2.5 |

**Notes**

NA: Not Available

OCD: Okanogan Conservation District

DOE: Department of Ecology

## Table 2.2-4: Sinlahekin Creek above Blue Lake Near Loomis

| PRIMARY SUBBASIN/STREAM NAME | PERIOD OF RECORD | ANNUAL MEAN FLOW | | AREA AT GAGE | ANNUAL VOLUME/AREA | UPSTREAM DIVERSIONS |
|---|---|---|---|---|---|---|
| | | *Cfs* | *ac-ft* | *sq mi* | *ac-ft/sq mi* | |
| **Sinlahekin Subbasin** | | | | | | |
| Similkameen River, Nighthawk | 10/1928-9/2004 | 2308 | 1672060 | 3500 | 478 | |
| Similkameen River Near Oroville | 6/1911-9/1928 | 2,121 | 1536586 | 3550 | 433 | 2900 ac in WA, 10,700 ac in BC |
| Toats Coulee Creek Near Loomis | 10/20 to 7/26, 1957-70 | 45.8 | 32839 | 130 | 253 | none |
| Sinlahekin Creek above Blue Lake Near Loomis | 5/1924-9/1930 | 11.8 | 8556 | 41.7 | 205 | |
| Sinlahekin Creek Near Loomis | 6/1903-3/1905 | 53.5 | 38759 | 86.6 | 448 | unknown |
| Sinlahekin Creek AB Chopaka Creek Near Loomis | 5/1957-10/1965 | 56.6 | 41005 | 256 | 160 | Whitestone Canal and some irrigation |
| **Joseph Subbasin** | | | | | | |
| Okanogan River (Malott) | 1/1966-9/2004 | 3049 | 2209092 | 8100 | 273 | 55,000 ac in BC, 22,000 ac in WA |
| Okanogan River (Near Malott) | 4/1958-7/1967 | 3005 | 2177011 | 8200 | 265 | 55,000 ac in BC, 22,000 ac in WA |
| **Osoyoos Subbasin** | | | | | | |
| Tonasket Creek at Oroville | 4/1967 to 9/1991 | 3.2 | 2333 | 60.1 | 38.8 | some irrigation |
| Whitestone Creek Near Tonasket | 10/1958-9/1972 | 2.9 | 2072 | 55.4 | 37.4 | regulated at Whitestone Lake |

## Table 2.2-4: Sinlahekin Creek above Blue Lake Near Loomis, continued

| PRIMARY SUBBASIN/STREAM NAME | PERIOD OF RECORD | ANNUAL MEAN FLOW | | AREA AT GAGE | ANNUAL VOLUME/AREA | UPSTREAM DIVERSIONS |
|---|---|---|---|---|---|---|
| | | *Cfs* | *ac-ft* | *sq mi* | *ac-ft/sq mi* | |
| Bonaparte Creek Near Wauconda | 12/1967-6/1973 | 5.0 | 3617 | 96.6 | 37.4 | several small diversions |
| Bonaparte Creek at Tonasket | 2002/2003 | 7.0 | 5057 | 136 | 37.2 | |
| Bonaparte Creek at Tonasket | 2003/2004 | 4.2 | 3021 | 136 | 22.2 | |
| Bonaparte Creek at Tonasket | 200420/05 | 4.9 | 3572 | 136 | 26.3 | |
| Bonaparte Creek | 2003 | 6.6 | 4774 | 136 | 35.1 | |
| Bonaparte Creek | 2004 | 4.0 | 2864 | 136 | 21.1 | |
| Okanogan River (Oroville) | 10/1942 - 9/2004 | 683 | 494808 | 3210 | 154 | 44,000 ac in BC |
| Okanogan River (Tonasket) | 6/1911-9/1925, 2004 | 2,942 | 2131370 | 7280 | 293 | 55,000 ac in BC, 10,700 in WA |
| **Salmon Subbasin** | | | | | | |
| N.F. Salmon Creek near Conconully | 2001/2002 | 2.9 | 2065 | 35 | 59 | |
| N.F. Salmon Creek near Conconully | 2002/2003 | 22.8 | 16518 | 35 | 472 | |
| N.F. Salmon Creek near Conconully | 2003/2004 | 23.7 | 17170 | 35 | 491 | |
| N.F. Salmon Creek near Conconully | 2004/2005 | 22.2 | 16083 | 35 | 460 | |
| Johnson Creek near Riverside | 1903-1962 | 5.0 | 3595 | 68.2 | 52.7 | |

## Table 2.2-4: Sinlahekin Creek above Blue Lake Near Loomis, continued

| PRIMARY SUBBASIN/STREAM NAME | PERIOD OF RECORD | ANNUAL MEAN FLOW | | AREA AT GAGE | ANNUAL VOLUME/AREA | UPSTREAM DIVERSIONS |
|---|---|---|---|---|---|---|
| | | *cfs* | *ac-ft* | *sq mi* | *ac-ft/sq mi* | |
| Johnson Creek near Riverside | 1918-1962 | 4.7 | 3422 | 68.2 | 50.2 | |
| Johnson Creek near Riverside | 1903-1917 | 5.7 | 4116 | 68.2 | 60.4 | |
| Salmon Creek near Okanogan | 10/1903-6/1910 | 51.5 | 37310 | 147 | 254 | |
| Salmon Creek at Conconully Lake | 1904-2002 | | 21635 | 121 | 179 | |
| Salmon Creek near Conconully | 10/1911-9/1922 | 32.8 | 23762 | 121 | 196 | unknown |
| **Omak Subbasin** | | | | | | |
| Tunk Creek near Riverside | 200220/03 | 5.1 | 3724 | 71 | 52.4 | |
| Tunk Creek near Riverside | 2003/2004 | 2.4 | 1739 | 71 | 24.5 | |
| Tunk Creek near Riverside | 2004/2005 | 2.0 | 1456 | 71 | 20.5 | |
| Omak Creek Near Omak | 3/1972-10/1978 | 10.9 | 7897 | 119 | 66.4 | many small diversions |

### 2.2.1 Sinlahekin Subbasin

Long-term mean annual flow data are available for the Similkameen River. Toats Coulee and Sinlahekin Creeks flow data are only available for the short-term. There are no available streamflow records for Chopaka, Sarsapkin and Cecile Creeks. Some of the mean annual flow data may be reduced by irrigation deliveries, but in some cases such as Toats Coulee and Sinlahekin Creek, the irrigation diversions are apparently below the points where flow has been measured (J. Barnes, personal communication, Okanogan Planning Unit). Deep snowpack, high drainage densities (the sum of all stream lengths per unit area) and higher elevations in this subbasin generally result in greater mean annual flows. On average, the data indicate that the mean annual flow (MAF) for the Similkameen River at Oroville ranges between 2200 to 3800 cubic feet cfs.

### 2.2.2 Osoyoos Subbasin

There is a good, moderate-term mean annual flow record for Tonasket Creek. Some short-term mean annual flow data are available for Whitestone and Bonaparte Creeks. Some partial short-term data are also available for Antoine, Siwash and Nine mile Creeks. There are no streamflow data for Chewiliken, Horse Springs, (drains Horse Springs Coulee area into Aeneas Lake and is located between Aeneas Creek and Whitestone Coulee) and Aeneas Creeks.

### 2.2.3 Salmon Subbasin

The Salmon Subbasin is comprised of a wide range of landscapes (variable physiography with low to high drainage densities) and climate zones, which means that there will be a wide range in recharge and runoff characteristics. For Johnson and Salmon Creeks, older (50 to 100 year old), good quality data were available. Good quality long-term modeled mean annual flow data were available for Salmon Creek. Some partial short-term records for Loup Loup and Tallant Creeks were also available. There was no data for the Pine Creek area.

### 2.2.4 Omak Subbasin

Estimates of mean annual flow are available, based on some partial short-term data, for Tunk and Omak Creeks. In general, though, the number of creeks in the subbasin is limited (i.e., there is a low drainage density) which means that overall runoff potential from the area is low; this may equate to higher evapotranspiration and higher recharge rates for some soil/rock-types (e.g., alluvium, glacial outwash) and lower recharge for other soils/rock-types (e.g., low permeability bedrock).

### 2.2.5 Joseph Subbasin

There are no mean annual flow data for streams in the Joseph subbasin including the Indian Dan, Whitestone and Swamp Creek drainages. Some partial short-term data are available for Chiliwist Creek. Drainage density in the subbasin is low and drainage systems are less developed with a high number of small lakes. This is likely due to resistant and low permeability properties of the bedrock

## 2.3 GEOLOGY AND HYDROGEOLOGY

Bedrock in the Okanogan River Basin consists principally of granitic, andesitic, basaltic, and metamorphosed sedimentary rocks (see Glossary for definition of these terms).. The Project Area experienced intense folding, thrust faulting, and intrusions in the Jurassic and Cretaceous periods, resulting in highly fractured bedrock.

During the last glaciation, more than 10,000 years ago, the Okanogan Lobe of the Cordilleran ice sheet covered much of the Okanogan Basin and rerouted ancestral streams. The retreating glacier left behind thick deposits of unconsolidated silt, sand, gravel, and cobbles as valley fill and terraces. These glacial deposits are estimated at more than 500 feet thick in certain areas (Ecology 1995).

The unconsolidated glacial deposits provide the primary water storage in the Project Area. The fractured bedrock contains only very low yield aquifers (Ecology 1974). Maps C1-C5 in Attachment 2 (Hydrogeology and Well Location by Subbasin Maps) provide an illustration of documented water producing wells (by well depth) in the basin in relation to the general rock-type (i.e., alluvium, glacial outwash, glacial till/drift, surficial deposits and bedrock) of the aquifer from which the water is drawn.

Rainfall/snowmelt provides the primary form of recharge for the aquifers. Groundwater and surface water interact throughout the watershed (Ecology 1995). Irrigation infiltration is an artificial recharge where irrigation is common practice (e.g., Pogue Flats and the Duckwater Groundwater Basin)

### 2.3.1 Sinlahekin Subbasin

Much of this subbasin is mountainous and used for timber harvest and grazing (ENTRIX and Golder 2001, WDNR 1996). Groundwater in this subbasin is generally limited to glacial and alluvial deposits in abandoned or partially abandoned valleys. An abandoned valley is once through which a stream once ran, but no longer does. For example, the Similkameen River once flowed through the valley now occupied by Sinlahekin Creek. During the last glaciation the river was rerouted through several temporary channels until it finally settled into its current channel as the glacier retreated. Glacial and alluvial deposits in the original channel and the temporary channels are several hundred feet thick with moderate to high yield aquifers. In contrast, due to a lack of glacial or alluvial deposits, groundwater is scarce in the current Similkameen River valley above Nighthawk to near Oroville (Ecology 1974).

### 2.3.2 Osoyoos Subbasin

The Osoyoos Subbasin includes much of the Okanogan River Valley from about five miles south of Tonasket (at the confluence with Chewiliken Creek) to the Canadian border. Glacial, alluvial, and lacustrine deposits (see glossary for definitions) are present in widely varying depths throughout the valley. Well yields also vary widely according to depth to bedrock or an impermeable blue-clay layer.

Bedrock is exposed in much of the area to the east of the Okanogan River Valley. Significant water storage is limited to the current and ancestral major stream valleys such as the Okanogan River, the lower three miles of Antoine Creek, and Bonaparte Creek where consolidated sediments may be up to 300 feet deep (although depths vary widely).

### 2.3.3 Salmon Subbasin

Much of the western half of the Salmon Subbasin is mountainous and located within the Okanogan National Forest. Most of the groundwater use in the subbasin is concentrated in the Pogue Flat, Johnson Creek and Scotch Creek areas, and along the Okanogan River Valley near the towns of Omak and Okanogan. Glacial and alluvial deposits in these areas are anywhere from several feet thick up to 100 feet thick. Unconsolidated sediments in the area of Spring Coulee and the Salmon Creek Valley can be up to 300 feet thick with some groundwater use surrounding Conconully Lake. Most other valleys in the subbasin have very little unconsolidated sediments and therefore limited water storage.

### 2.3.4 Omak Subbasin

As with the other areas of the Okanogan Watershed, the availability of groundwater in the Omak subbasin is limited to unconsolidated sediments of the major stream valleys. In this subbasin, most of the water use is in the Tunk Creek Valley, where sediments are likely less than 100 feet thick and composed mostly of till. In the Omak Creek Valley, unconsolidated deposits are mostly impermeable clay mixed with sand and gravel layers, with low yield.

### 2.3.5 Joseph Subbasin

In general, fractured basalt, such as that found in the southeastern portion of the Joseph subbasin, is known to have very high water storage capabilities. However, in this subbasin the basalt flow is an extension of the Columbia River basalt flows and is likely not thick enough to have the large water storage capabilities for the subbasin.

Wells in the Chiliwist Creek Valley have penetrated as much as 200 ft of unconsolidated sediments with high yields.

## 2.4 WATER BALANCE

Mean annual precipitation values were computed for each major subbasin following the methods and assumptions described in Appendix E and are summarized in Table 2.4-1 below.

**Table 2.4-1: Computed Mean Annual Precipitation per Subbasin**

| PRIMARY SUBBASIN | MAP (INCHES) |
|---|---|
| Sinlahekin | 22.1 |
| Osoyoos | 15.4 |
| Omak | 13.3 |
| Salmon | 19.1 |
| Joseph | 14.0 |

The precipitation data indicate that the Sinlahekin and Salmon Subbasins receive significantly more (124 percent to 166 percent) water than the other three subbasins. Water balances were computed for each major subbasin using these precipitation values and following the methods and assumptions described in Appendix E (Water Balance). The results are summarized in Table 2.4-2. Detailed calculations are provided in the water balance spreadsheet (Appendix D).

**Table 2.4-2: Subbasin Water Balances (values in thousand acre-ft per year)**

| PRIMARY SUBBASIN | PRECIPITATION | ET | RECHARGE** | MEAN ANNUAL FLOW | |
|---|---|---|---|---|---|
| | | | | Groundwater Discharge | Rainfall and Snowmelt Runoff |
| Sinlahekin | 436 | 359 | 22 | 22 | 56 |
| Osoyoos | 416 | 402 | 10 | 10 | 3 |
| Omak | 322 | 309 | 8 | 8 | 5 |
| Salmon | 402 | 367 | 20 | 20 | 15 |
| Joseph | 215 | 212 | 3 | 3 | 0.4 |
| | | Percentage of Precipitation | | | |
| | | As ET | As Recharge (Gr) | As Groundwater Discharge (Gd) | As Runoff (R) |
| Sinlahekin | | 82% | 5.0% | 5.0% | 12.8% |
| Osoyoos | | 97% | 2.5% | 2.5% | 0.8% |
| Omak | | 96% | 2.5% | 2.5% | 1.5% |
| Salmon | | 91% | 5.0% | 5.0% | 3.8% |
| Joseph | | 98% | 1.5% | 1.5% | 0.2% |

In general, the calculations indicate that, depending on subbasin location, 82 percent to 98 percent of precipitation is returned to the atmosphere via evapotranspiration. The Sinlahekin and Salmon subbasins not only receive more total water per unit area, but evapotranspiration rates are also lower, indicating that more water is available to recharge groundwater and support higher streamflows (per unit area). Thus, mean annual streamflow (Gr + R) is signficantly higher in the Sinlahekin subbasin – an order of magnitude higher than in the Osoyoos and Omak subbasins and two orders of magnitude higher than in the Joseph subbasin.

A simple accounting of water in the Okanogan River was developed using measured mean annual flow (MAF) for the three USGS stations on the river and comparing these measured flows to the total surface water available, as calculated from the water balance described above. Table 2.4-3 indicates that the measured mean annual flow of the Okanogan River at Tonasket was 49,000 af/yr less than the total calculated total surface water available. It is likely that water diversions from tributary streams and the Okanogan River, and well production from valley aquifer (in hydraulic connection with the Okanogan River) contribute to this net loss.  In other words, this loss may be due to well production from the valley aquifer This net loss is reduced to about 21,000 ac-ft/yr at Malott, where return flow from tributary streams, diversions and groundwater discharge have likely made up some of the deficit.

## Table 2.4-3: Okanogan River Water Balance (all values in thousand acre-ft per year)

| | TRIBUTARY BASINS | | OKANOGAN RIVER | | |
|---|---|---|---|---|---|
| **Major River/Subbasin** | **Calculated Total Surface Water Available** | **Measured Total Surface Water Available** | **Calculated Total Surface Water Available** | **Measured Total Surface Water Available** | **Net Loss/Gain** |
| **Okanogan River at Oroville** | | | | 494 | |
| Similkameen River from Canada | 1,594 | | | | |
| Contribution from Sinlahekin Subbasin | 77 | | | | |
| Similkameen River (at Nighthawk) | | 1,672 | 2,167 | | |
| Contribution from Osoyoos Subbasin | 14 | | | | |
| **Okanogan River at Tonasket** | | | 2,180 | 2,131 | -49 |
| Contribution from Omak Subbasin | 13 | | | | |
| Contribution from Salmon Subbasin* | 37 | | | | |
| **Okanogan River at Malott** | | | 2,230 | 2,209 | -21 |
| Contribution from Joseph Subbasin | 4 | | | | |
| Okanogan River at Columbia River | | | 2,234 | | |

- includes portion not included in subbasin calculations referred to as Okanogan River - Middle

# Chapter 3.0: Water Quantity

This section presents water rights and water use information for WRIA 49 and its major subbasins. These data provide a picture of the extent to which water that is physically available has been legally appropriated for human use (Chapter 3.1), and the actual extent of use (as opposed to the amounts legally appropriated; Chapter 3.2). An assessment of surface water (Chapter 3.3) and ground water (Chapter 3.4) appropriations is also included.

Water rights data were obtained from the Washington Department of Ecology WRATS and GWIS database. The accuracy of these data for water right permits and certificates are fair to good, although the databases have a history of providing somewhat inconsistent results when queried several times. They are not updated with current water right ownership information, and they do not reflect whether the water rights recorded remain perfected in use ("wet" water rights) or have been lost due to non-use ("paper" water rights). Also, the database contains numerous duplicate records and requires great familiarity to use without errors. Many water rights have multiple purposes, but the amount of water appropriated by purpose is not allocated.

Data (GWIS) provided by Ecology did not map the locations of new water right applications or include a WRIA 49 subbasin identifier, so it was not possible to assess potential new water rights by subbasin without much more extensive analysis of individual water right records. However, the effect of new applications is taken into account in the growth forecast (Chapter 3.5).

Water claims are also recorded in the Ecology databases, but the quality of information is poor. Issues include the existence of numerous spurious and false claims; data errors; highly inaccurate records (which are filled out by the individuals registering a claim). More than 70 percent of surface sources from which the right to divert water is claimed are unnamed in the claims. There is no "fix" for these issues short of adjudication.

Water use data were obtained for the domestic and municipal (water systems and exempt wells); commercial/industrial/Institutional; and agricultural sectors from such sources as Group A water system comprehensive plans (WSCPs), irrigation districts, Washington Department of Health Group A and B reports, the Washington Department of Ecology well-log database, and both local and national statistical sources of agricultural water use data.

The quality of data available to characterize municipal and domestic water use is generally fairly good. Data from WSCP's are not directly comparable as the dates of the plans vary and there are no data for smaller Group A's and Group B's beyond the number of connections served. There are no good sources of data to characterize commercial, industrial and institutional water use. This information can be inferred to a

limited degree from County Assessor land use data and water rights with pertinent purposes listed in the Ecology databases, or from representative average data elsewhere.

The well-log database has generally good quality data. About 2 percent of the wells are not water wells and the use of the well-log data as a proxy for exempt well use double counts water-righted wells (these duplicates could be screened out in Level 2 work if desired). Some data are missing and there are coding errors. These issues can be fixed by comparing the well log data to the water rights database and eliminating duplicates.

Agricultural water use data were obtained from irrigation districts; the USDA; and County Assessor land use codes. The quality of this data is poor to good. Generally, there was little accurate, current data from made available from WRIA 49 irrigation districts and County data does not disaggregate discrete acres by crop. NASS data is not fine grained (it is aggregated for the County as a whole). The County Assessor's data includes orchard, irrigated alfalfa, vineyards, irrigated pasture, and other irrigated crops, but multiple codes apply to most parcels and the breakout among crops is unknown. These issues would need to be addressed by survey work in Level 2.

## 3.1 WATER RIGHTS

### 3.1.1 Overview of Water Rights

WRIA 49 water rights are mapped by subbasin in Attachment 2 Map Atlas. Water rights data are presented in Appendix A-1. A primer on water rights is provided in Appendix A-1.1.

Figures 3.1-1 and 3.1-2 show the WRIA 49 water rights and claims[1] by type (certificates, permits, applications, and claims), and by type of source (surface and ground water). Data on certificates and permits is contained in Appendix A-1.2, including the full Ecology WRATS/GWIS database (Appendix A-1.2a) and the filtered data analyzed for the Level 1 Report (Appendix A-1.2b). There are a total of 1867 certificates and permits (including change certificates and permits), 324 new applications, and 4,756 water claims. Figure 3.1-2 indicates the predominance of water claims, which represent more than 68 percent of the records. There are 2.5 times as many claims as certificates and permits, which total about 27 percent of all records.

[1] Claims are statements that water use existing before the surface and ground water codes established the water rights system – people may go on using water in amounts and for purposes that existed before the codes were passed into law, but must register a formal "claim".

**Figure 3.1-1: WRIA Water Rights and Claims**

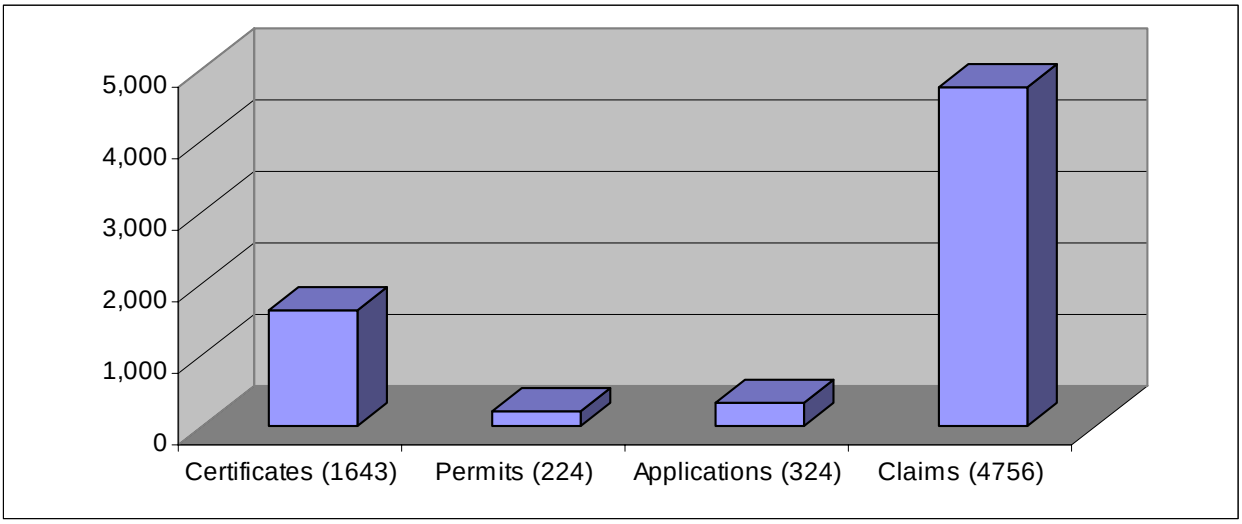
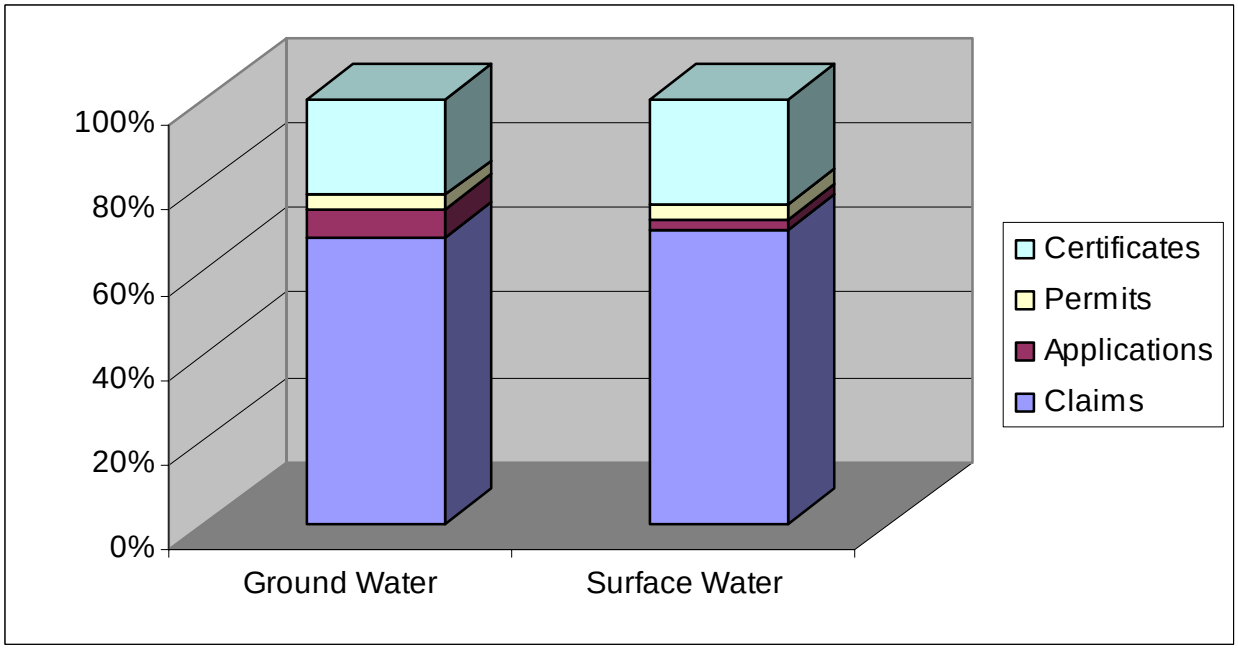



**Figure 3.1-2: WRIA 49 Water Rights and Claims by Source Type**




New applications are summarized in Table 3.1-1. Data are presented in Appendix A-1.3 New applications appear to focus on meeting peak needs or providing supplemental water (to backup primary water sources), because relatively little additional annual volume is requested (1,689 AFY, equivalent to about 0.6 percent of existing water rights). Ground water is emphasized over surface water in new applications: if all applications were approved, diversions from streams would increase by 2.5 percent but pumping would increase by 49 percent over current levels.

**Table 3.1-1: New Applications by Source Type**

| NEW APPLICATIONS | NUMBER | CFS | GPM | AFY | ACRES IRRIGATED |
|---|---|---|---|---|---|
| **Ground Water** | 240 | 0 | 91,640 | 9 | 9,923 |
| **Surface Water** | 84 | 73.25 | 0 | 1,680 | 3,159 |
| **TOTAL** | 324 | 73.25 | 91640 | 1689 | 13082 |

Water claims are mapped in Attachment 2 Atlas Maps, and data are provided in Appendix A-1.4a. Claims, which represent statements that water was in use prior to the establishment of the surface and ground water codes, comprise an unknown – and potentially large – commitment of water resources. Most claims are not quantified, and many may be invalid. As an example, Table 3.1-2 and Appendix A-1.4b show the results of an investigation of claims for Salmon Creek. Only 0.02 percent of claimed flows (cfs) and 0.21 percent of claimed annual quantities of water were valid.

**Table 3.1-2: Water Claims Example: Salmon Creek**

| | CFS | AFY | ACRES IRRIGATED |
|---|---|---|---|
| CLAIMS REGISTRY | 8,626.39 | 321,286 | 100,279 |
| VALID CLAIMS | 1.81 | 668 | 5,032 |
| **% VALID** | **0.02%** | **0.21%** | **5.02%** |

The validity of claims can only be established through adjudication (court determination of legal water rights), which can be a lengthy and expensive process if done on a large scale. An unusually large proportion of WRIA 49 water rights have already been in adjudicated in various subbasins (for example, Johnson Creek): 23 percent of all certificates, including 17 percent of ground water and 30 percent of surface water have been decided by the courts (Figure 3.1-3). Data on WRIA 49 adjudicated water rights is given in Appendix A-1.5.

Figure 3.1-4 indicates the total amounts of ground water (103,041 AFY) and surface water (186,900 AFY) appropriated in WRIA 49. Data on the largest WRIA 49 water rights is summarized in Appendix A-1.6, which lists water rights appropriating more than 10 cfs, more than 1,000 gpm, and more than 1,000 AFY. As compared to many other WRIAs, average water rights in WRIA 49 are relatively modest and are not greatly concentrated in large rights. With few exceptions, the largest WRIA 49 water rights do not appear to have critical effects on the sources that supply them.

**Figure 3.1-3 WRIA 49 Adjudicated Rights**

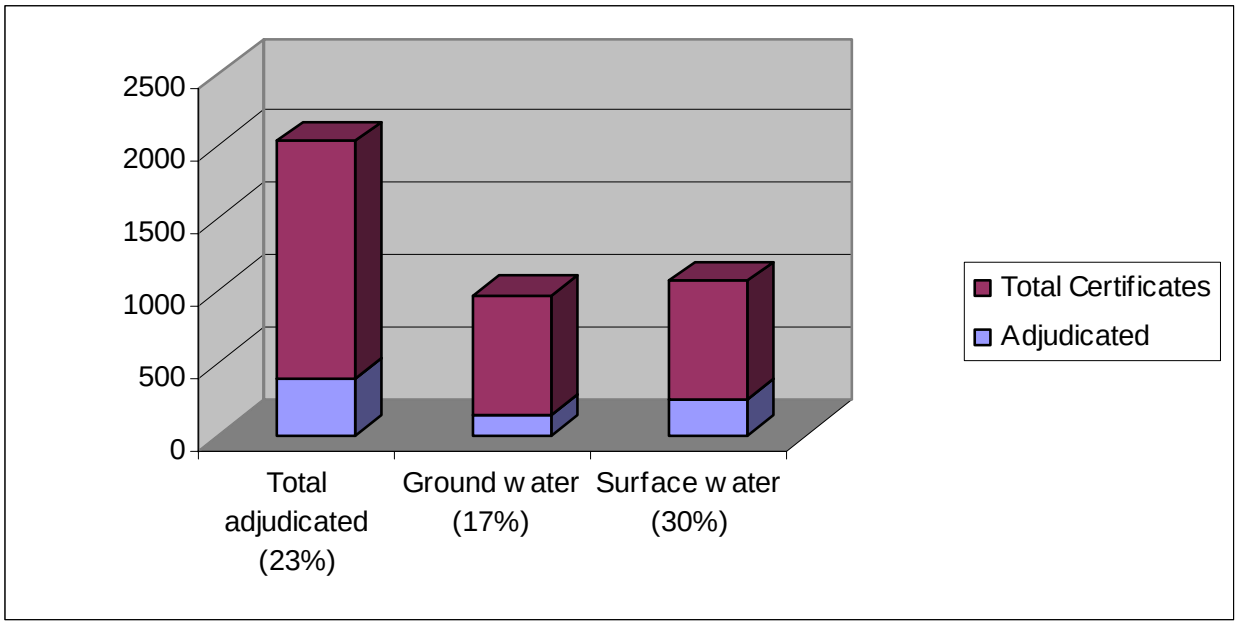
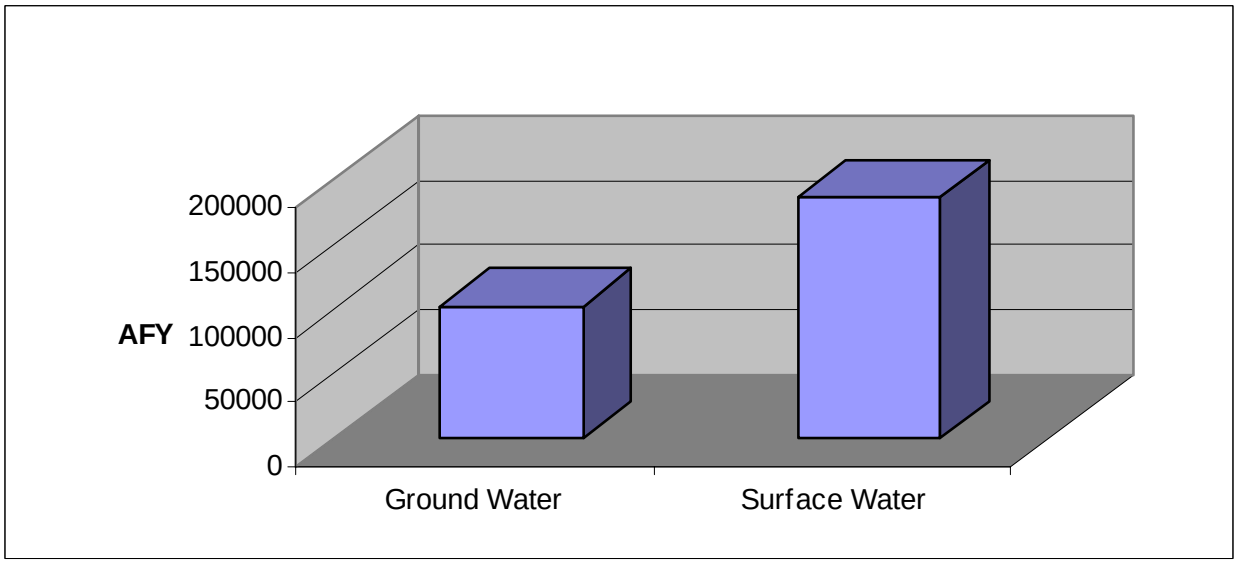



**Figure 3.1-4 WRIA 49 Ground and Surface Water Rights**




Of the 27 water rights appropriating 10 cfs or more, only three appear to be of concern. Twelve are from the Okanogan River or mainstem lakes and represent a small proportion of mean and low flows. Four appear to have been converted to a ground water source. Four are listed on the Similkameen River, and three of these are known to be inactive or transferred to other sources (in the case of the OTID water right). The fourth Similkameen water right is a non-consumptive right, for run-of-river power generation at Enloe dam (Okanogan PUD). Two, at Duck Lake and Johnson Creek, are

water rights owned by Okanogan Irrigation District in an adjudicated basin; the Johnson Creek water right is junior to other rights and is rarely exercised. Two 168 cfs water rights on Sinlahekin Creek in the name of the Sinlahekin Water Users Association, and appear not be in use or to be at most used only in small part, because these are storage rights (which require secondary permits to divert the water and put it to use). A 1984 change certificate indicates that the Sinlahekin Rights are now associated with Whitestone Reclamation District for the storage of 2,400 AF of water in Blue Lake and diversion of 3.3 cfs for irrigation. The remaining three include a right for 375 cfs on Tonasket Creek issued to a private irrigator in 2003; a right for 105 cfs granted to Whitestone Reclamation District with a 1913 priority date; and a 14.7 cfs diversion from Spectacle Lake, also owned by Whitestone Reclamation District (1924 priority). The Tonasket Creek and Toats Coulee Creek rights should be checked, as neither has the flow to support such a level of use. (The water rights may specify seasonal limitations, for example.)

Level 1 data does not suggest a concern with the effect of any of the 28 ground water rights larger than 1,000 gpm. The two largest, each for 5,000 gpm, are both in the Joseph Subbasin. One is owned by Crown Zellerbach and has a commercial purpose; the other is owned by the City of Omak and is used for municipal purposes.

There are 37 water rights with an annual volume exceeding 1,000 AFY; 15 of these are larger than 3,000 AFY and only three are larger than 10,000 AFY. Sixty percent have an irrigation purpose and 14 percent are municipal water rights. Three of the four largest rights are for non-consumptive purposes (fish propagation and storage).

Figure 3.1-5 summarizes the purposes of WRIA 49 water certificates and permits. The volume of water allocated to these purposes cannot be calculated with certainty from the Ecology database (because some water rights have multiple purposes). As one would expect, the primary purposes given for water use are for irrigation (65 percent of all water rights), domestic use (32 percent), and stockwatering (25 percent). Water claims focus on the same three key uses: 55 percent are for domestic use; 51 percent include stockwatering; and 27 percent have an irrigation purpose.

Commercial water rights are not dominant in WRIA 49. Total pumping under rights with a commercial purpose amounts to 4.5 percent of existing ground water rights, and 3.8 percent of the total annual volume of all existing WRIA 49 water rights. The largest commercial water right is owned by Crown Zellerbach Corporation, in the Joseph Subbasin, granting 5,000 gpm and 8,030 AFY from an unnamed source (1945 priority).

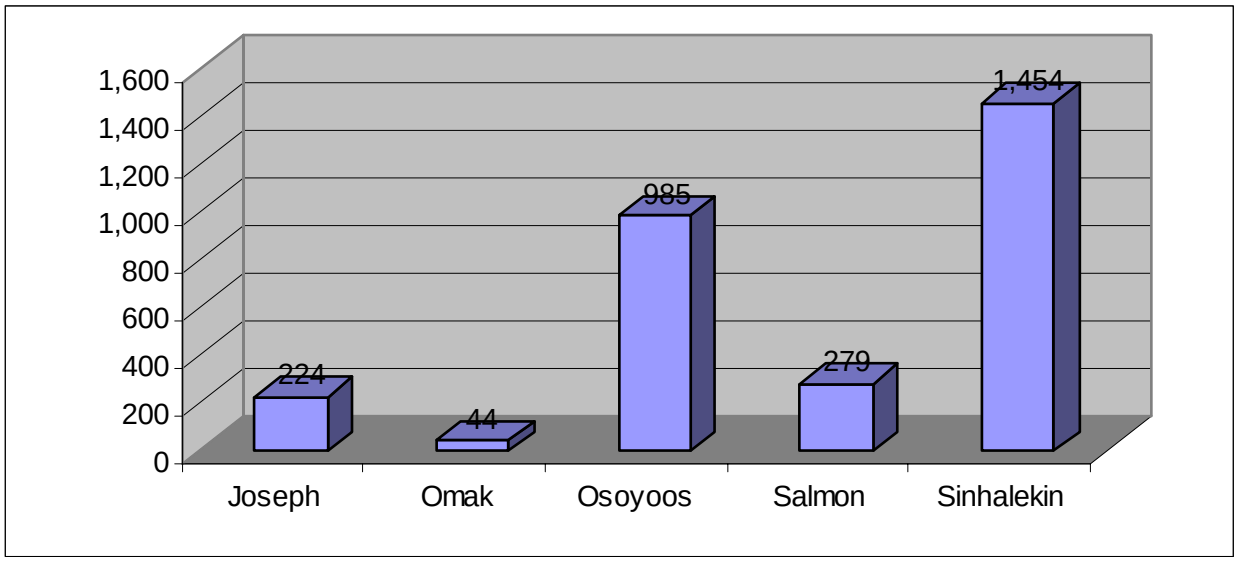
### 3.1.2 Subbasin Water Rights Assessment

Figures 3.1-5, 3.1-6, and 3.1-7 and Table 3.1-3 present the amounts of surface and ground water appropriated within each WRIA 49 subbasin. Figure 3.1-5 shows instantaneous rights to surface flows (cfs); Figure 3.1-6 shows instantaneous rights to pump ground water in gallons (gpm); and Figure 3.1-7 shows annual surface and groundwater rights (AFY).

## Table 3.1-3: Water Rights Subbasin Totals

| BASIN | NUMBER | CFS | GPM | AFY | | | SURFACE SOURCES - CFS BY BASIN |
|---|---|---|---|---|---|---|---|
| **JOSEPH** | | | | | | Joseph | 224 |
| **Ground Water** | 163 | 0 | 50,953 | 34,727 | | Omak | 44 |
| **Surface Water** | 160 | 224 | 0 | 43,804 | | Osoyoos | 985 |
| **TOTAL** | 323 | 224 | 50,953 | 78,531 | | Salmon | 279 |
| | | | | | | Sinlahekin | 1,454 |
| **OMAK** | | | | | | | |
| **Ground Water** | 25 | 0 | 5,507 | 2,464 | | | Groundwater - GPM by basin |
| **Surface Water** | 54 | 44 | 0 | 2,003 | | Joseph | 50,953 |
| **TOTAL** | 79 | 44 | 5,507 | 4,468 | | Omak | 5,507 |
| | | | | | | Osoyoos | 51,368 |
| **OSOYOOS** | | | | | | Salmon | 65,529 |
| **Ground Water** | 273 | 0 | 51,368 | 29,196 | | Sinlahekin | 14,307 |
| **Surface Water** | 359 | 985 | 0 | 86,941 | | | |
| **TOTAL** | 632 | 985 | 51,368 | 116,137 | | | All sources - AFY by basin |
| | | | | | | Joseph | 78,531 |
| **SALMON** | | | | | | Omak | 4,468 |
| **Ground Water** | 443 | 0 | 65,529 | 29,496 | | Osoyoos | 116,137 |
| **Surface Water** | 229 | 279 | 0 | 32,423 | | Salmon | 61,919 |
| **TOTAL** | 672 | 279 | 65,529 | 61,919 | | Sinlahekin | 28,887 |
| | | | | | | | |
| **SINLAHEKIN** | | | | | | | |
| **Ground Water** | 41 | 0 | 14,307 | 7,159 | | | |
| **Surface Water** | 120 | 1,454 | 350 | 21,729 | | | |
| **TOTAL** | 161 | 1,454 | 14,657 | 28,887 | | | |
| | | | | | | | |
| **WRIA 49 TOTAL** | | | | | | | |
| **Ground Water** | 945 | 0 | 187,663 | 103,041 | | | |
| **Surface Water** | 907 | 2,987 | 350 | 186,900 | | | |
| **Reservoir** | 15 | 0.00 | 0 | 10,880 | | | |
| **TOTAL** | 1,867 | 2,987 | 188,013 | 289,941 | | | |

## Figure 3.1-5: WRIA Appropriation by Subbasin (CFS)




## Figure 3.1-6: WRIA Appropriation by Subbasin (GPM)

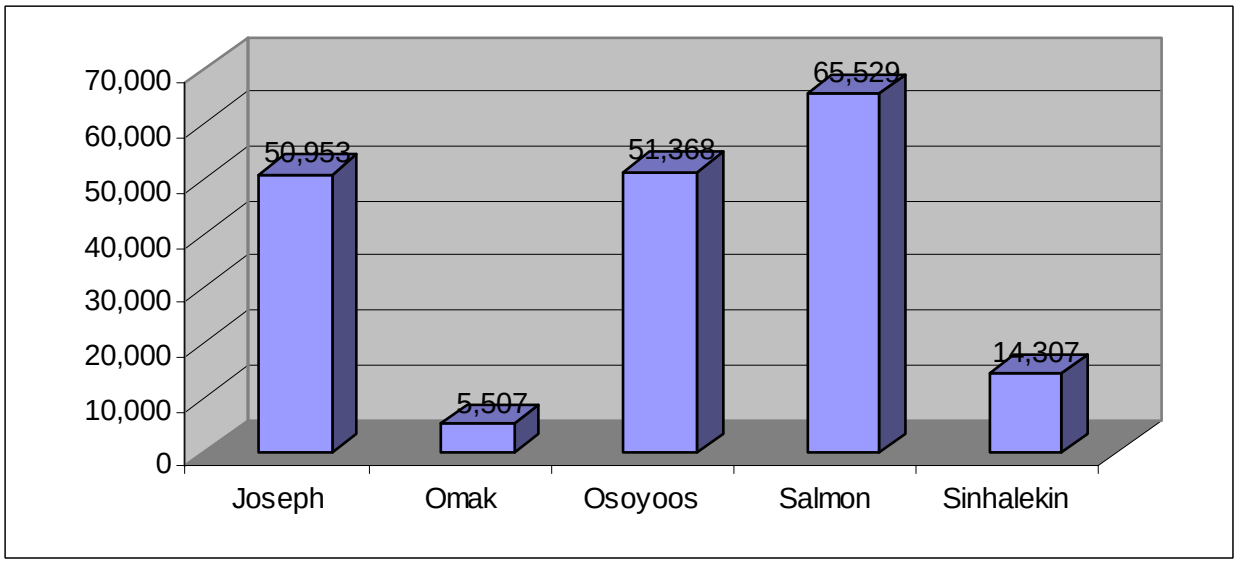
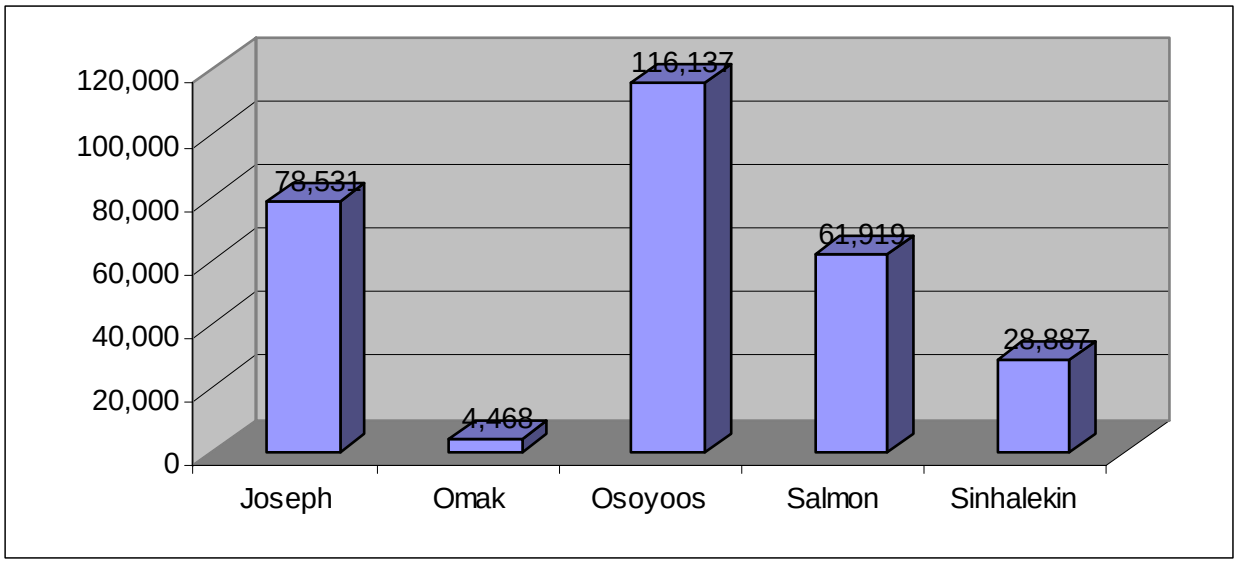


**Figure 3.1-7: WRIA Appropriation by Subbasin (AYF)**




Relatively little water is appropriated in the **Omak Subbasin** (which contains largely reservation lands). Appropriations from ground water wells and the Okanogan River account for 91 percent of the annual volume of water rights in the Omak Subbasin.

**Sinlahekin Subbasin** consumptive appropriations are also small. The large appropriation of flow shown in Figure 3.1-5 is dominated by three large non-consumptive water rights: (1) the 1,000 cfs Similkameen non-consumptive water right for run-of-river power generation at Enloe dam); and (2-3) the large 168 cfs water storage rights on Sinlahekin Creek owned by the Sinlahekin Water Users Association. We understand from Planning Unit members that the latter right was never used by placed in this association, which does not actually operate. These three rights comprise 92 percent of the instantaneous surface rights in the subbasin. Otherwise, Sinlahekin Subbasin instantaneous appropriations of ground water and annual appropriations of ground and surface water are relatively modest.

The **Joseph and Salmon subbasins** are roughly comparable in amounts of water appropriated. Each has a modest amount of instantaneous surface flows appropriated, but relatively large instantaneous appropriations of ground water and large annual appropriations of ground and surface water. For the Joseph Subbasin, a total of 209 cfs (93 percent of the total) is appropriated from the large mainstem rivers (Okanogan and Columbia) or lakes (Lake Pateros) it borders. In the Salmon Subbasin, 113 cfs (40 percent of the total) is appropriated from the Okanogan River, and an additional 107 cfs of surface water rights (38 percent) appear to have been converted to ground water sources. There are no other large surface water instantaneous water rights in either subbasin.

Most of the large annual appropriations of water in the Joseph Subbasin are for irrigation, and occur from the Okanogan River or Lake Pateros, including a 12,160 AFY private water right to irrigate 2432 acres from Lake Pateros. Nearly three-quarters (72 percent) of Joseph Subbasin water rights (by annual volume) have an irrigation purpose (although not all this water may be allocated to irrigation, as many of these water rights have multiple purposes). This subbasin also includes a large commercial right to 5,000 gpm and 8,030 AFY nominally owned by Crown Zellerbach Corporation. (The Ecology database does not track changes in ownership; apparently Crown Zellerbach no longer is in operation in the County, but the ownership of the rights is unknown. They may have been relinquished for non-use.).

In the Salmon Subbasin, 94 percent of water rights (by annual volume) have an irrigation purpose (although not all this water may be allocated to irrigation, as many of these water rights have multiple purposes). This subbasin has 4 municipal wells with annual water rights totaling 1,830 AFY, and no other large annual appropriations.

The **Osoyoos Subbasin** has the largest volume of potentially consumptive instantaneous surface flows appropriated, the largest annual volume of water appropriated, and compares with the Joseph and Salmon subbasins in its appropriation of ground water. Osoyoos Subbasin surface flow appropriations are dominated by: (1) the very large 375 cfs private irrigation right on Tonasket Creek and (2) a total of 203 cfs in 95 separate water rights on the Okanogan River and Osoyoos Lake. These together account for about 70 percent of the instantanous surface rights in the subbasin.

The three largest annual water rights (and 5 of the 10 largest rights) in the Osoyoos Subbasin are non-consumptive. These nonconsumptive purposes total 50,615 AFY (44 percent of the total) and are for storage and fish propagation. In the Osoyoos, a greater proportion of water rights annual volume is for domestic and municipal use than in the other subbasins, which is consistent with the development trends discussed in this report. Of the annual water rights in the Osoyoos Subbasin, 48 percent (by volume) have an irrigation purpose and 13 percent have domestic/municipal purposes (some water rights have both purposes and are counted in both totals).

Figure 3.1-8 compares the numbers of water claims registered by WRIA 49 subbasin. Claims tend to be concentrated in the Osoyoos and Salmon subbasins, each of which have more than 1,000 ground water claims and nearly 700 surface water claims. As explained previously, these claims are largely unquantified and many are suspect. Table 3.1-4 summarizes the numbers and types of claims by subbasin.

**Figure 3.1-8: WRIA Water Claims by Basin**

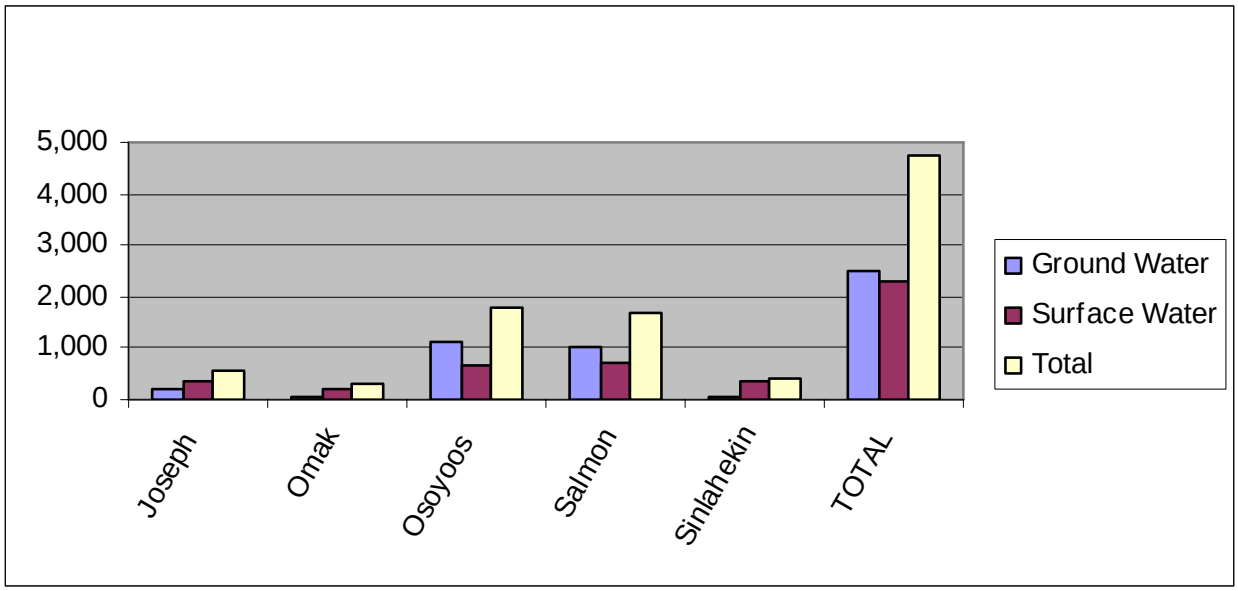



**Table 3.1-4: Water Rights Claims Summary by Subbasin**

| BASIN | GROUND WATER | SURFACE WATER | TOTAL |
|---|---|---|---|
| Joseph | 215 | 355 | 570 |
| Omak | 75 | 216 | 291 |
| Osoyoos | 1,114 | 668 | 1,782 |
| Salmon | 1,005 | 692 | 1,697 |
| Sinlahekin | 70 | 346 | 416 |
| TOTAL | 2,479 | 2,277 | 4,756 |

## 3.2 WATER USE

Water use is described in terms of the amount both surface and ground water used. The major uses of water in WRIA 49 are for agricultural and municipal and domestic purposes. Water may be taken for use either from exempt wells (exempt from the requirement to obtain a water right certificate), or from a water right stating the purpose, place of use, and amount of water that may be used (including any seasonal or other restrictions on the timing of use).

### 3.2.1 Exempt Wells[2]

WRIA 49 water well data were obtained from the Washington Department of Ecology well-log database (Appendix A-2), including the downloaded data from Ecology (Appendix A-2.1) and the filtered data analyzed for the Level 1 Report (Appendix A-2.2).

Locations and relative distributions of WRIA 49 water wells are shown in Attachment 2, Atlas Maps. There are 4,183 well logs recorded in the Ecology well log database for WRIA 49, and 910 water-righted wells identified in the water rights database. This suggests that there may be about 3,300 exempt wells in the WRIA. There are about 3,900 residences in the WRIA that are not connected to public water and about 2,300 unoccupied residences. Since the number of unconnected residences exceeds the number of exempt wells, this suggests that some of the unoccupied residences may not have wells developed (some of these may be in public water system service areas but not yet connected). Alternatively, some residences may share wells with neighbors, but not be reported as Group B water systems.

Wells range in size from 6-inch residential wells to large diameter irrigation, commercial, and municipal water supply wells, and include wells up to 5 to 10 feet in reported diameter, some of which are probably old hand-dug wells and some of which may be Ranney collectors. Figure 3.2-1 and Table 3.2-1 present summaries of water well diameters, including an inferential guess at which of them may be exempt versus non-exempt. More than 80 percent of WRIA 49 wells are 6- to 8-inch diameter, and most of these are probably exempt wells.

Figure 3.2-2 and Table 3.2-2 present summaries of water well depths. A fairly even distribution occurs over the range up to 300 feet in depth, accounting for 78 percent of all wells. A substantial number of wells have been drilled in the 300- to 500-foot depths (12 percent of the total), and even up to 800 feet (4 percent). The deepest wells are at 1510 feet and 2400 feet, and nearly 100 wells are reported to be 20 feet or less in depth.

As is true of many other regions, there has been an increasing trend to drill wells, with the number of new wells per year multiplying by a factor of three through the 1960s and 1970s. In the 1980s and 1990s the numbers of new wells continued to double, flattening off in the 2000-2005 period at 142 new wells per year (Figure 3.2-4 and Table 3.2-3).

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[2] "Exempt well" is shorthand for groundwater withdrawals that are exempt from the water right permitting process through the Washington State Department of Ecology (but not exempt from regulation in the same manner as other water withdrawals – the exemption extends only to the paperwork of permitting). Specific exemptions include:

- withdrawal of groundwater for stock watering,
- irrigation of a lawn or non-commercial garden not exceeding one-half acre in size,
- single or group domestic purposes in amounts less than 5000 gallons per day, or
- industrial purposes in an amount less than 5000 gallons per day
- Exempt wells may serve individual dwellings or Group B systems of up to six connections.

These data may reflect an increase in WRIA 49 land development in more remote areas, far from public water service.

**Figure 3.2-1: Diameters of WRIA 49 Water Wells**

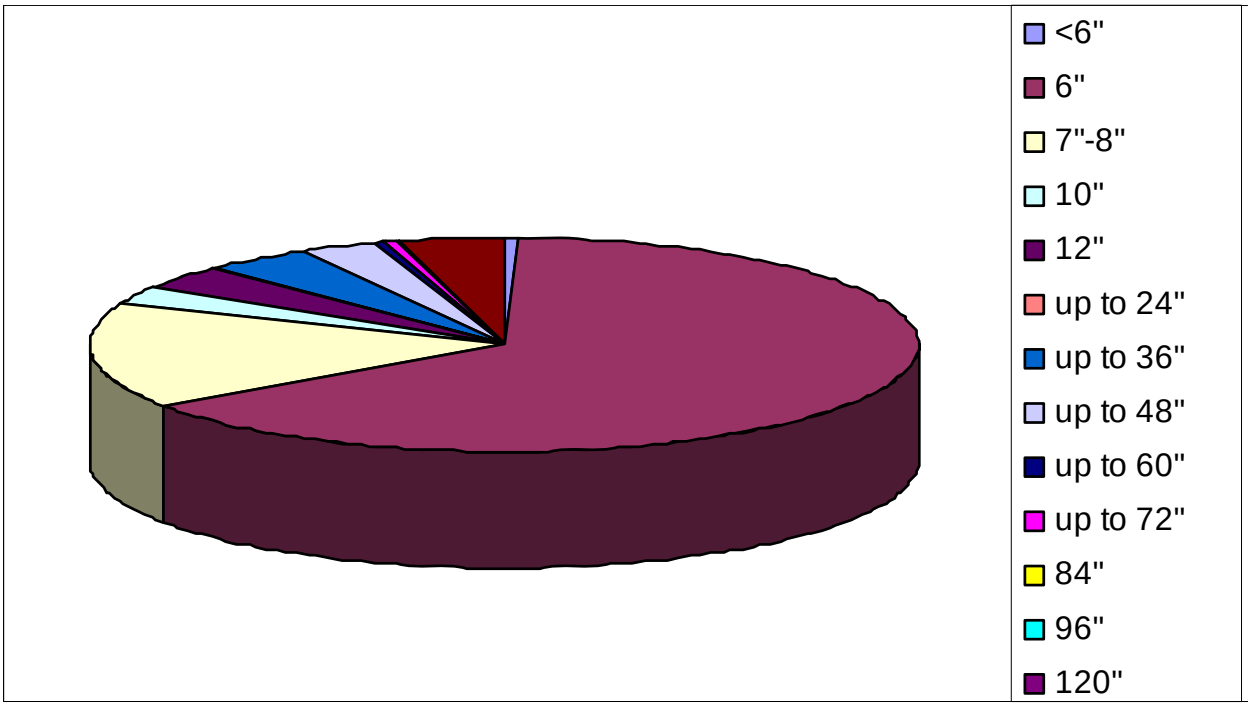
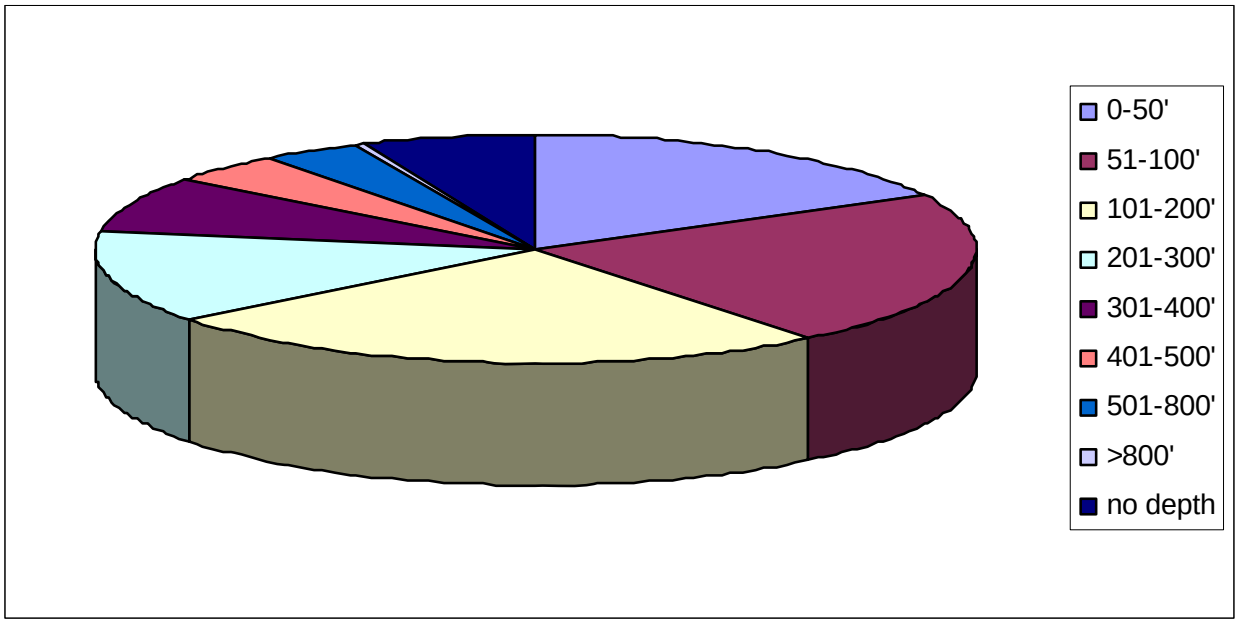



**Table 3.2-1 Water Well Depths**

| | DIAMETER | NUMBER | PERCENT |
|---|---|---|---|
| | <6" | 29 | 0.7% |
| Exempt | 6" | 2705 | 64.7% |
| Wells | 7"-8" | 658 | 15.7% |
| | 10" | 116 | 2.8% |
| Non-exempt | 12" | 149 | 3.6% |
| (municipal | up to 24" | 19 | 0.5% |
| & industrial) | up to 36" | 171 | 4.1% |
| | up to 48" | 130 | 3.1% |
| | up to 60" | 13 | 0.3% |
| Hand-dug | up to 72" | 13 | 0.3% |
| (exempt) | 84" | 3 | 0.1% |
| | 96" | 4 | 0.1% |
| | 120" | 1 | 0.0% |
| | no diameter | 172 | 4.1% |
| | | 4183 | 100.0% |

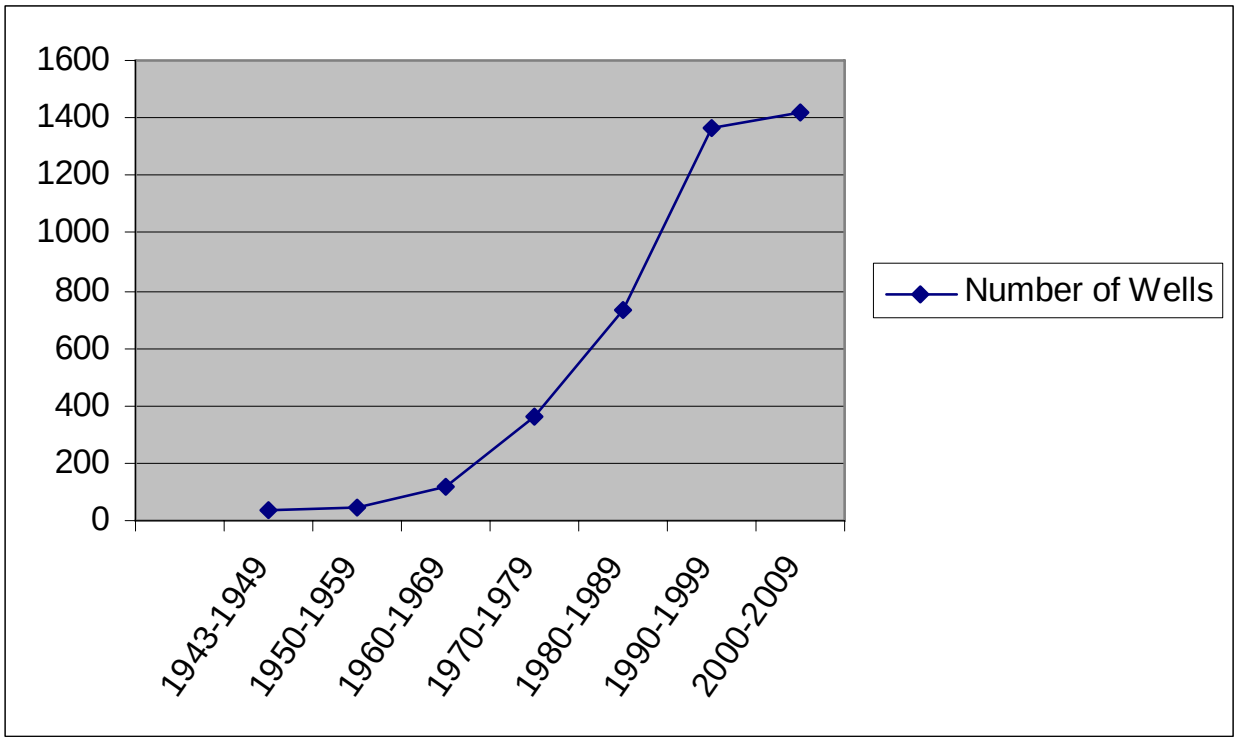
## Figure 3.2-2: WRIA 49 Water Well Depths




## Table 3.2-2: WRIA 49 Water Well Depths

| DEPTH | NUMBER | PERCENT |
|---|---|---|
| 0-50' | 722 | 17.3% |
| 51-100' | 923 | 22.1% |
| 101-200' | 1046 | 25.0% |
| 201-300' | 551 | 13.2% |
| 301-400' | 324 | 7.7% |
| 401-500' | 183 | 4.4% |
| 501-800' | 150 | 3.6% |
| >800' | 15 | 0.4% |
| no depth | 269 | 6.4% |
| | 4183 | 100.0% |

## Figure 3.2-3: WRIA 49 New Wells by Decade




## Table 3.2-3: WRIA 49 New Water Wells by Decade

| DECADE | NUMBER OF WELLS | NEW WELLS | ROUGH RATE OF INCREASE |
|---|---|---|---|
| 1943-1949 | 35 | 5 | |
| 1950-1959 | 43 | 4 | 1.0 |
| 1960-1969 | 120 | 12 | 3.0 |
| 1970-1979 | 358 | 36 | 3.0 |
| 1980-1989 | 731 | 73 | 2.0 |
| 1990-1999 | 1368 | 137 | 2.0 |
| 2000-2005 | 852 | 142 | 1.0 |
| 2006 | 8 | 5 | 1.0 |
| No date | 668 | 4 | 3.0 |
| | 4183 | | 3.0 |
| | 35 | | |

### 3.2.2 Domestic & Municipal Water Use

Single domestic (residential) use in WRIA 49 is supplied by exempt wells and by water rights with domestic purposes. Multiple domestic use requires service by a Group A or Group B water system. Group B systems serve 2 to 14 connections. Those with 15 or more connections are classed as Group A systems. Table 3.2-4 summarizes the number of Group A and B water systems in the WRIA, the total number of connections they serve, and the population served. The distribution of exempt wells, discussed above, reflects the likely comparative domestic water use by subbasin.

**Table 3.2-4: WRIA 49 Group A & B Water Systems**

| | NUMBER | TOTAL CONNECTIONS | POPULATION SERVED |
|---|---|---|---|
| Group A Systems | 59 | 7,223 | 15,663 |
| Group B Systems | 189 | 817 | 1,278 |
| **TOTAL** | 248 | 8,040 | 16,941 |

The larger WRIA 49 Group A water systems (Brewster, Okanogan, Omak, Oroville, Riverside, and Tonasket) file WSCPs with the Department of Health. These are required to be updated every six years. Appendices A-3.1 and A-3.2 contain DOH data for all WRIA 49 Group A and B water systems, and more detailed information from the WSCPs for the six large Group A systems (including current and future water demand). Appendix A-3.3 summarizes water conservation programs and measures described in the WSCPs.

Estimating water use for municipal and domestic purposes depends upon the number of residences and population size. Table 3.2-5 summarizes current WRIA 49 population and housing (based on Census 2000). The census reported a population of 32,588 in the WRIA, an average household size of 2.7 persons, and a total of 14,178 residential units. Of these, some are seasonally occupied and 2,268 are unoccupied (16 percent).

Census 2000 data do not currently reconcile well with Okanogan County Assessor parcel data, which reports a substantially smaller number of residences (6,553). This discrepancy should be considered for Level 2 analysis to provide more confidence in the estimated water use.

There are 8,040 total connections (residential and non-residential) reported to be served by public water systems in WRIA 49, most of which are residential. Above, it was estimated that there may be about 3,300 exempt wells in the WRIA; some exempt wells serve small water systems (connecting several residential units), and some serve individual dwellings. The sum of public water connections and exempt wells (11,340) agrees reasonably well with the 2000 Census report for the number of residential units (11,910). (Detailed data, if it were available, would show that some of the 8,040 connections are not residential, but that some of the exempt wells serve more than one

residence; adjusting for both of these factors would likely reconcile with the reported number of residences.)

Table 3.2-6 summarizes the numbers of residences, connections, and source (public water versus exempt well) for WRIA 49.

**Table 3.2-5: WRIA 49 Current Population and Housing**

| LOCATION | POPULATION | TOTAL HOUSING UNITS | HOUSING UNITS | |
|---|---|---|---|---|
| | | | Occupied | Unoccupied |
| City of Brewster | 2,189 | 739 | 662 | 77 |
| City of Oroville | 1,653 | 794 | 691 | 103 |
| City of Tonasket | 994 | 482 | 420 | 62 |
| Town of Riverside | 348 | 153 | 143 | 10 |
| Town of Conconully | 185 | 192 | 94 | 98 |
| City of Omak | 4,721 | 2,016 | 1,861 | 155 |
| City of Okanogan | 2,484 | 997 | 909 | 88 |
| Total Incorporated | 12,574 | 5,373 | 4,780 | 593 |
| Unincorporated | 20,014 | 8,805 | 7,130 | 1,675 |
| **WRIA 49 Totals** | **32,588** | **14,178** | **11,910** | **2,268** |

**Notes:**

Based on Census 2000

Average household size: 2.7

Percent unoccupied: 16%

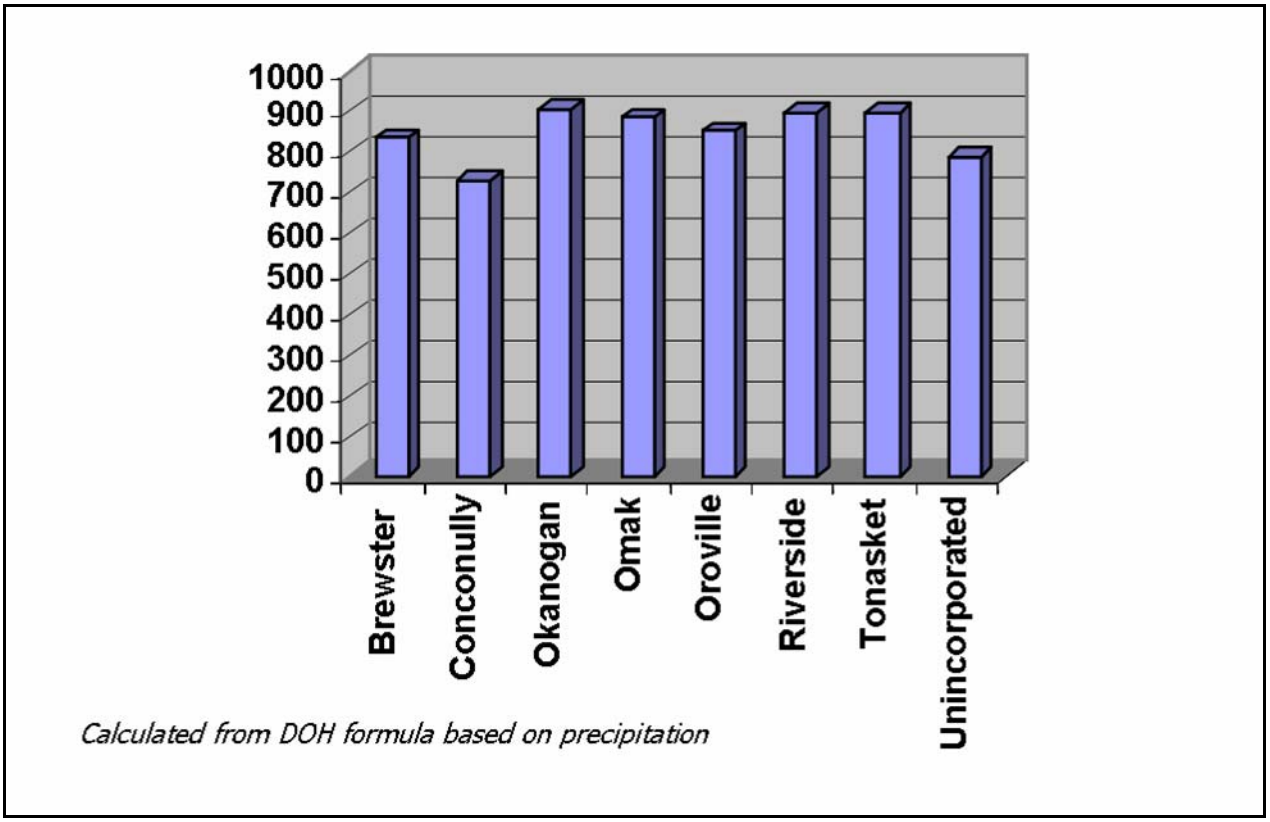
**Table 3.2-6: WRIA 49 Residences Served by Wells and Public Water Systems**

| WRIA 49 | |
|---|---|
| Occupied Residences | 11,910 |
| Connections | 8,040 |
| Residences not Connected to Public Water | 3,870 |
| Wells | 4,183 |
| Unoccupied Residences | 2,268 |

Based on a formula provided by the Washington Department of Health (see Chapter 2) which uses local precipitation to calculate water demand, Figure 3.2-5 summarizes average residential water demand for the larger WRIA 49 cities and towns, and for the unincorporated area. Demand is presented in gallons per day (gpd), and is calculated on a standard basis used in the municipal water industry called an “ERU” or Equivalent

Residential Unit[3]. The graph shows that on an average day, standard residential use would range from a low of about 700 gpd in Conconully to a high of about 900 gpd in Okanogan.

**Figure 3.2-5 Average Residential Water Dam and gpd/ERU**




### 3.2.3 Commercial, Industrial & Institutional Water Use

Some Commercial, industrial, and institutional use may be served by individual wells or stream diversions under water rights owned by the business or institution, or by larger public water systems. Use in these categories is generally not documented in much detail in the WSCPs. There are a total of 25 WRIA 49 water rights with “CI” (Commercial and Industrial) purposes. These are almost entirely served by ground water and have appropriated 8,529 gpm and 11,101 AFY of water. These represent 4.5 percent of instantaneous ground water rights and 10.8 percent of annual water rights in WRIA 49. Water rights recorded in the database as owned by Crown Zellerbach comprise the largest group owned by a single industrial user, with 60 percent of the CI pumping rights (5,025 gpm) and 77 percent of the annual CI water rights (8,529 AFY).

[3] An equivalent residential unit is simply the amount of water used by an average residence in a water system’s service area. It is used to place different types of connections on a common footing for analysis (such as commercial, institutional, industrial, residential, outdoor watering, etc.

### 3.2.4 Agricultural Water Use

There are about 80,668 acres of land water-righted for irrigation in WRIA 49, according to the Ecology WRATS/GWIS database. As discussed previously, it is undocumented – and unlikely – that all water rights are fully employed. The County Assessor's parcel database designates a total of 55,321 acres for an agricultural use of some sort. The 1999 Okanogan LFA identified a total of 101,930 acres of crop land in the Okanogan Basin, of which 50 percent (about 51,000 acres) was estimated to be irrigated. This value would agree reasonably well with the County Assessor's data.

Agricultural water use is typically calculated by determining the acreages of land planted in different crop types and the crop water requirements (or water duty) of each crop on a seasonal basis for a particular climate. Crop water requirements for WRIA 49 are shown in Table 3.2-7 (source: OCD). Irrigation season water requirements range from 19 inches per acre for grapes to nearly 33 inches for cherries. The LFA estimated that 13 percent of cropland was irrigated hay and 37 percent was orchard (these add to the 50 percent of cropland under irrigation cited above). Given the water requirements shown in Table 3.2-7 for growing alfalfa in the region (about 25" per acre) and for orchard crops (ranging from about 29 inches to 33 inches per acre), a simplifying (and conservative) assumption was made for Level 1 analysis that irrigation averages 30 inches per acre per year (as shown at the bottom of the table).

**Table 3.2-7: Seasonal Water Duty by Crop Type**

| SEASONAL WATER DUTY BY CROP TYPE | |
|---|---|
| **Crop Type** | **Seasonal Water Duty** |
| Alfalfa | 25.39" |
| Pasture | 26.90" |
| Apples | 31.65" |
| Pears | 29.53" |
| Cherries | 32.89" |
| Other minor crops | 15" - 30" |
| Grapes | 19.09" |
| *Level 1 Assumption* | 30" |

If all acres designated for agricultural use in the County were irrigated, and assuming an irrigation season water requirement of 30 inches, total agricultural water use would be more than 138,000 AFY. This is surely an over-estimate. National Agricultural Statistics Service (NASS) data, presented in Appendix A-4.1, is available only for Okanogan County as a whole (including WRIAs 48 and 49), and shows 48,416 acres of irrigated land in the entire county in the 2002 Census of Agriculture. NASS also shows a

declining trend in irrigated land, dropping from 50,469 acres in 1997 – a decline of about 1 percent per year.

Appendix A-4.2 presents an analysis of County Assessor parcel data, identifying the number of parcels and deeded acres in a series of land use designations, including agriculture. The County Assessor database includes orchard, irrigated alfalfa, vineyards, irrigated pasture, and other irrigated crops (in addition to a number of use categories for dry land agriculture). Often multiple land use codes apply to a single parcel, and the breakout of crop acreage is unknown, making it impossible to use this data source to definitively identify irrigation water use.

The analysis in Appendix A-4.2 shows the breakout of land designated for agricultural use in the eight largest irrigation districts in WRIA 49: Aeneas Lake, Alta Vista, Brewster Flat, Helensdale, Okanogan, Oroville-Tonasket, Riverside Flood, and Whitestone. Together, these irrigation districts comprise 9,123 deeded acres under agricultural designation. The largest of these, OTID, has 6,553 deeded acres in agricultural designation, followed by OID with 1,762 deeded acres. Together these two irrigation districts account for 91 percent of the total agricultural lands in the eight largest districts but only 15 percent of all County Assessor deeded acres with an agricultural designation.

Agricultural water use data were solicited from all the irrigation districts, but only OID and OTID responded with information. A distribution of acreage by crop types is shown in Table 3.2.8. Note that the acreage totals for OID (3,511 acres) and OTID (9,3000) are significantly greater than shown in the County Assessor's parcel database. These discrepancies and the general lack of irrigation data for smaller irrigators are data gaps that could be addressed in Level 2. Appendix A-4.3 presents an example of a detailed irrigation district analysis, conducted for OID as part of the Salmon Creek project. Elements of this analysis may be considered for Level 2 work. It includes:

- Summary of district water rights and claims.
- Characterization of irrigation diversions, losses, flow requirements, end of canal spills, and delivery to farms.
- Calculated district-wide and on-farm efficiencies of water use.
- Crop water use: district acreage by crop, ET rates by crop, district water requirements by crop, and comparison of warm/cool and dry/wet year demand.
- District water balance (pump, delivery, crop water use, spills), including water sources and the percent contribution of each, as well as calculated annual water quantities diverted, used, lost/spilled by source.
- Water source budgets, monthly flows vs. water rights and use for stream sources; annual inflows and outflows for reservoir sources; and recharge and withdrawal for ground water sources.

## Table 3.2-8 Distribution of Crop Types by Irrigation District

DISTRIBUTION OF CROP TYPES BY IRRIGATION DISTRICT

| | OID | | OTID | |
|---|---|---|---|---|
| **Crop Type** | **Acres** | **Percent of Land** | **Acres** | **Percent of Land** |
| Alfalafa | 372 | 11% | | |
| Other hay | 101 | 3% | 917 | 10% |
| Pasture | 870 | 25% | 1,005 | 11% |
| Apples | 1586 | 45% | 3,217 | 35% |
| Pears | 436 | 12% | 1,406 | 15% |
| Cherries | 107 | 3% | 922 | 10% |
| Apriots | 4 | 0% | | 0% |
| Peaches | 5 | 0% | | 0% |
| Other minor crops | 30 | 1% | 123 | 1% |
| Soft Fruit | | | 408 | 4% |
| Grapes | | | 76 | 1% |
| Vegetables | | | 80 | 1% |
| Ind. (?) | | | 41 | 0% |
| Fallow | | | 1,105 | 12% |
| | 3511 | 100% | 9,300 | |

Figure 3.2-6 and subbasin atlas maps summarize the distribution of acres designated for agricultural use by the five major WRIA 49 subbasins. Appendices A-4.5 and A-4.6 present agricultural parcel data and water use data by subbasin.

Figure 3.2-6 compares the water-righted acreage with the acres designated by the County Assessor in agricultural categories likely to be irrigated. As one would expect, water-righted acreage is greater than the acreage designated in current use in all subbasins but Omak. The Omak result could be due to tribal land under irrigation outside of Washington water rights.

The Osoyoos Subbasin has the greatest acreage under irrigation, with 44 percent of the total (based on County Assessor data). The Salmon Subbasin has about 21 percent, Omak about 17 percent, and the Joseph subbasin about 12 percent of the total. Sinlahekin has relatively little irrigation, about 6 percent of total County-designated acres.

Assuming an average irrigation season water requirement of 30 inches, Figure 3.2-7 shows the relative water use by subbasin. Since all subbasins have the same average irrigation season crop water requirement under this simplified analysis, the proportions are the same as for agricultural acreage.

**Figure 3.2-6: Acres Under Irrigation by Subbasin**

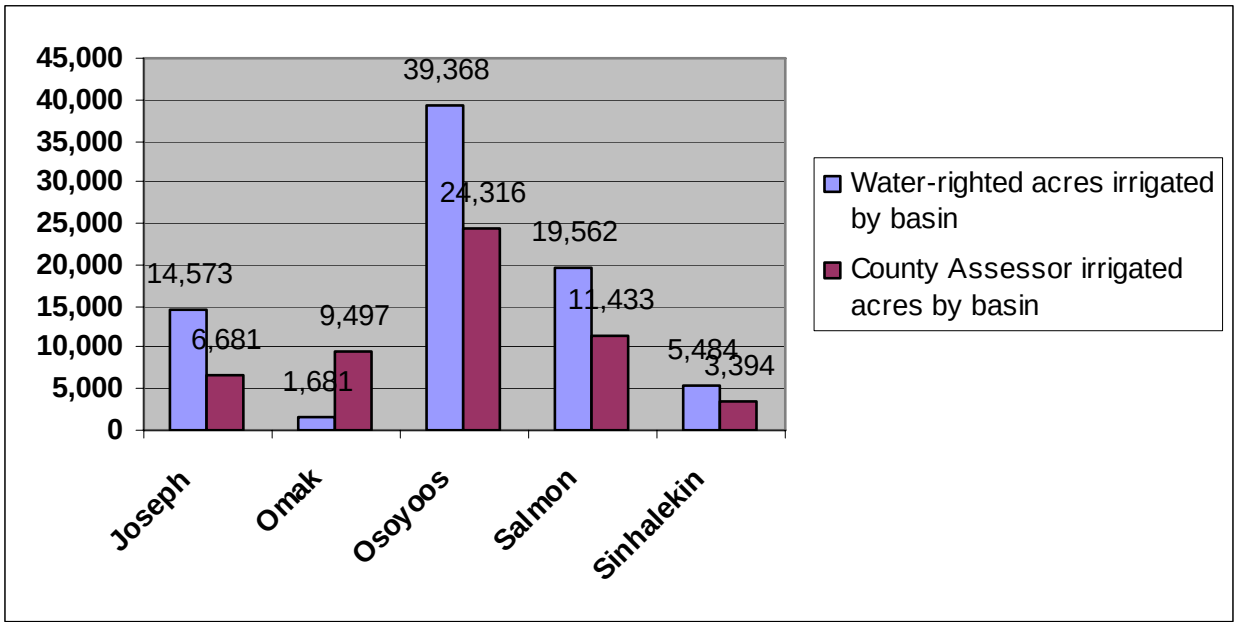
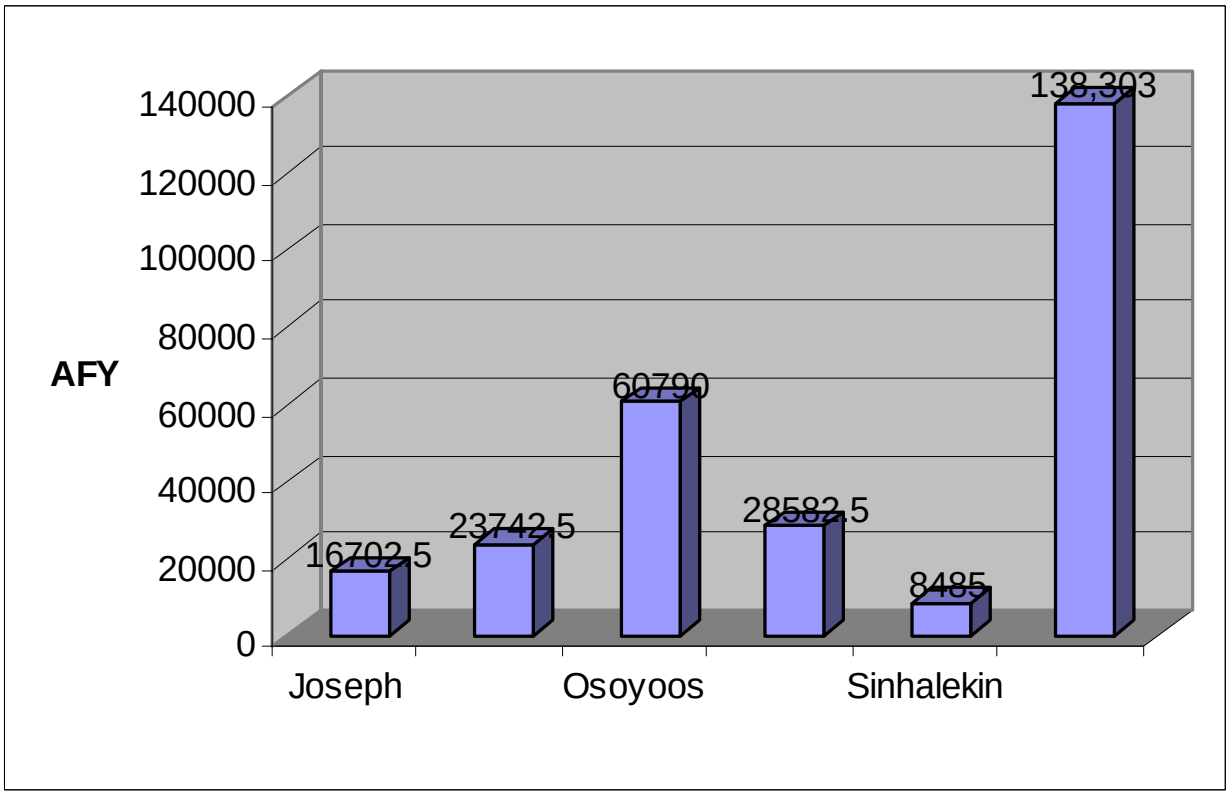



**Figure 3.2-7: Agricultural Water Use by Subbasin (30”/acre)**



## 3.3 APPROPRIATIONS FROM STREAMS

Table 3.3-1 lists streams with major diversions, aggregating quantities from all permits and certificates for those named stream sources that total more than one cfs. Appropriations are compared with mean and estimated low flows. Tonasket and Toats Coulee creeks are of concern due to large appropriations, as discussed above.

Anotine and Tunk creeks appear to be overappropriated in terms of low monthly summer flows (however, Level 1 analysis did not look at individual water rights, which may contain seasonal restrictions on diversions). Bonaparte, Loop, Peony, Sinlahekin, Toats Coulee, and Tonasket creeks appear to be overappropriated in terms of both mean annual flows and summer low flows. Johnson Creek also appears overappropriated, but has been adjudicated. Tables 3.3-2 and 3.3-3 summarize the percent of mean annual and summer low flows appropriated from smaller streams in WRIA 49. Table 3.3-4 contrasts flows appropriated from the larger rivers (Similkameen and Okanogan). WRIA 49 water rights appropriate 10 to 13 percent of these rivers' mean annual flows, and 35 to 38 percent of their low summer flows (this does not include non-consumptive appropriation for run-of-river power generation on the Similkameen).

Figure 3.3-1 compares total appropriations of surface waters by subbasin (in terms of total annual water rights expressed as AFY) with net runoff to streams in these subbasins estimated from the Level 1 water balance. These data suggest that surface waters may be overappropriated in the Joseph and Osoyoos subbasins. Moreover, appropriations in these two subbasins include significant amounts from the Okanogan River and Lake Osoyoos, which receive only a small proportion of their flow from net runoff generated in these subbasins (skewing the comparison). However, using the rough estimate generated above that half of WRIA 49 water rights are not in current use, it appears that while there may be overappropriation in some basins, it is doubtful that there is overuse. This may not be true of some individual streams, but more detailed Level 2 analysis would be needed to confirm that.

## Table 3.3-1: Major Stream Diversions

| STREAM | APPROPRIATED FLOW (CFS) | MEAN ANNUAL FLOW (CFS) | PERCENT APPROPRIATED | LOW MONTHLY SUMMER FLOW | PERCENT APPROPRIATED |
|---|---|---|---|---|---|
| ANTOINE CREEK | 8.87 | no data | | 0.01 | 88700.0% |
| BONAPARTE CREEK | 16.475 | 5 | 329.5% | 0.04 | 41187.5% |
| CHILIWIST CREEK | 3.596 | no data | | no data | |
| CHOPAKA CREEK | 6.78 | no data | | no data | |
| DUCK LAKE | 20.66 | no data | | no data | |
| JOHNSON CREEK | 23.30 | 5.00 | 466.0% | 0.8 | 2912.5% |
| LAKE OSOYOOS | 32.85 | no data | | no data | |
| LAKE PATEROS | 119.092 | no data | | no data | |
| LOOP CREEK | 3.13 | 1.60 | 195.3% | 0.01 | 31250.0% |
| MIDDLE CHILIWIST CREEK | 2.98 | no data | | no data | |
| NORTH FORK SALMON CREEK | 1.7381 | 22.2 | 7.8% | 3.7 | 47.0% |
| OKANOGAN RIVER | 403.264 | 3049 | 13.2% | 1154 | 34.9% |
| PALMER LAKE | 10.795 | no data | | no data | |
| PEONY CREEK | 2.56 | 2 | 128.0% | 0.5 | 512.0% |
| SARSAPKIN CREEK | 1.22 | no data | | no data | |
| SIMILKAMEEN RIVER | 228.83 | 2308 | 9.9% | 599 | 38.2% |
| SINLAHEKIN CREEK | 364.77 | 53.5 | 681.8% | 12.1 | 3014.6% |
| TOATS COULEE CREEK | 115.55 | 45.8 | 252.3% | 9.6 | 1203.6% |
| TONASKET CREEK | 379 | 3.22 | 11770.2% | 0.7 | 54142.9% |
| TUNK CREEK | 1.3 | 3.1 | 41.9% | 0.1 | 1300.0% |
| WHITESTONE CREEK | 1.04 | 2.86 | 36.4% | 1.8 | 57.8% |
| WHITESTONE LAKE | 11.485 | no data | | no data | |
| WHITESTONE LK CR | 1.2 | no data | | no data | |

**Note:** nonconsumptive appropriations not included (e.g., Similkameen PO 1000 cfs) does not include water claims

## Table 3.3-2: Percent of Mean Annual Flow Appropriated from Smaller Streams

| STREAM | MEAN ANNUAL FLOW (CFS) | PERCENT APPROPRIATED |
|---|---|---|
| Bonaparte Creek | 5 | 330% |
| Johnson Creek | 5.00 | 466% |
| Loop Creek | 1.60 | 195% |
| North Fork Salmon Creek | 22.2 | **8%** |
| Peony Creek | 2 | 128% |
| Sinlahekin Creek | 53.5 | 682% |
| Toats Coulee Creek | 45.8 | 252% |
| Tonasket Creek | 3.22 | 11770% |
| Tunk Creek | 3.1 | **42%** |
| Whitestone Creek | 2.86 | **36%** |

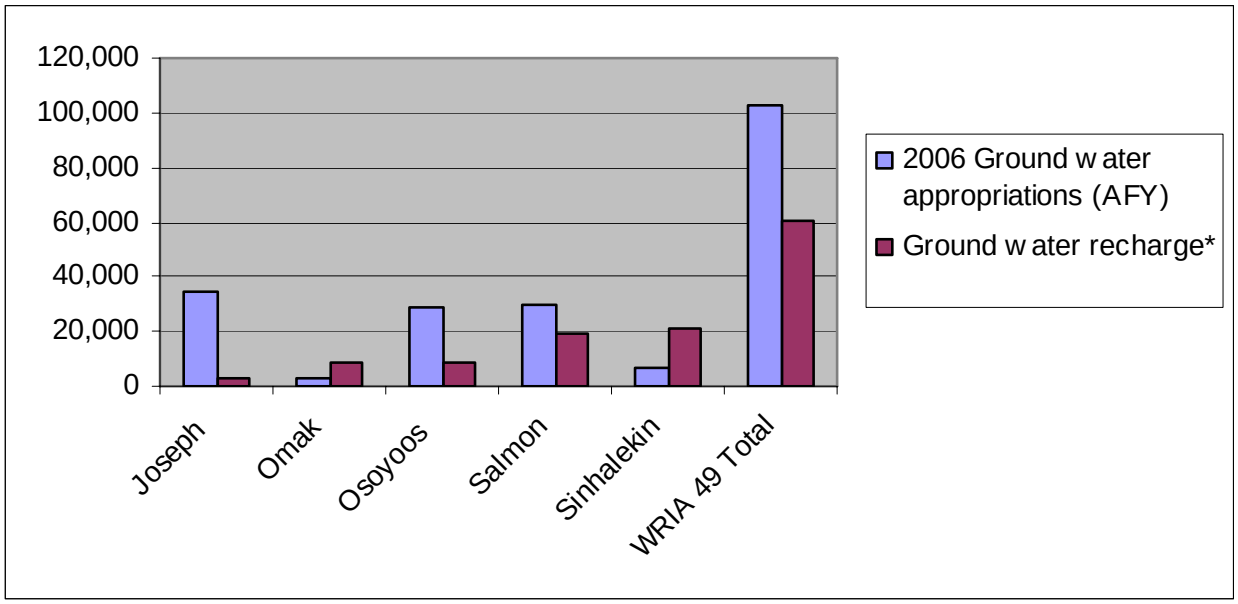
## Table 3.3-3: Percent of Low Summer Monthly Flow Appropriated from Smaller Streams

| STREAM | LOW MONTHLY SUMMER FLOW | PERCENT APPROPRIATED |
|---|---|---|
| Antoine Creek | 0.01 | 88700% |
| Bonaparte Creek | 0.04 | 41188% |
| Johnson Creek | 0.8 | 2913% |
| Loop Creek | 0.01 | 31250% |
| North Fork Salmon Creek | 3.7 | **47%** |
| Peony Creek | 0.5 | 512% |
| Sinlahekin Creek | 12.1 | 3015% |
| Toats Coulee Creek | 9.6 | 1204% |
| Tonasket Creek | 0.7 | 54143% |
| Tunk Creek | 0.1 | 1300% |
| Whitestone Creek | 1.8 | **58%** |

## Table 3.3-4: Percent of Flow Appropriated from Larger Streams

| | SIMILKAMEEN RIVER | OKANOGAN RIVER |
|---|---|---|
| **Appropriated Flow** | 229 | 403 |
| **Mean Annual Flow (cfs)** | 2,308 | 3,049 |
| **Percent Appropriated** | 9.9% | 13.2% |
| **Low Monthly Summer Flow** | 599 | 1,154 |
| **Percent Appropriated** | 38.2% | 34.9% |

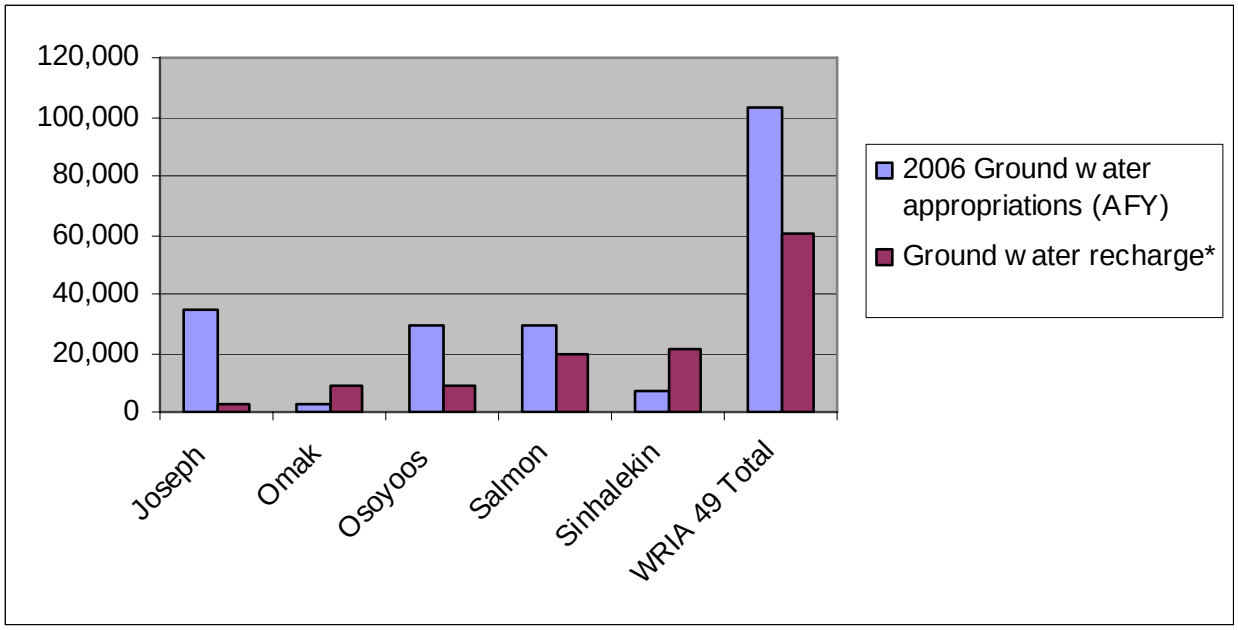
## Figure 3.3-1: Current Appropriation of Surface Water (AFY)



## 3.4 APPROPRIATIONS FROM GROUND WATER

Figure 3.4-1 compares total appropriations of ground waters by subbasin (in terms of total annual water rights expressed as AFY) with ground water recharge in these subbasins estimated from the Level 1 water balance. These data suggest that ground waters may be overappropriated in the Joseph, Osoyoos, and Salmon subbasins. Again, our rough estimate that half of WRIA 49 water rights are not in current use would cast doubt on this conclusion. Further, ground water appropriations in these basins may be in hydraulic continuity with the Okanogan River, which delivers a large additional increment of recharge beyond that which would occur from percolation of surface precipitation within the boundaries of the subbasin. Therefore, it appears that while there may be overappropriation in some basins, it is doubtful that there is overuse. Again, this may not be true of some individual aquifers, particularly small lenses or perched aquifers, but more detailed Level 2 analysis would be needed to confirm that.

**Figure 3.4-1: Current Appropriation of Groundwater (AFY)**




## 3.5 FUTURE WATER DEMAND

### 3.5.1 Overview of Future Water Demand

Level 1 analysis of WRIA 49 future water demand suggests that water in WRIA 49 may be overappropriated, but not overused. To calculated future demand, WRIA 49 growth rates were first projected (Table 3.5-1).

## Table 3.5-1: Growth Projections for WRIA 49

| DATA SOURCE | AREA/ENTITY | PERIOD | ANNUAL GROWTH RATE | NOTES |
|---|---|---|---|---|
| U.S. Census | Okanogan County | 2000-2005 | 0.1% | Block level analysis |
| Washington OFM | Okanogan County | 20-yr low<br>20-yr med<br>20-yr high | 0.1%<br><br>2.2% | Projections based on Countywide data. |
| Water System Comprehensive Plans | City of Brewster (1999) | 1980-1997<br><br>20 year forecast | 2.56%<br><br>2.1% | (growth 1337 to 2055 over period)<br><br>Project growth at 11% over 5 years based on 1995 Comp Plan |
| | City of Okanogan (2000) | 1980-1990<br>1990-1998<br><br>20 year forecast | 0.1%<br>1.9%<br><br>1.3% | WSCP range 0.85% (low) to 1.9% (high) |
| | City of Omak (2004) | 1990-2000<br><br>20 year forecast | 1.38%<br><br>1.38% | Projects growth to continue at historical rate |
| | City of Oroville (2003) | 1990-2000<br><br>20 year forecast | 0.9%<br>1.7%<br><br>1.5%<br>3%<br>0.5% | City historical<br>Unincorporated hist.<br><br>City forecast<br>North End/East Lake<br>Commercial/industrial |
| | City of Riverside (2000) | 1980-1998<br><br>20 year forecast | 1%<br><br>2.8% | Riverside growth rate based on housing units (population forecast is 3.1%) |
| | City of Tonasket (2004) | 1980-2000<br><br>20 year forecast | 0%<br><br>1.77% | No net growth over past 20 years; forecast based on OFM |
| Okanogan PUD (professional opinion) | PUD Service Area | 2000-2005<br><br>2005-2010<br>North End | 2%<br><br>3%<br>up to 5% | Electrical connections and building permits provide best insight on growth. |

Figure 3.5-1 indicates the projected growth rates for the larger cities and towns and for the unincorporated area of WRIA 49. These range from 1.3 percent (Okanogan) to 2.8 percent (Riverside) for the cities. The unincorporated areas of Okanogan County are forecasted to grow at a somewhat greater rate (3 percent). The taller bar to the right of the figure shows the estimated north end growth rate (5 percent).

In summary, until recently historical rates of growth have been very low for unincorporated areas and the County as a whole. The cities of Okanogan and Tonasket have had no net growth for long periods. Recent growth in incorporated areas has been one to two percent per year (according to WSCPs), except in Brewster where higher growth has been experienced (2.6 percent per year). In the past five years, the north end growth rate has increased.

Figure 3.5-2 shows current (2006) and a 20-year forecast (2026) of water demand for the larger cities and towns. The greatest current use; 602 million gallons per year (MGY) and greatest growth (792 MGY) occurs in Omak; at the other end of the range, Conconully has low current use (25 MGY) and little growth (37 MGY) (see Appendix A-3.1 for data).

Figures 3.5-3 and 3.5-4 compare residential and total water demand for 2006 and 2026, looking at the total incorporated demand, demand in unincorporated areas, and total WRIA 49 demand. These figures demonstrate that: (1) most demand growth is driven by growth in residential demand, and (2) most of that demand growth occurs in unincorporated areas.

This analysis does not include the agricultural water use sector, because NASS data – as well as information from Planning Unit members – indicates that farmland conversion is occurring and less land is irrigated now than in the past. This trend is expected to continue, and would offset the growth in domestic and municipal water demand in the WRIA. However, the data do not currently exist to quantify these trends in agricultural water use.

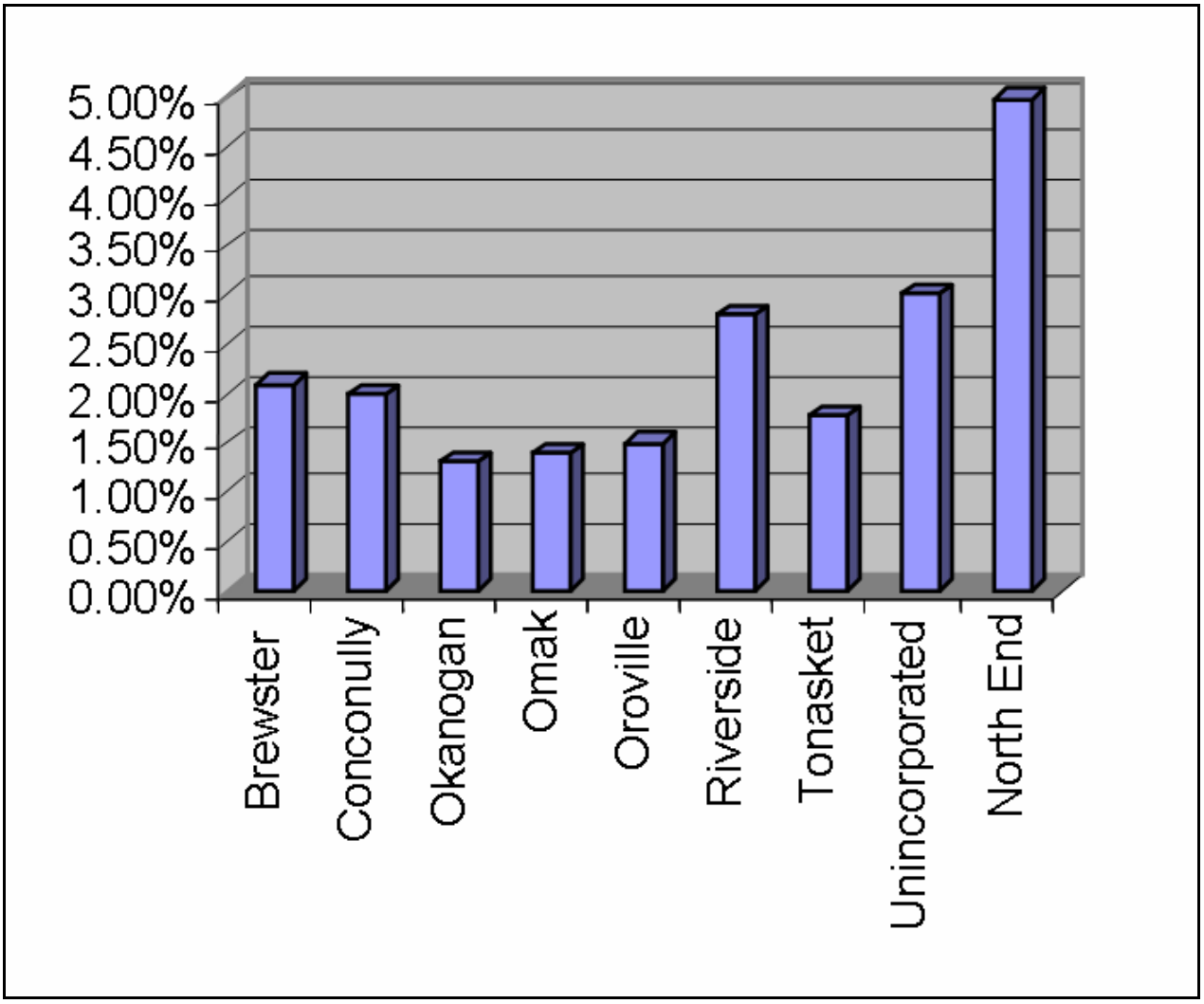
In round numbers, the projected growth in WRIA 49 water demand by 2026 (not including offsetting reduction in agricultural water use) is roughly 2,000 MGY. This is equivalent to approximately 6,500 AFY, or continuous pumping of 4,000 gpm, or continuous diversion of 9 cfs. This is not a great deal of water, particularly framed as an increase in demand over 20 years.

Existing appropriations (water rights, discussed above) would appear to fully use or overuse the available from of some surface waters and the recharge capacity of some ground waters in the WRIAs, *if the water rights were fully used*.

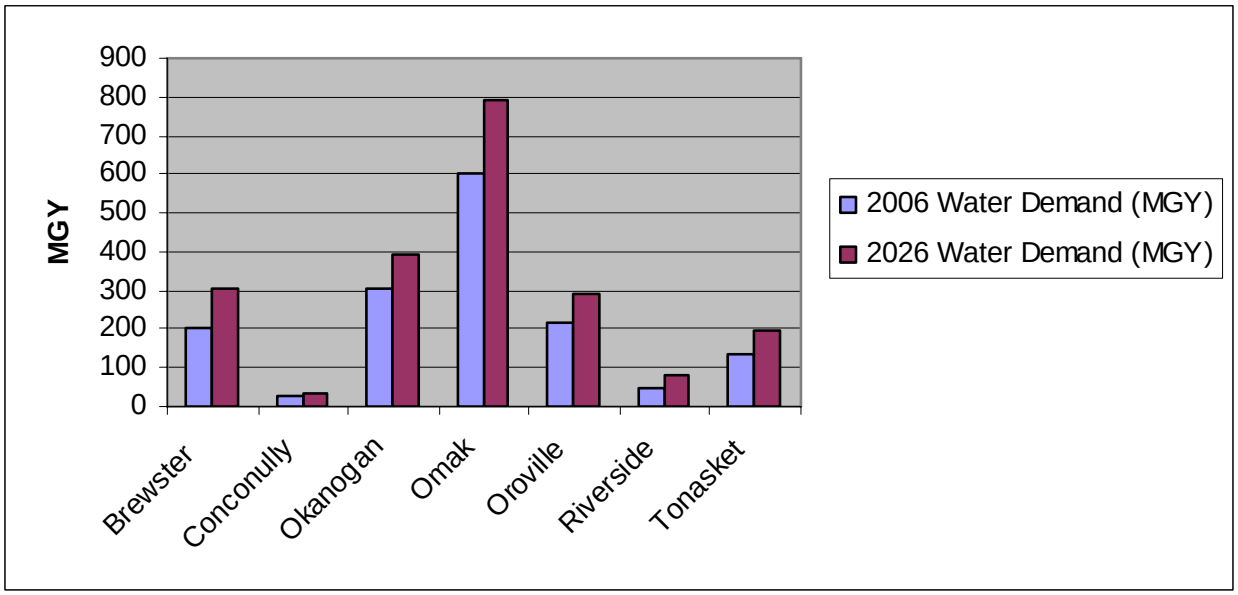
Because the volumes of water used for agriculture appears to be much greater than domestic and municipal use in WRIA 49 (approximately 138,000 AFY versus approximately 4,000 AFY), and because the basis of calculation for agricultural water use is so rough and inexact, it is not possible to state with confidence what proportion of

water rights are used in the WRIA. However, if these values were roughly correct, about 142,000 AFY of water are put to use, representing a little less than half of all existing WRIA 49 annual water rights.

**Figure 3.5-1: WRIA 49 Projected Growth Rates**



## Figure 3.5-2: 2006 and 2026 Residential Water Demand – Incorporated Areas




## Figure 3.5-3 WRIA 49 2006 and 2026 Residential Water Demand Combined

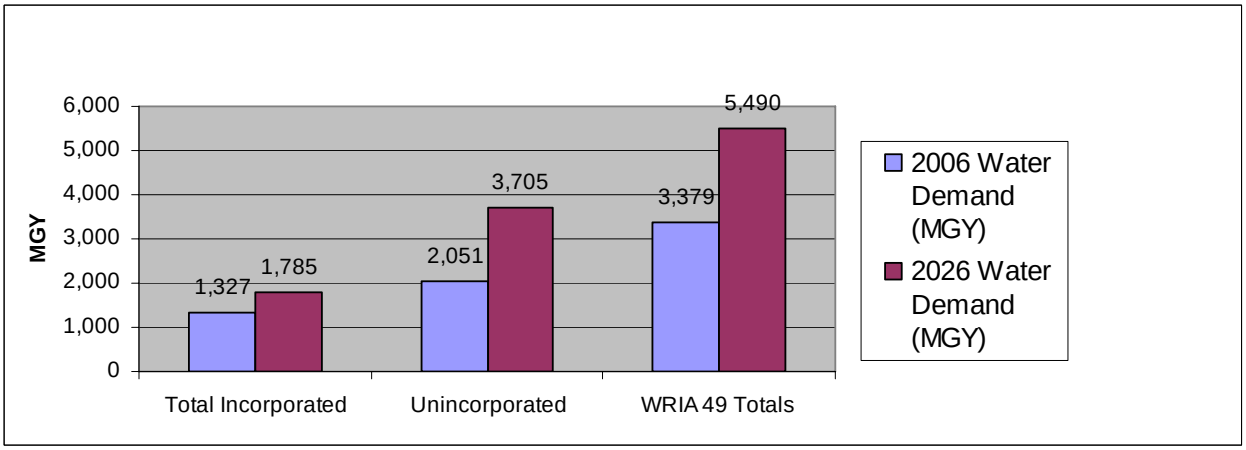


**Figure 3.5-4 WRIA 49 2006 and 2026 Total Water Demand**

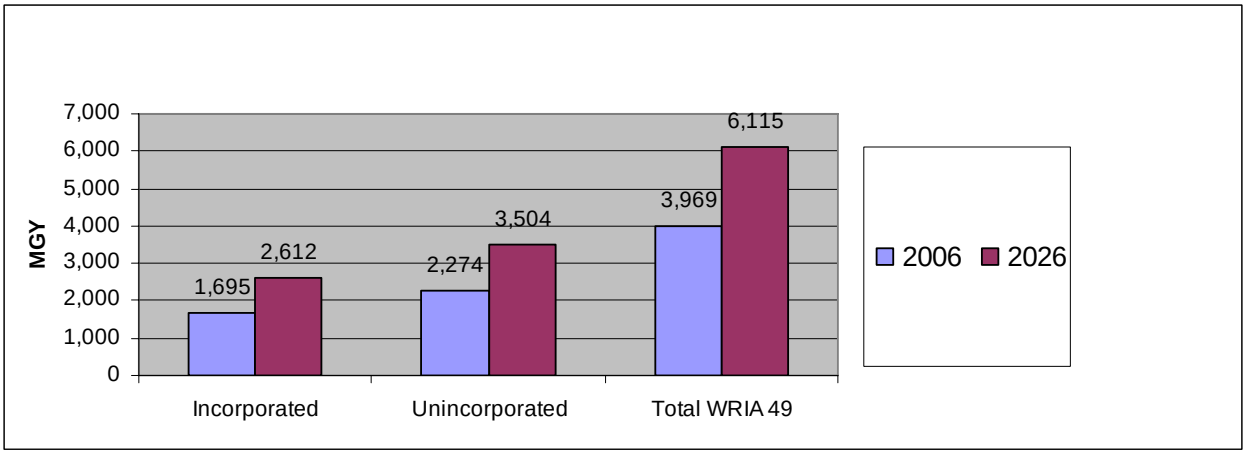
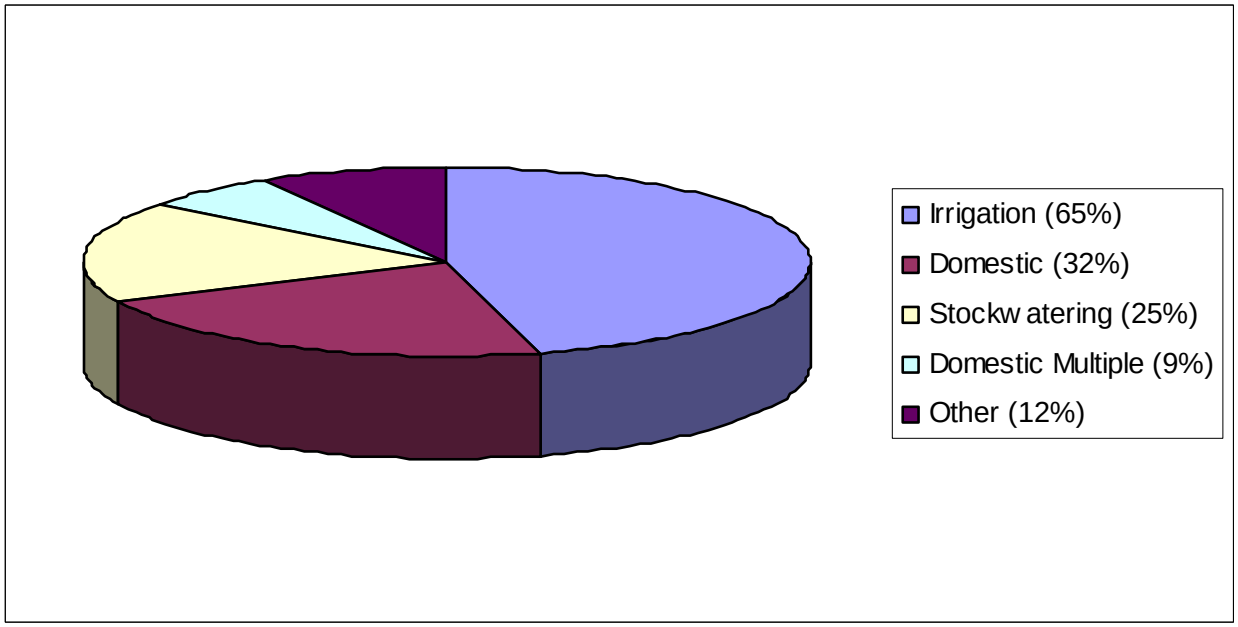
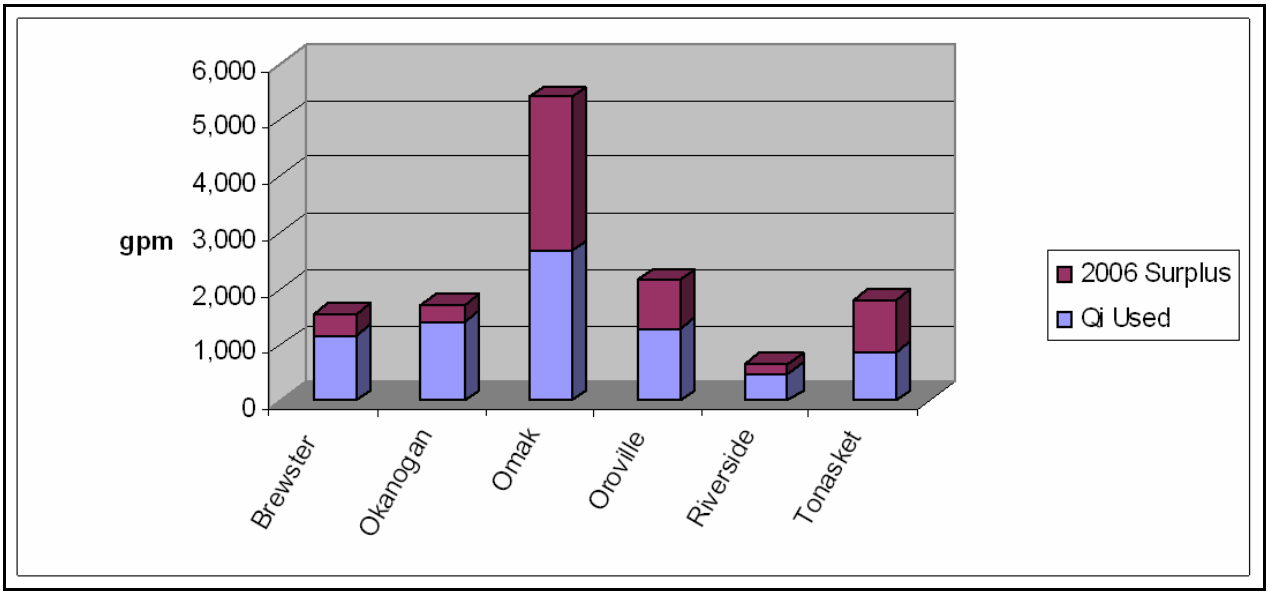



Figure 3.5-5 shows existing (2006) and 2026 demand for water for the six largest Group A water systems in the WRIA. Both peak demand (maximum demand day, MDD) expressed in gallons (gpm) and annual demand (MGY) are shown (see Appendix A-3.2 for data). Based on these existing and projected levels of demand, and the information presented in these water systems' WSCPs, a comparison was made to the adequacy of their existing water rights, water sources, and pumping capacity to supply that demand (Figures 3.5-6, 3.5-7, 3.5-8, and 3.5-9).

**Figure 3.5-5: WRIA Purposes of Water Rights**



## Figure 3.5-6: Source Pumping Surplus/Deficit (2006)




## Figure 3.5-7: Source Capacity Annual Surplus/Deficit (2006)

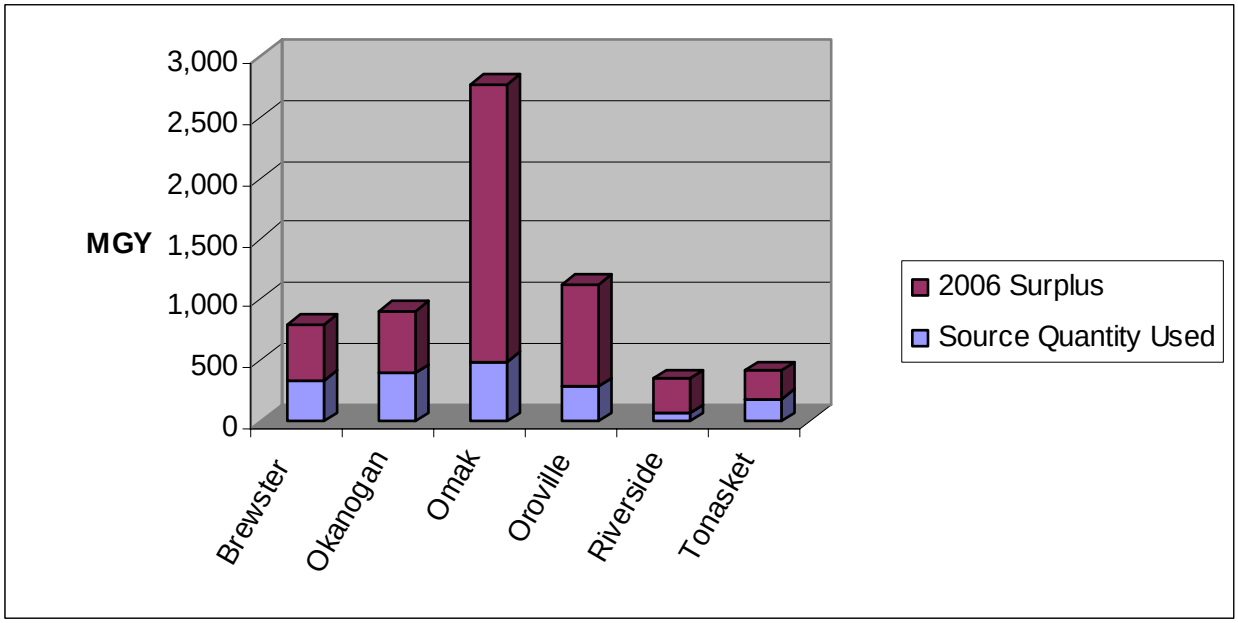


**Figure 3.5-8: Instantaneous Water Rights Surplus/Deficit**

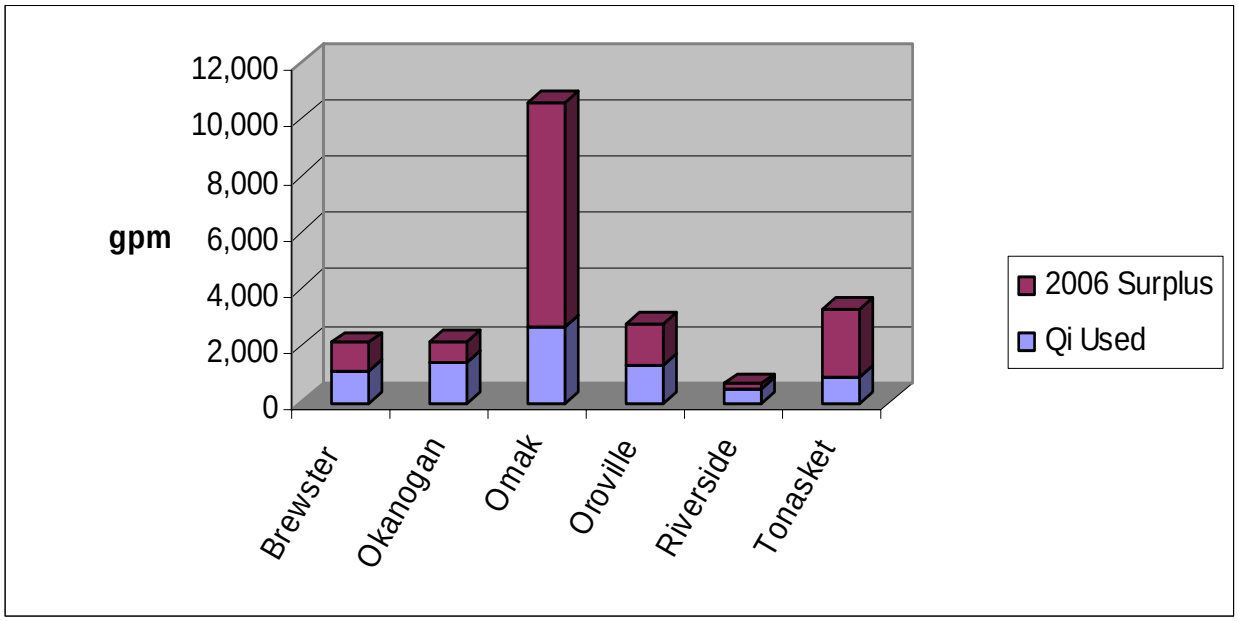
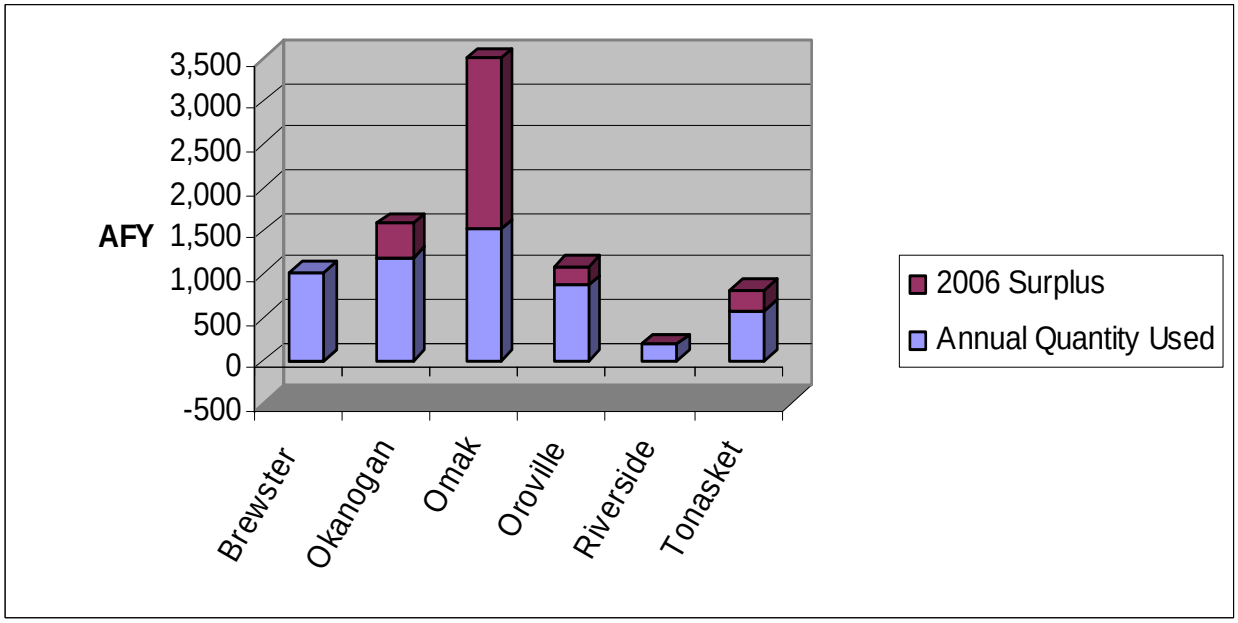



**Figure 3.5-9: Annual Water Rights Surplus/Deficit**




Figures 3.5-10, 3.5-11, 3.5-12, and 3.5-13 show the adequacy of the six larger water systems water rights, water sources, and pumping capacity to supply demand with growth trends extended to 2026. Only the Omak and Tonasket have sufficient current pumping capacity to meet the 20-year forecasted demand; Brewster (615 gpm deficit), Riverside (413 gpm), Okanogan (295 gpm), and Oroville (50 gpm) would need to add

capacity. All the systems, however, have sufficient source capacity to meet growing demand over the next 20 years.

**Figure 3.5-10: Source Capacity Pumping Surplus/Deficit (2026)**

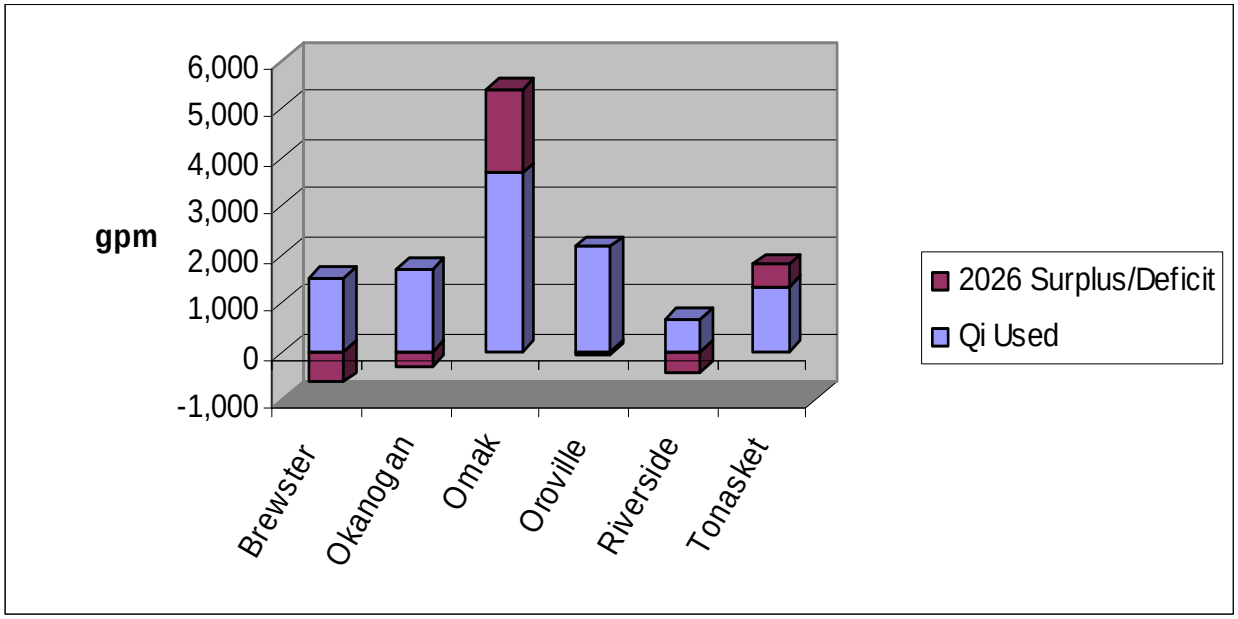



**Figure 3.5-11: Source Quantity Annual Surplus/Deficit (2026)**

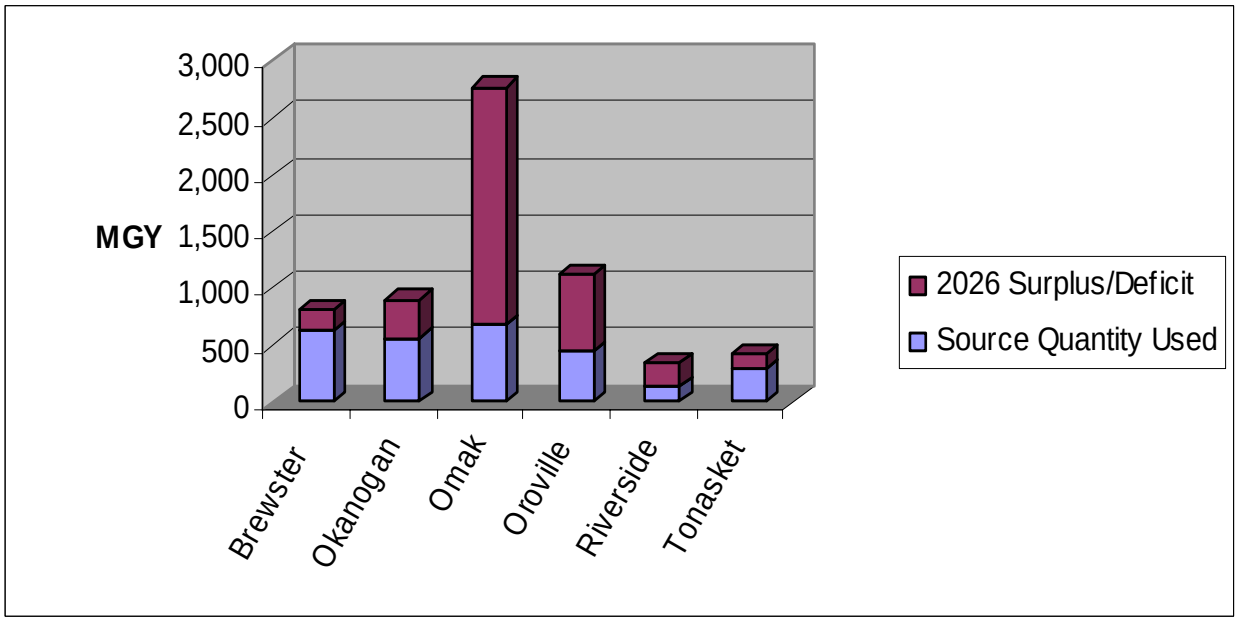


**Figure 3.5-12: Instantaneous Water Rights Surplus/Deficit (2026)**

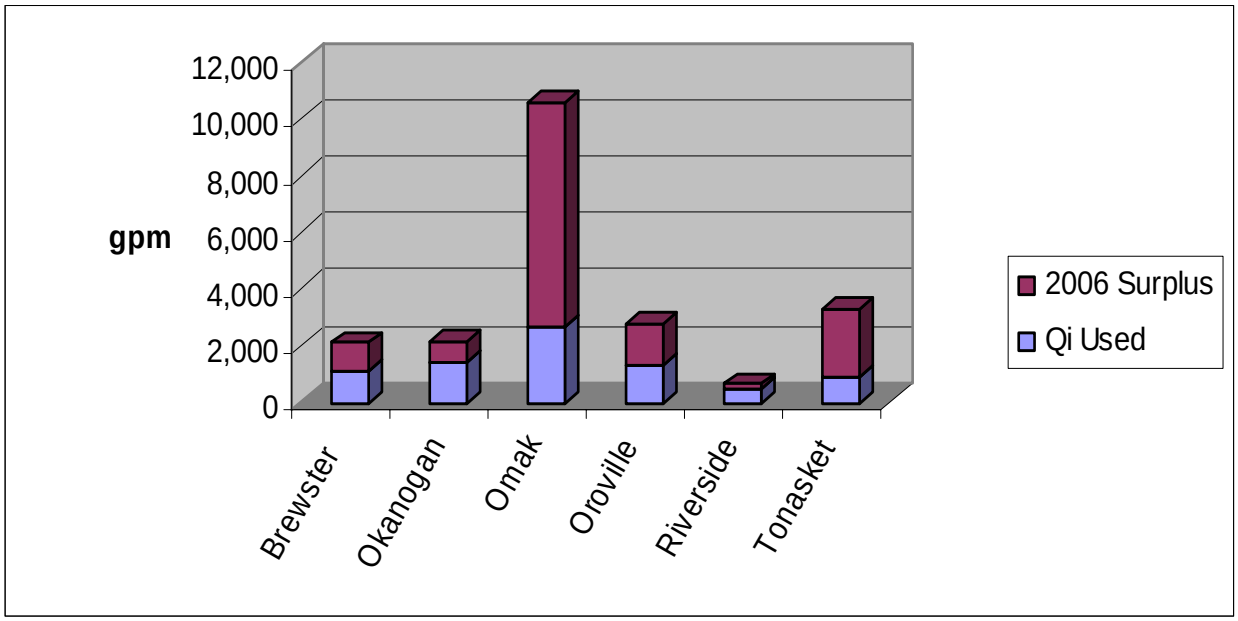
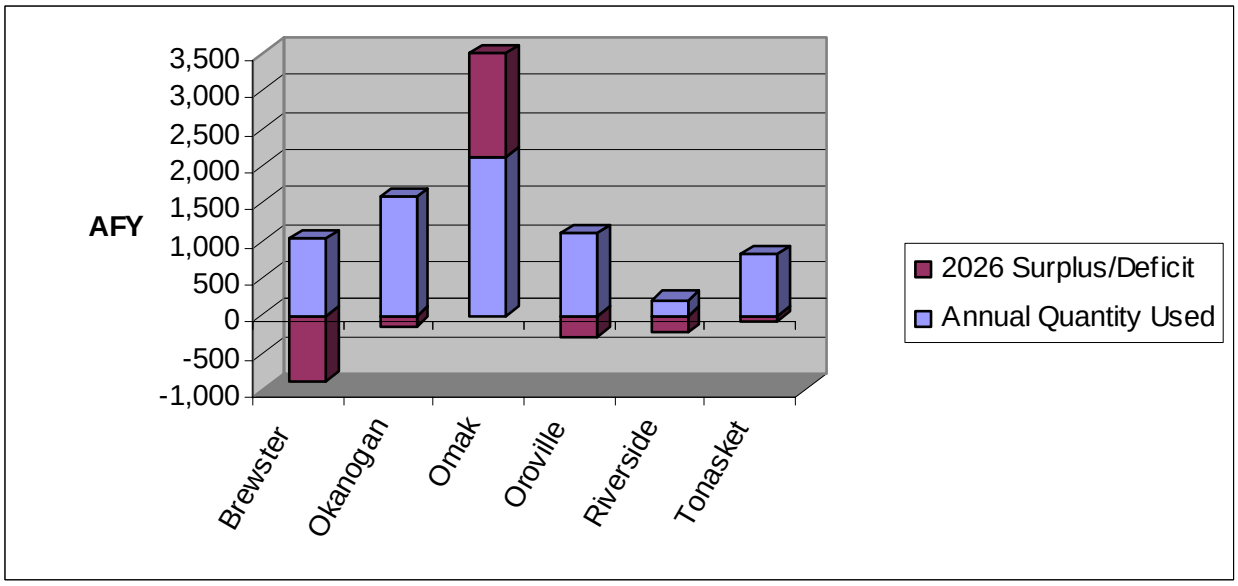



**Figure 3.5-13: Annual Water Rights Surplus/Deficit (2026)**




These figures show that all six water systems currently have surplus pumping capacity and surplus source capacity to meet existing demand. Existing instantaneous water rights are also more than sufficient to meet current demand, but not all of the water systems may have sufficient water rights to meet water demand on an annual basis. Both Brewster and Riverside appear to be fully using their existing water rights to meet current needs, and appear to have no margin left to serve new growth.

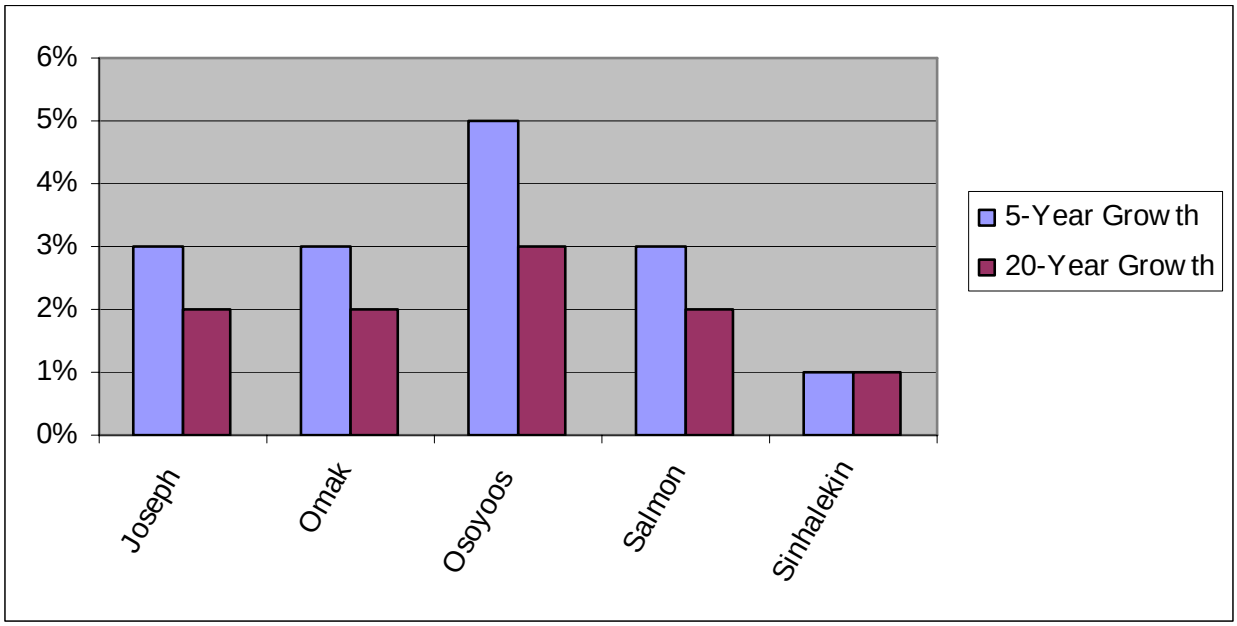
Turning to instantaneous water rights with growth projected to 2026, again both Omak and Tonasket have a large surplus; Oroville's water rights are more than adequate; and Okanogan has a slim margin. Riverside (433 gpm) and Brewster (45 gpm) would require additonal water rights to serve growth.

On an annual basis, all the water systems except Omak would need additional water rights by 2026. Deficits range from 78 AFY (Tonasket) to 887 AFY (Brewster). Detailed data for all the water systems, including these projections, is contained in Appendix A-3.2.

### 3.5.2 Subbasin Future Water Demand Assessment

Figure 3.5-14 presents estimated growth rates by subbasin. These include 5-year and 20-year horizons, based on an expectation that near-term growth would be somewhat higher but could not be reasonably projected to continue at that rate for as long as 20 years.

**Figure 3.5-14: WRIA Subbasin Growth Rates**




For the near-term, the Osoyoos Subbasin is projected to experience a significantly higher growth rate, 5 percent per year, due to development in the north end in the vicinity of Lake Osoyoos. The rate is projected to drop to 3 percent per year for the 20 year forecast.

The Joseph, Omak, and Salmon subbasins are all forecasted to grow at an annual rate of 3 percent for the next five years, dropping to 2 percent per year for the 20 year forecast. The Sinlahekin Subbasin is considered a low growth area, holding at a 1 percent per year growth rate over the entire 20 year forecast period.

Figures 3.5-15 and 3.5-16 compare ground water recharge and net runoff to streams for the five major WRIA 49 subbasins with the projected water appropriations in 2026. It is evident that the same three basins (Joseph, Osoyoos, and Salmon) continue to be of concern. Again, the role of Okanogan River in delivering water from outside the subbasin boundaries that is appropriated within the subbasin skews the comparison.

**Figure 3.5-15: 2026 Appropriation of Groundwater**

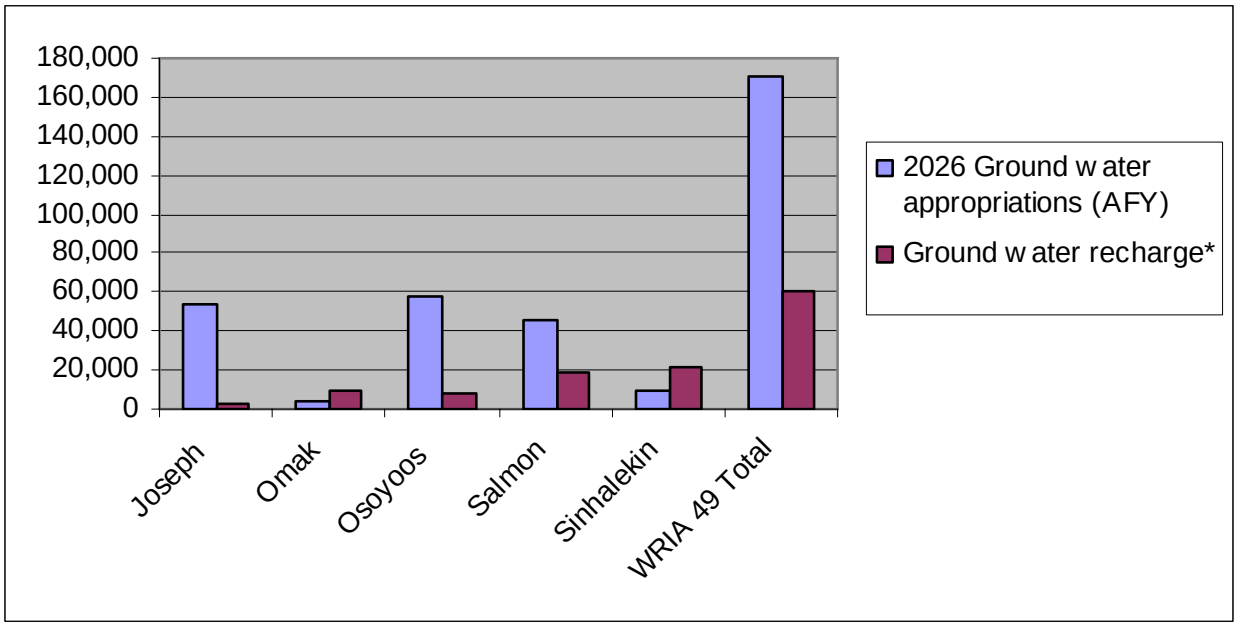
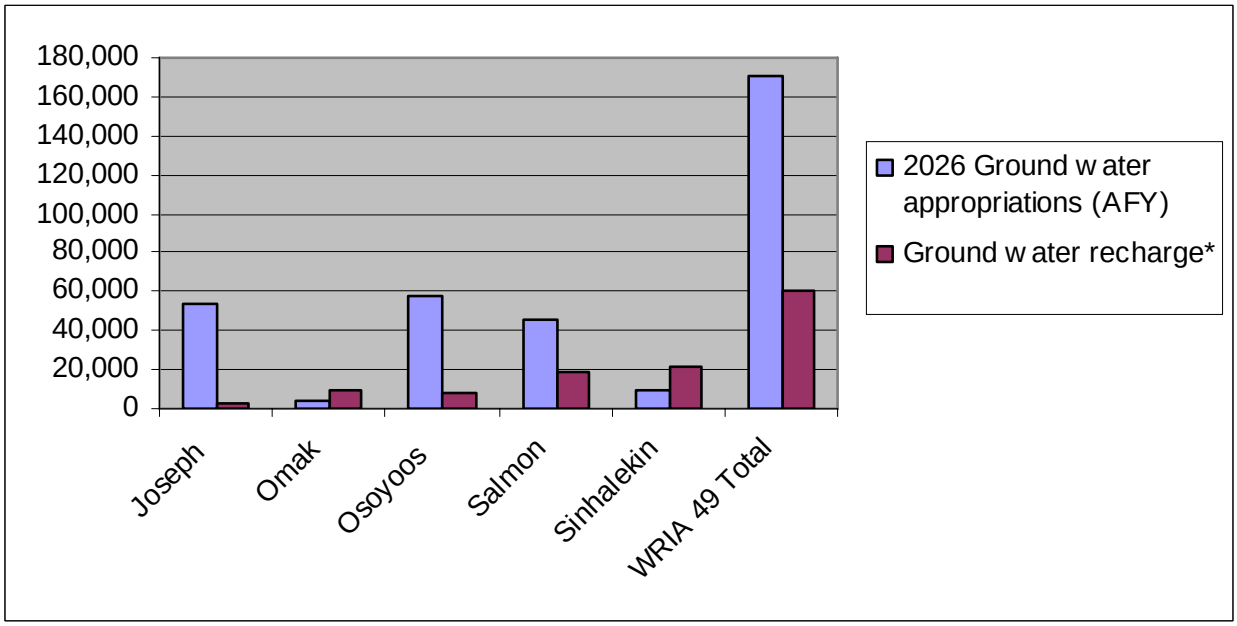



**Figure 3.5-16: 2026 Appropriation of Surface Water (AYF)**



Since we have data on the relative proportions of surface and ground water that is appropriated but we do not have data on the relative proportions of surface and ground water actually used, appropriations are used as a surrogate for projecting future growth even though it is not at all likely that Ecology would continue issuing new permits and certificates at a rate that matches growth. However, using the rough approximation of 50 percent of water rights put to use, and considering the role of the Okanogan River, it appears that overuse may not be of concern in the next 20 years for the larger subbasins. Again, individual streams and aquifers may be overused. Level 2 work which could address these might include:

- identifying “unnamed streams” in the water rights database
- refining net runoff and ground water recharge estimates
- better delineating aquifers
- obtaining flow measurements for streams of concern
- investigating actual use of some large water rights on small streams
- checking individual water rights on small streams for seasonal limitations
- determining actual water use for specific streams and aquifers of concern

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# Chapter 4.0: Water Storage Assessment

This section summarizes existing information regarding water storage opportunities in the Okanogan Basin. Existing documents (see bibliography in Appendix F) were searched for information characterizing any known water storage opportunities and the larger Group A water systems and irrigation districts were contacted to ascertain any plans, studies, or anecdotal information regarding water storage in the WRIA.

Existing information on WRIA 49 water storage potential is available from the Salmon Creek Phase I Study and from studies of projects on the Similkameen River by the Okanogan PUD. These provide good sources of information for surface water storage potential on the Salmon Creek and Similkameen River drainages, and a fair evaluation of ground water storage potential in the Salmon Subbasin. No storage information was found for the Omak, Osoyoos, or Joseph basins.

Additional information on water storage opportunities has been requested through the offices of Senator Morton, who has been a leading figure in the Legislature following up on the State water storage program, and from irrigation districts that may have investigated individual storage sites. This information has not been received in time for the Level 1 Report.

## 4.1 SALMON CREEK BASIN

Figure 4.1-1 indicates the location of several potential surface and ground water storage sites investigated for the Salmon Creek Phase I Study. Data collected for these sites is provided in Appendix C-1. Table 4-1 (taken from the Salmon Creek Phase I Study, Table ES-2), provides a summary of the storage opportunities, timing and amount of water potentially available, cost and timeframe of development, engineering feasibility, regulatory requirements, and environmental impacts and benefits. This summary provided a “fatal flaw” level screening, and could be considered as a prototype or template for Level 2 work on other potential storage opportunities in WRIA 49.

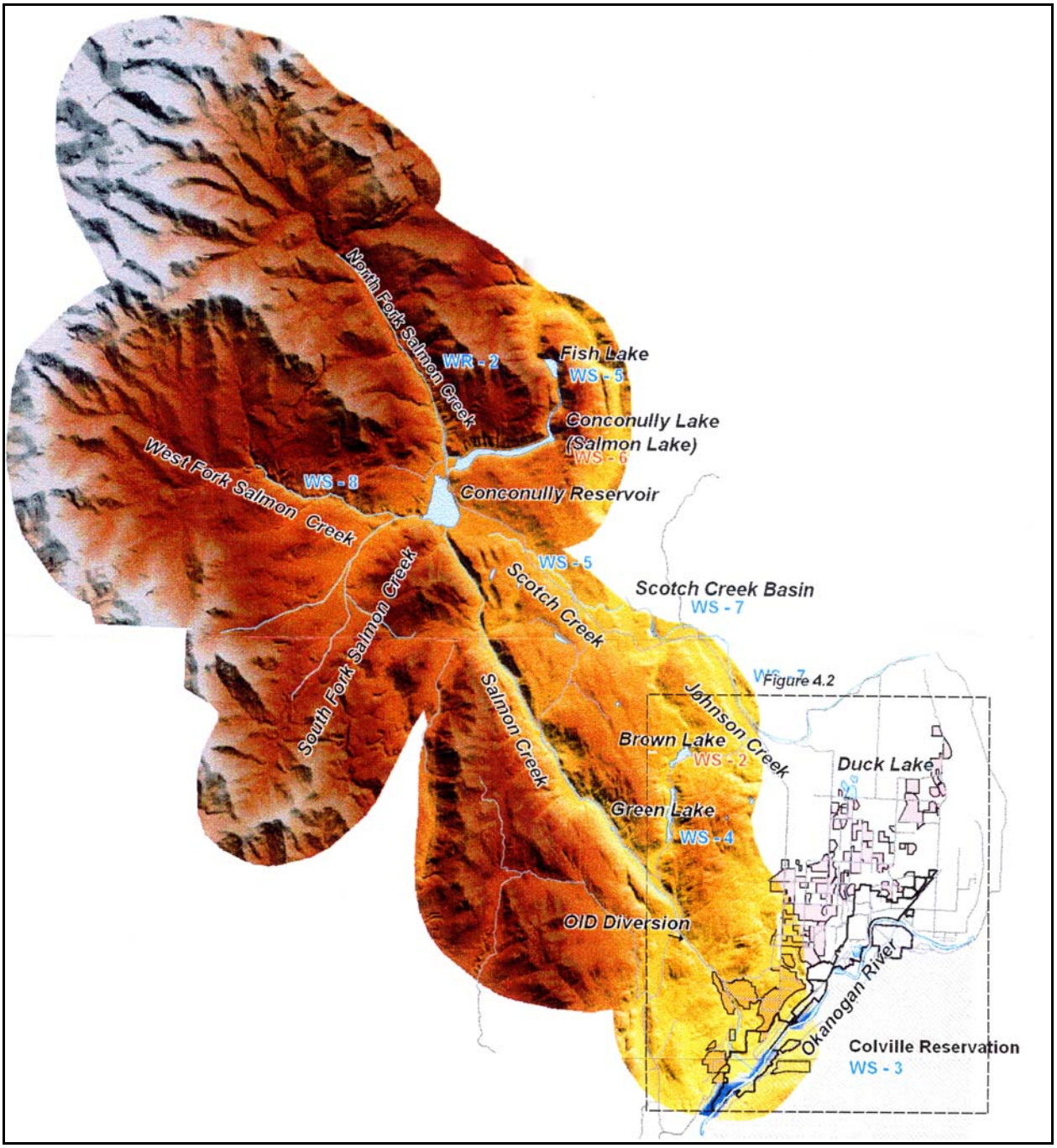
### Aquifer Storage and Recovery

Aquifer storage and recovery (ASR) in the Salmon Basin was considered capable of providing approximately 5,100 acre-feet (AF) of storage with a firm yield of 800 acre-feet per year (AFY). In 1999, ASR was roughly estimated to cost $2.5 M to develop and $40,000 per year to operate.

### Brown Lake

At Brown Lake, about 10,000 AF was available, with a firm yield of 1,300 AFY at a cost if $8 M. A high dam at Salmon Lake was considered capable of providing up to 990 AF, with a firm yield of 200 AFY, at a cost of $2.1 M.

## Figure 4.1-1: Potential Surface and Groundwater Storage Sites Investigated for the Salmon Creek Phase I Study



### Infeasible Water Storage Sites

Storage at Green Lake was investigated, but the 5,000 AF site considered infeasible due to impacts. No storage sites were identified in the West Fork of Salmon Creek, and no water was available to serve storage at Scotch Creek, Johnson Creek, or Fish Lake.

Scotch Basin offered an attractive 10,000 AF storage site, but was considered infeasible under the constraints used by the Joint Committee (Colville Tribes and OID), due to its impacts. In addition, the Joint Committee ruled out the site in consideration of the fact the area is owned by WDFW and is designated for wildlife and other environmental purposes.

### Irrigation Reregulating Reservoir

The Okanogan Irrigation District also considered a small (100 AF) reregulating reservoir as part of the Salmon Creek Project, but it was ultimately considered infeasible due to cost.

## 4.2 SIMILKAMEEN RIVER

### Enloe Dam

A grant application to investigate flashboard storage at Enloe Dam was submitted to the Washington Department of Ecology in December 2005, and was endorsed for study by the WRIA 49 Planning Unit. The flashboards would have provided 280 to 350 AF firm yield (cost unquantified) and would have supplied water to the City of Oroville. The application was not funded by Ecology; the reason given was that the Planning Unit had not completed its Watershed Plan.

### Palmer Lake

OTID conducted a study of potential storage at Palmer Lake in 1990 under the Small Reclamation Projects Act (CH2M Hill 1990) (Appendix C-2.1).[4] Palmer Lake is a natural water body located approximately two miles south of the confluence of Palmer Creek and the Similkameen River. The lake floods during spring runoff, raising the level of the lake an average of 12 feet to an elevation of 1156 feet. During the severe flood of 1972, the lake reached an elevation of 1165 feet. Average late summer minimum pool elevation is 1144 feet. A 1955 Plan of Development issued by the International Columbia River Engineering Board considered a low earth-fill dam raising the level of the lake by 15 feet and providing 30,000 AF of storage (Appendix C-2.2). A 1972 evaluation by Ecology concluded that the same amount of storage could be obtained by raising the lake 12 feet, using an 18-foot dike. Ecology found that a 30-foot dike would have protected against the 46,500 cfs floodstage reached in 1972 on the Similkameen (Appendix C-2.2).

[4] CH2M Hill. 1990. Palmer Lake Environmental Assessment. Prepared for Oroville-Tonasket Irrigation District under Small Relcamation Projects Act (Public Law 84-984).

OTID's predecessor, West Okanogan Valley Irrigation District, obtained in 1919 the right to store up to 10,500 AF of flood water in Palmer Lake. OTID proposed to construct a concrete control structure adjacent to Chopaka Road bridge over Palmer Creek, about one mile north of the lake. The control structure would have consisted of two 15-foot wide steel gates between two earthfill embankments. The gates would maintain the lake at an elevation of 1149 feet to achieve 10,500 AF of water storage. The project would have been operated to release flows from July through October for irrigation purposes. Storage would expand the lake surface by 180 acres (from 2,020 to 2,200 acres). Natural flooding normally inundates up to 530 peripheral acres around the lake, including the acreage that would be dedicated to water storage under this project. CH2M Hill (1990) reported that the project would have very little impact. No costs were included in the CH2M Hill report.

## Shanker's Bend

A large volume of storage is potentially available upstream of Enloe on the Similkameen River, at Shanker's Bend. Excerpts from detailed studies and announcements regarding potential projects at this site are provided in Appendix C-2.2. Storage at this site was first studied 1948,[5] in a study of major storage and hydro projects on the Columbia River and its tributaries issued by the U.S. Army Corps of Engineers. This Similkameen River site is the last of the large feasible storage projects that remains unrealized; the others have all been constructed.

The 1948 Corps design would have backed water about 10 miles into Canada, almost to Cawston. The design featured either an earth-fill or a rock-fill dam with a top elevation of 1304 feet and a pool elevation of 1289 feet. As designed, the dam was 260 feet high and had a top length of 1200 feet. The existing railroad tunnel (on the west bank, now abandoned and considered for a Nighthawk to Oroville recreational trail), would have been employed as a power tunnel (conveying water to the powerhouse located at the PUD's then-active Enloe generating station). Further details are given in Appendix C-2.2. Costs estimates by the Corps at the time ($37 million) are obsolete and would need to be redone.

The project was designed to provide both flood control and hydroelectric generation. With 245 feet of head and 1.3 M acre-feet of usable storage capacity for power generation, the project was capable of producing up to 84 MW of power.

The project's flood control storage would be somewhat larger, with 1.6 M acre-feet of usable storage available. The Corps estimated in 1972 that about 367,000 AF of storage would be needed to control a 100 year flood on the Okanogan; Appendix C-2.2. Washington Department of Ecology published an Okanogan Basin Initial Statement in 1972 which reviewed the Shanker's Bend high dam option and concluded that it would have been capable of controlling the severe 1972 flood to well below the non-damage level of 17,000 cfs at Tonasket. Ecology also found that the project "would provide

[5] U.S. Army Corps of Engineers. 1948. Review Report on the Columbia River and Tributaries. H.D. 531-81-2 Vol. III.

ample water (minimum flow of 1,000 cfs) to mitigate thermal blocks for anadrmous fish in the lower Okanogan, to dilute effluent from sewage treatment plants, and to cover spawning areas).

In 1955, the same project was included in a Plan of Development issued by the International Columbia River Engineering Board. The Plan of Development also included a low dam at Shanker's Bend, with a pool elevation of 1175 feet, usable storage of 162,000 AF, and a generating capacity of 11 MW. This would have required a 160-foot high dam with a crest length of 800 feet, and would not have backed water into Canada. It would have provided a smaller flood hazard management benefit, not capable of controlling the 1972 flood.

The 1955 Plan of Development also included brief descriptions of projects at Nighthawk, and in Canada at many other locations in the Similkameen Basin. Preliminary information for the Nighthawk site suggested a dam ranging in height from 30 to 45 feet (elevation ranging from 1155 to 1170 feet), with associated storage of 31,900 to 106,000 AF. This design would not have backed water into Canada and would not generate power.

In 1972, the Corps published a brochure depicting the high and low Shanker's Bend storage alternatives with substantially the same design information as was developed in 1948. In 1975, Governor Evans wrote to Secretary of State Kissinger to request the assistance of the International Joint Commission in resolving water resource management problems of the Okanogan-Similkameen river basins. The letter cited the Corps and others studies of basin potential and addressed the need for international cooperation to determine the best solution and recommend implementation. Evans addressed two major areas: (1) Osoyoos Lake levels and inflows, and (2) potential multiple use projects on the Similkameen River, including the proposed high and low dams at Shanker's Bend. Evans noted that aspects of both project were (at that time) unacceptable to one or both parties, and proposed terms of reference to the International Joint Commission to include benefits on both sides of the water of: flood control, irrigation, power generation, fisheries, and water based recreation. In today's environment, water supply benefits would have to be added to that list. Evans noted that there would need to be allocation of flow interests in and to the waters of the basin; clear recommendations on the sharing of the costs and benefits of storage; and clear disposition of the inundated lands.

The Okanogan PUD is currently considering applying for funding recently allocated by the Washington State Legislature to perform water storage feasibility studies. The scope would be to reevaluate all previously considered projects and new alternatives to determine the optimal size of a water storage project. The PUD obtained a Preliminary Permit in 1983 for a 90' dam at Shanker's Bend that would have backed water to the confluence of the Similkameen River and Palmer Creek. It would not have flooded Nighthawk, but the shoreline would have been quite close.

Impacts of a high dam at Shanker's Bend identified by the Corps included relocation of 16 miles of road; the location of a mine adit (a horizontal mine entry) at Nighthawk that would be below the proposed pool level; and inundation of 18,000 acres of agricultural lands, rural homesites (including properties around Palmer Lake and at Nighthawk), and tribal lands. Inundation effects would be felt on both sides of the border.

The benefits of a large storage project at Shanker's Bend could be regional. As described in the Summary of Concerns section opening this report, the Okanagan region of southern B.C. is one of the Province's most densely populated regions and has one of the fastest population growth rates in Canada. Growth is leading to concerns on both sides of the border about the future availability of water and the situation appears to be ripe for collaborative development of future water supplies. To the south, inquiries regarding the availability of Okanogan water have been made by representatives from Washington's Tri-Cities.

In addition to its potential water supply benefits, a large storage project on the Similkameen upstream of Enloe Dam also could provide regional fisheries and water quality benefits by providing flows that cool the Okanogan River and benefit anadromous fish well downstream, and potentially by diverting smaller flows to local streams that could provide or improve resident and anadromous fish spawning and rearing habitat (pers. comm. Perry Harvester, WDFW, January 6, 2006).

Potential agricultural benefits cited by the Corps in 1948 included the potential rehabilitation of irrigation projects undertaken by Whitestone Reclamation District that had been adandoned due to insufficient water supply from Sinlahekin and Toats Coulee Creeks.

As noted, the project would be large enough to provide flood control benefits, capable of controlling the 100 year flood on the Okanogan and reducing floods to below damage levels, particularly to the City of Oroville and downstream to Tonasket.

Finally, potential hydroelectric generation at Shanker's Bend could provide substantial regional economic benefits to local ratepayers and potential development partners. These economic benefits were estimated to be so large as to be capable of more than offsetting the costs and compensation related to inundation of lands by the reservoir.

# Chapter 5.0: Water Quality Assessment

In this section we summarize water quality conditions observed in the mainstem Okanogan River and its tributaries based on a review of the available water quality data obtained from the CCT, the OCD ,and the Washington State Department of Ecology (Ecology). The summary provided here is truncated from Appendix B-1, where the data are explored in greater depth and discussed relative to objectives outlined in the Data collected by the OCD were in response to recommendations first identified in the Okanogan County Water Quality Management Plan (OCD 1999, *revised* 2005). The initial plan itself does not present data, but an outline for data needs. Figure 5-1-1 identifies the water quality and flow monitoring stations throughout the Okanogan watershed where data have been collected, and the approximate periods of record covered by each monitoring program. Some of the stations identified are historic only. The Excel data files from each of the sources are provided in Appendix B. Specifically, Appendix B-2 contains the data files from the CCT, B-3 contains the data files from the OCD and B-4 the files from Ecoogy. A full listing of all the appended data files the data files found within Appendix B is provided in the Table of Contents.

A screening level analysis was conducted to evaluate water quality conditions relative to existing Class A and Class AA water quality numeric criteria recognized in the State of Washington (Tables 5-1 and 5-2, see also Appendix B-1). Class A criteria apply throughout the Okanogan watershed, including the mainstem and tributaries. As demonstrated in Tables 5-1 and 5-2, Class AA criteria are slightly more stringent for some water quality parameters, but are not legally applicable to the Okanogan watershed. Notwithstanding, for this report monitoring results were compared to both of these standards, as it was thought equally important to identify when water quality conditions met the highest AA standards recognized by the state, as well as those waters that regularly or periodically failed to meet Class A standards. A more detailed description of the methods used to evaluate water quality in the Okanogan basin is provided electronically in Appendix B-1 of this report. Appendix B-1 also describes the relevancy of each parameter monitored, the specific monitoring programs overseen by the CCT, OCD, and Ecology, and detailed results and graphics by parameter. However, for many of these programs, flow was also a parameter measured, and summary tables of the flow data sources are found in Chapter 2 (Attachment 3, printed with this main report provides a brief condensed tabulated description of some of the water quality parameters, their relevancy, and what has been considered “properly functioning conditions” of the parameters for salmonid fishes).

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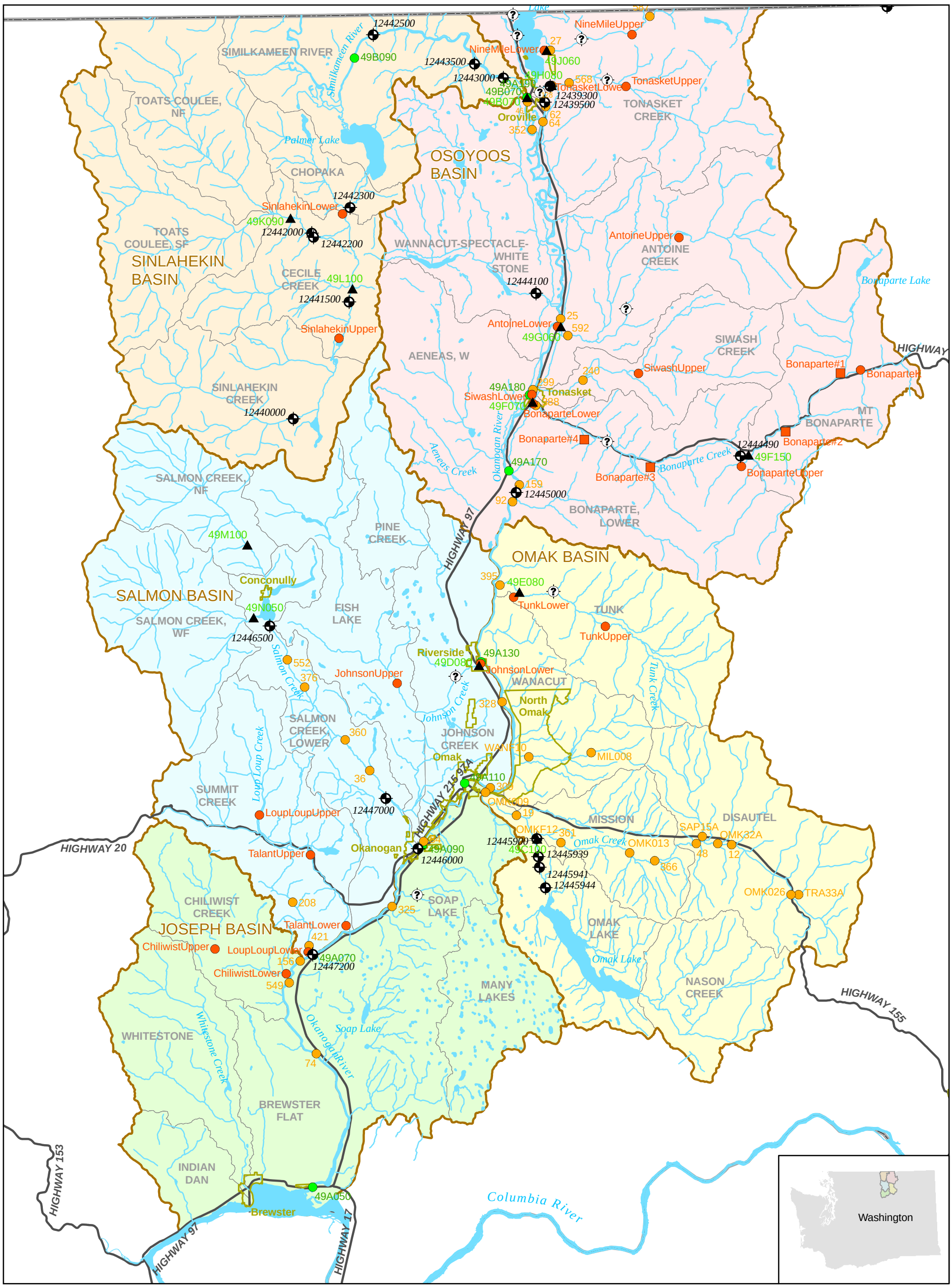
# WRIA 49 Stream Monitoring Locations




Okanogan County
City Boundary
Stream
Lake/Reservoir
Highway
Basin Boundary
WAU Boundary

**Monitoring Stations**

- Fecal (Okanogan Conservation District)
- Water Quality (Okanogan Conservation District)
- Water Quality (Colville Tribe)
- Water Quality (WA DOE)

**Stream Flow Gages**

- Stream Flow (WA DOE)
- USGS Stream Gage
- Stream Flow Gage (Location uncertain)

N

2 1 0 2 4 Miles

Stateplane 4601 NAD27 Feet

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## Table 5.1-1: Washington State Water Quality Standards for Conventional Parameters

| PARAMETER | AA STANDARD | A STANDARD |
|---|---|---|
| Temperature | Must not exceed 16.0 C[1] | Must not exceed 18.0 C[1] |
| Turbidity | Not to exceed 5 NTU over background, or 10% over background of 50 NTU or more | Not to exceed 5 NTU over background, or 10% over background of 50 NTU or more |
| Dissolved Oxygen | Must exceed 9.5 mg/L | Must exceed 8.0 mg/L |
| pH | Within 6.5 – 8.5[2] | Within 6.5 – 8.5[2] |
| Ammonia-N | Varies with pH and temperature:<br>Acute = 0.26 mg/L (@ 20 $^{o}$C, 8.0 $\leq$ pH $\leq$ 9.0)<br>Chronic = 0.04 (@ 15 $^{o}$C, 7.7 $\leq$ pH $\leq$ 9.0) | Varies with pH and temperature |
| Fecal Coliform | Not to exceed geometric mean of 50 col./100 ml, less than 10% of all samples exceeding 100 col./100 ml | Not to exceed geometric mean of 100 col./100 ml, less than 10% of all samples exceeding 200 col./100 ml |

[1] Human activities shall not result in more than a 3.0oC increase when water temperatures naturally exceed this maximum criterion. Incremental temperature increase resulting from point source activities shall not exceed t=28/(T=7) where T=background temperature; maximum incremental increase for nonpoint sources is 2.8 C.

[2] Human caused variation must be + / – 0.2 pH units (Class AA) and +/- 0.5 (Class A).

[3] Does not apply when stream flow exceeds the 7-day, ten-year frequency flood.

## Table 5.1-2: Washington State Water Quality Standards for Metals (micrograms/L)

| PARAMETER | ACUTE | CHRONIC |
|---|---|---|
| Arsenic | 360.0 | 190.0 |
| Cadmium[1] | 3.5 | 0.311 |
| Chromium (hexavalent) | 15 | 11 |
| Copper[1] | 17.0 | 11.4 |
| Lead[1] | 64.6 | 2.5 |
| Mercury | 2.1 | 0.012 |
| Selenium | 20.0 | 5.0 |
| Silver[1] | 3.45 | NA |
| Zinc[1] | 100.4 | 93.0 |

[1]. Numeric standards listed are based on an assumed hardness of 100 mg/L as calcium carbonate. Section 3 metals analysis used site specific hardness concentrations in determination of compliance with water quality standards as presented in WAC 173-201A-04[0.]

The following text summarizes the principal findings, relative to existing criteria, for conventional water quality parameters (e.g., temperature, dissolved oxygen, pH,

turbidity), metals, and organic pollutants (e.g., DDT, PCBs). More sophisticated modeling would be required to characterize how changes in land use practices might yield measurable changes to these water quality parameters in the surface waters of the Okanogan Basin, and how parameter results may vary[6] (e.g., relationship between dissolved oxygen and temperature). Modeling using such tools as AquaTox® or multivariate regression can be used to better understand how the watershed would respond to the implementation of management actions. Such applications could be considered by the Planning Unit for the Level 2 watershed assessment.

**Table 5.1-3: Washington State Water Quality Standards for Organic Pollutants Identified as Chemicals of Concern in the Okanogan Watershed**

| PARAMETER | ACUTE | CHRONIC |
|---|---|---|
| DDT1 (ug/l) | 1.1a | 0.001b |
| Polychlorinated Biphenyls (PCBs)1 (ug/L) | 2.0 b | 0.014 b |
| (108) 4,4'-DDT2 (ug/l) | 0.00059 | 0.00059 |
| (109) 4,4'-DDE2 (ug/l) | 0.00059 | 0.00059 |
| (110) 4,4'-DDD2 (ug/l) | 0.00083 | 0.00083 |

[1]. Numeric criteria from WAC 173-201A-040.

[2]. Human health criteria from 40CFR131.36 (July 1, 2000), for the consumption of organisms and water.

[a] Instantaneous concentration not to be exceeded at any time.

[b] A 24-hour average not to be exceeded.

Tables 5.2-1 to 5.2-7 summarize the results of the water quality screening against existing surface water quality criteria for the Okanogan mainstem, and for the tributaries where monitoring has been conducted. The values *are not* (emphasis added) a reflection of measured concentrations — these are provided graphically in the full water quality report provided electronically as Appendix B-1, and/or in data files used to prepare that appendix (*see* appendices B-2, B-3 and B-4). Rather, they are a reflection of the percentage of samples collected that did not meet water quality standards. The inset box describes how to read and interpret these tables. The text following the inset box highlights some of the more significant findings of the parameters monitored.

## 5.1 TEMPERATURE

Monitoring data from all the sources reviewed (i.e., OCD. WDOE, CCT) has shown that Class A criteria are exceeded regularly in the Okanogan River mainstem and in many of the WRIA 49 streams where temperature has been monitored. Tributary contributions of cooler water appear to reduce mainstem temperatures slightly downstream of Lake Osoyoos. This is demonstrated by a lower percentage of temperature exceedances

[6] Covariance in this context refers to how a change in one water quality parameter can affect the measurement of another parameter. For example, the maximum amount of oxygen dissolved in water reduces with increasing water temperature.

recorded at Mallot. However, temperature measurements still exceed the Class A standards to a degree that concern may be warranted for sensitive aquatic life. Anecdotal information on salmonid migrations through the Okanogan suggests that salmonids are negatively impacted by the high temperatures seen in the mainstem at some times of the year (C. Fisher personal communication, CCT, 2006). For example, sockeye salmon that migrate through the U.S. portion of the Okanogan mainstem to spawn in Canadian waters, regularly stage below the Okanogan confluence when extended periods of high temperature occur in the mainstem.

Numerous tributary exceedances of Class A temperature standards were identified in multiple monitoring stations in Omak, Tunk, Salmon Creek, and Wannacut creeks, and in the lower Sinlahekin, Bonaparte, Antoine, and middle Tonasket creek monitoring stations. There are some stations and creeks, however, where temperature is not regularly noted as a problem. These tributaries currently include Chiliwist, Tallant, Johnson, Siwash and Loup Loup creeks. Some of these systems (e.g., Loup Loup) probably experience cooler temperatures due to the heavily forested nature of the watersheds. For others, more work is needed to ascertain the role of riparian shading for buffering stream temperatures. Where the proportion of warmer surface runoff to cooler ground water is low, temperatures may be reduced. Ground waters often represent the most significant contribution to baseflows during the time of year when temperatures often exceed criteria.

At some stations, the number of temperature exceedances that occurred over the monitoring period may have been underestimated. The OCD, as a condition of their approved quality assurance plan (QUAP) was required to monitor during the same period for their grab samples. Since the grab samples (i.e., not the continuous monitoring stations) were collected in the morning hours, before peak daily temperatures would occur, higher temperatures may have occurred that were not recorded.

## 5.2 DISSOLVED OXYGEN

Monitoring by the OCD and detected possible problems in dissolved oxygen (DO), based on the failure to meet Class A criteria on more than 10 percent of the monitoring dates, at the following stations: lower Tunk Creek, Salmon Creek, Johnson Creek, Bonaparte Creek, Antoine Creek, Tonasket Creek, and Ninemile Creek. Tables 5.-2 through 5.-7 demonstrate the relationship between systems that failed to meet the DO standards outlined in Table 5.1-1 and the recurrence of temperature exceedances for some systems. Such findings are not surprising, as water holds less dissolved oxygen saturation with increasing temperature and altitude (Fisher 2000). However, this finding cannot be assumed to be the cause for all the tributary systems that repeatedly failed to meet Class A DO standards. For example, Bonaparte and Salmon Creeks exhibited extreme deficits in DO (Table 5.2-6), but these deficits were not always associated with temperature problems (at least, not at every station). In Bonaparte Creek, it is possible that the DO problems identified (e.g., at the uppermost station K1) are at least partially

contributed by high biological oxygen demand (BOD), as evidenced from the high fecal coliform counts measured in that system. At other stations (middle Siwash), further research is needed. Considering that 65 percent of the records fail to meet DO criteria (Table 5.2-6), BOD may be contributing to oxygen deficits where monitoring results have not indicated there is a problem with temperature exceedances. In still other cases, fecal coliform is recorded as a regular problem, yet DO criteria are generally met (e.g., Sinlahekin Creek).

Regardless of the cause, the extensive number of tributary systems that fail to meet Class A DO criteria could be problematic for aquatic life and the restoration of salmonid populations in some tributaries, as outlined in other planning documents (ENTRIX and Golder 2001, NWPPC 2004). Of all the conventional parameters monitored, deficits in oxygen will have the most severely limiting effect on the functionality of aquatic systems to support aquatic life.

## 5.3 pH

The pH of the Okanogan basin's tributaries appears almost uniformly high (well above neutral readings of 7), and slightly elevated in the mainstem. Clearly, the alkaline pH recorded throughout the basin is primarily reflective of natural conditions, but in some systems the alkaline pH readings are particularly high (e.g., Tunk Creek monitoring stations, lower Tallant monitoring station). Data reviewed suggest a fairly consistent increase in pH lower in the tributary subbasins (i.e., where multiple monitoring stations allow for such comparisons). In the mainstem, pH criteria were exceeded in no more than 10 percent of the samples collected, suggesting that some of the alkalinity is quenched by the higher water flows and/or organic matter in the mainstem – as compared to the tributary systems.

The relationship between pH and water allocations and use requires further exploration. Although the pH values are generally alkaline throughout the basin, the pH of the basin's waters do not exceed physiological limitations for most fish species (Fisher 2000). A longer period of record is required to tell if there has been a progressive increase in pH in the Okanogan's tributary systems that may suggest causes related to land use or other climatic factors. It is possible that repeated land disturbance that increases sediment run-off, coupled with an increase in dewatering and/or evaporation rates, could potentially increase salt and/or carbonate concentrations in the remaining surface waters, but such explanations are inherently speculative at this point. The biological significance of such increases, should they be occurring, cannot be deduced from the existing data.

## 5.4 TURBIDITY

Generally, turbidity increases with total suspended solid (TSS) loads and is an optical measure of light penetration or light refraction, depending on the method of measurement. Factors that contribute to TSS include suspended sediment, suspended

organic matter, and dissolved organic matter (e.g., tannic acids from decaying leaves). The precise relationship between turbidity and TSS is generally basin specific, and depends on the source geology and organic matter in a system. Turbidity is generally measured as a measure of light reflection (nephelometric turbidity units), or light penetration (jackson turbidity units — JTUs). In the Okanogan basin, turbidity regularly exceeds 50 nephelometric turbidity units (NTUs) in the mainstem and in a variety of tributaries. As an inverse measure of light penetration (i.e., the NTU number increases with decreasing light penetration/increasing light reflection), NTU's generally increase with an increase in sedimentation in a system. The relevancy of the parameter is explained in Appendix B-1, but in brief, a 50 NTU measurement might be of the color of a cup coffee with cream.

Because turbidity can be caused by both inorganic and organic particles suspended in the water column, and because it varies with basin geology, a direct reflection of the relevancy of the parameter to factors such as aquatic life tend to be basin specific. In general, the impact of turbidity on aquatic life generally depends on the duration and frequency of events where it is measurable above background levels. However, no basin-wide background turbidity has been established in the Okanogan river, so the exceedance rate summaries identified in Tables 5.-1 to 5.-7 should be considered qualitative and preliminary. Notwithstanding, Omak Creek and Tunk Creek appear to have excessive sediment recruitment to cause turbidity. This finding was previously thought likely due to high road density within these watersheds and/or improper maintenance of them (ENTRIX and Golder 2001). Without a site-specific analysis of turbidity effects on biological resources in the basin, identifying additional systems that may be affected is speculative. Establishing the relationship between TSS and turbidity for a "model system" within the watershed (e.g., Omak or Bonaparte Creek) could provide data to develop a relationship further that could be applied to many other tributaries in the Okanogan basin with similar geology. This could yield a powerful tool by which to predict sedimentation loads entering the mainstem Okanogan from simple turbidity measurements.

## 5.5 NUTRIENTS AND FECAL COLIFORM

Excessive contributions of nutrients – ammonia, nitrite nitrate, soluble reactive phosphorous and total phosphorous – ha the potential to degrade baseline water quality. Ammonia is a nitrogen-based waste product from humans and animals, and is often contained in high concentrations in fertilizers. It can be highly toxic to aquatic life at low parts per million concentrations. Ammonia is oxidized (broken down) to nitrite, and subsequently to nitrate by bacterial populations naturally present in all water bodies. Ammonia chemistry and toxicity is explained further in Appendix B-1.

Both nitrates and phosphates are readily used by plants, and when present in excess can lead to unwanted blooms of algae and/or other aquatic plant life. Such "eutrophication" processes may reduce the ability of waters to support the beneficial uses that are recognized (as narrative standards) in Washington's water quality criteria.

An example of such a “narrative standard” would be “salmonid spawning and rearing”. Nutrient loading may reflect human and/or animal waste input into a system. This can be measured by fecal coliform counts, as explained in detail in Attachment 5. The principal findings from monitoring of both of these water quality elements are discussed in this section.

### 5.5.1 Okanogan Mainstem

In the Okanogan mainstem, ammonia-nitrogen concentrations were detected at all three mainstem sampling stations (Figure 5.1-1), but were lower than the detection limit in more than half of the samples. The range of observed values for this parameter was relatively similar at all stations, although the Oroville and Malott stations were observed to have slightly higher concentrations than the Similkameen station. The median nitrate-nitrite-nitrogen concentration at Malott was 0.21 mg/L while median values at the other stations were recorded at the detection limit. The maximum concentration observed at the Oroville station equaled 2.5 mg/L and was an order of magnitude higher than the maximum concentration observed at the Similkameen station (0.149 mg/L) and the Malott station (0.23 mg/L).

Median soluble reactive phosphorous concentrations at the Similkameen River station (0.0034 mg/L) were slightly above the detection limit while concentrations at the Malott station (0.00465 mg/L) were higher yet. Further, the range of soluble reactive phosphorous concentrations at the Malott station, in comparison to the other stations, were higher. For samples collected at the Oroville station, more than 50 percent contained concentrations of soluble reactive phosphorous lower than the detection limit. One possible explanation for these noticeably lower concentrations is that soluble reactive phosphorous becomes “fixed” by primary production in Lake Osoyoos.

In contrast to the results for soluble reactive phosphorous measured in the mainstem, the range of total phosphorous values at the Oroville station were similar to those observed at the Similkameen station and, in fact, median values were higher suggesting that phosphorous is present in the system, but perhaps, not biologically available. Median total phosphorous concentrations at the Malott station were double those observed at the Similkameen station.

Fecal coliform samples rarely exceeded numeric criteria at the Similkameen River (AA = 8, A = 3, n = 322) and Okanogan River at Oroville (AA = 3, A = 1, n = 306) stations. Exceedances at the Malott station were of a greater magnitude and were more frequent than at the other mainstem monitoring stations (AA = 56 percent, A = 18 percent, n = 290). Patterns of abundance are further detailed in the box plot charts provided in Appendix B-1, with counts at the Malott station greatly exceeding those observed at the other stations regardless of season (see Appendix B-1, Figure 5.1-7). All of the stations exhibited seasonal trends, with counts generally higher between May and October and lower between November and February. However, some comparatively high values were observed at the Malott station in February, although the median values were

consistent with prevailing seasonal patterns. The seasonal pattern of fecal coliform identified in the mainstem may reflect greater direct contact with the water by livestock and wildlife during the late spring to early fall months.

### 5.5.2 Tributary Findings

Nutrient data of adequate quality for interpretation were identified only from Tunk, Sinlahekin, and Bonaparte creeks. Sampling conducted in Omak creek for ammonia following two spills of fire retardant in 2002 and 2003 was not relevant to the baseline data collected from these other systems and was not reviewed for watershed assessment purposes. The principal findings from these sampling events, detailed completely in Appendix B-1, are as follows:

- Fecal coliform was sampled twice in Omak Creek at stations OMK009 and OMK013 and three times at OMKF12 and OMK32A in 2005. None of these samples exceeded numeric water quality criteria. Further sampling is ongoing by the CCT.
- Fecal coliform samples collected at lower and upper Tunk Creek locations exceeded Class AA numeric criteria on 20 occasions and Class A criteria on thirteen occasions. These exceedances correlate with exceedances of ammonia detected in this tributary at both the upper (n = 5) and lower (n = 4) sampling stations.
- A persistent and significant problem with fecal coliform is present in Bonaparte Creek (Table 5.2-6). For example, between 2000 and 2003, 50 percent and 33 percent of 36 samples from lower Bonaparte Creek exceeded Class AA and A criteria, respectively. At the Upper Bonaparte station, Class AA numeric criteria were exceeded in sixteen samples and Class A criteria in eight samples (n = 33). Additional samples were collected at station numbers one through five between 2002 and 2003. The proportion of samples that exceeded criteria generally (not always) increased downstream. At station #5 12 of 13 samples exceeded Class AA criteria and 8 of those samples exceeded Class A criteria.
- As might be expected from the frequent fecal criteria exceedances, the nutrient contributions in Bonaparte Creek also exceeded water quality criteria. Observed ammonia-nitrogen concentrations at the Upper Bonaparte K sampling location exceeded acute (n = 4) and chronic criteria (n =18). Fewer exceedances were observed at the Upper Bonaparte station with two classified as acute and eight as chronic. Only the chronic criteria were exceeded at the Lower Bonaparte station (n = 6).
- As demonstrated in Table 5.2-7, fecal coliform samples collected at the lower Sinlahekin Creek monitoring station exceeded Class AA numeric criteria on 78 percent, and 56 percent of the sampling events, respectively (i.e., n = 28, n = 20). Fewer exceedences were observed in samples collected in the upper reach, but the rates of exceedance were still significant; Class AA criteria were violated seven times (19 percent) and Class A criteria four times (11

percent). Similar to Bonaparte Creek, there appears to be a correlation between the high rates of fecal coliform exceedance, and nutrient contributions. Observed ammonia-nitrogen concentrations in lower Sinlahekin Creek exceeded acute and chronic toxicity standards on two and 14 occasions, respectively.

Information regarding nutrient contributions throughout the basin is localized to a few select basins. Results from these basins each demonstrate potentially significant problems with fecal coliform and/or nutrient contributions that may or may not be related. Given that problems have been identified in each basin where these parameters have been investigated, an expansion of nutrient analysis should be considered in other basins.

## 5.6 METALS

### 5.6.1 Mainstem and Similkameen Findings

Ecology surveyed metals concentrations in the Similkameen River at four locations in August 1995 and April 1996. Sampled constituents included iron, aluminum, and manganese (Johnson 1997). Key findings from this study include:

- Metals concentrations were highest during spring floods;
- “All metals concentrations were within EPA criteria for protection of aquatic life criteria and within state drinking water standards;”
- “Copper (0.51 – 2.6 ug/L), arsenic (2.0 – 7.0 ug/L), and mercury (<0.001 – 0.006 ug/L) were the predominant metals of interest in the water column;”
- EPA human health National Toxics Rule criteria for arsenic (consumption of fish = 0.14 ug/L; consumption of fish and water 0.018 ug/L) were exceeded; and
- Previous USGS studies analyzed samples for chlorinated pesticides and PCBs but did not detect significant concentrations.

Ecology conducted a field study to determine if small-scale gold dredging operations in the Similkameen River increase ambient concentrations of arsenic, copper, lead, zinc, turbidity, and total suspended solids (TSS) (Johnson and Peterschmidt 2005). Dredge effluent was analyzed at 14 locations between Nighthawk and Oroville and discharge plumes were sampled immediately below three dredges. Key findings from this study include:

- Arsenic, copper, zinc and lead concentrations in dredge effluents were higher than ambient river concentrations;
- Turbidity, total suspended solids, zinc, and arsenic concentrations were highest in within 10 feet of dredging operations and declined to levels approaching those measured outside the immediate influence of dredging (i.e., background).

- Copper concentrations in the dredge effluent occasionally exceeded acute and chronic water quality standards and lead concentrations occasionally exceeded chronic criteria. Arsenic and zinc concentrations in the effluent did not exceed either acute or chronic criteria; and
- Plume concentrations were below acute and chronic standards.

Ecology recently analyzed metals concentrations in the Okanogan River at the Malott monitoring station six times between October 4, 2004 and August 1, 2005. Their findings can be summarized as follows:

- None of the observed concentrations, for any parameter, exceeded water quality standards.
- Silver concentrations were always below the detection limit and cadmium, mercury, and lead were detected infrequently and at concentrations only slightly greater than the detection limit.
- Arsenic, chromium, copper, and zinc were generally present at measurable concentrations, but were still substantially lower than Class A or AA surface water quality criteria.

### 5.6.2 Recent Findings from Tributary Sampling Conducted by the OCD

The Okanogan Conservation District collected grab samples from four systems between 2000 and 2003. With the exception of Tunk Creek, where copper and lead were detected above metals criteria, there were no other exceedances of metals criteria in the tributaries monitored by the OCD. Table 5.2-1 summarizes the nominal metals values (the dissolved metals concentrations) recorded from the OCD's efforts between 2000 and 2003. Table 5.2-4 reflects the percent exceedances found in Tunk Creek. However, it is recognized that the database for analysis is limited — only three tributaries and the mainstem Okanogan River were monitored for metals. Indeed, in the monitoring conducted (Table 5.2-1), only one other system monitored had detectable dissolved metals (Bonaparte Creek). Arsenic, technically a "metalloid", was repeatedly detected in Sinlahekin Creek, near the detection limit of the analytical method; it was not detected in the mainstem in the OCD monitoring program.

Collectively, the results of the metals sampling conducted by Ecology and the OCD do not suggest there are basin-wide issues with metal contamination. Issues may exist within some tributary basins from localized land use practices (e.g., dredge mining, etc.) that could be addressed through changes in management practices, but these do not, with the present information available, appear to be significant at the watershed scale. The alkaline conditions of the waters within the basin help to buffer the potential toxicity of metals, but given that in the systems monitored there have been few detections, this buffering capacity is essentially moot. The source of copper and lead contributions to Tunk Creek may be natural, or have anthropogenic causes. The data base evaluated does not provide adequate information to identify source contributions for this Level 1 analysis. Nor are the data comprehensive enough to characterize metals contributions

throughout the basin. The biological significance of localized actions that may mobilize metals to concentrations above water quality criteria remains a data gap.

## 5.7 ORGANIC POLLUTANTS

DDT and related compounds (DDE, DDD, etc.,) and PCBs appear to persist in low but detectable levels in some isolated areas, but current evidence does not suggest these persistent organic pollutants, for which TMDL studies have been conducted, are a problem basin-wide. The following discussion highlights the principal findings of authors that have overseen the most recent studies of organic pollution within the Okanogan Basin.

### 5.7.1 Mainstem and Similkameen Findings

Previous USGS studies analyzed samples for chlorinated pesticides and PCBs but did not detect significant concentrations. More recent information on the presence of persistent bioaccumulative toxins in the Okanogan Basin was recently presented in Serdar (2003) and Peterschmidt (2004). Specifically, DDT and PCB concentrations were examined in the Okanogan River and tributaries, in Osoyoos Lake, and in sewage treatment plant effluent and sludge, sediment in cores of bottom sediment, and in fish tissues were examined between 2001 and 2002. Key findings from the mainstem and Similkamen sampling include:

- 4,4’-DDE, 4,4’-DDD, and t-DDT were detected at sampling stations near Zosel Dam, at Riverside, and Malott. Observed concentrations were lower than lower than those specified for human health and aquatic life and therefore these waterbodies complied with applicable standards.
- 4,4’-DDT and PCBs were not detected in the water column in May, 2002. The PCB detection limit (0.64-0.66 ng/L) was lower than the NTR threshold.
- None of the DDT compounds were detected in the Similkameen River during May, 2002 sampling event.
- 4,4’-DDE, 4,4’-DDT, and t-DDT were detected in the Oroville STP effluent. Constituents detected in the Okanogan STP effluent included 4,4’-DDE, 4,4’-DDD, 4,4’-DDT, t-DDT, and PCBs. A small number of samples at both plants exceeded human health standards. None of the DDT or PCB derivatives were detected in the Omak STP effluent. Overall, the transfer of these pollutants to the environment from the STPs (loading) was low. These pollutants were detected in the wastewater treatment sludge at all three STPs.
- Loading from the source tributaries and Osoyoos Lake are “low”.
- In general, DDT concentrations in fish tissue appear to be declining from 1980s and 1990s. However, concentrations of 4,4-DDE in fish tissue samples exceeded human health advisory criteria in 23 of 24 samples. PCB concentrations appear similar to previous studies, suggesting little attenuation is occuring.

- The primary source of the pollutants in fish tissue is believed to be from bottom sediments in the Okanogan River.

### 5.7.2 Tributary Findings

In April and/or May of 2001 Ecology sampled for the persistent bioaccumulative toxicants DDT (and its related compounds) and PCBs at one station each in Loup, Loup, Tonasket, Nine Mile, Antoine, Whitestone, Elgin, Mosquito, Siwash, Salmon, Bonaparte, Aeneas, Johnson, Chewiliken, Wanacut, and Tunk creeks (Serdar 2003). Principal findings from these tributaries are summarized as follows:

- Detected pollutants 4,4'-DDE, 4,4'-DDD, 4,4'-DDT and t-DDT exceeded human health standards (based on the consumption of organisms and water) and/or the chronic aquatic life criteria for total-DDTs (i.e., 1 part per trillion) in Elgin, Whitestone (4,4' DDE only), Tonasket, Nine Mile, Antoine, Mosquito, and Loup-Loup creeks.
- Detectable DDT forms or "moieties" (e.g., 4,4'-DDE and t-DDT) were measured in Bonaparte, Salmon, Siwash, and Aeneas creeks, but health standards were not exceeded.
- DDT and its metabolites were not measurable in Tunk, Wannucut, Chewiliken and Johnson Creeks
- Tallant Creek, which was placed on the 303(d) list because of 1995 samples that contained levels of DDT and/or its metabolites above chronic toxicity criteria (Johnson et al. 1997), was not sampled due to lack of flow.

## INTERPRETING TABLES 5.2-1 TO 5.2-7

Tables 5.2-1 to 5.2-7 summarize the proportion of surface water samples that failed to meet the Washington State Class A or AA water quality criteria outlined above in Tables 5.1-1 to 5.1-3. The values represented in Tables 5.2-1 to 5.2-7 represent the percent of samples of the total number analyzed that exceeded (i.e., did not meet) the numeric water quality standard for that parameter. Tables 5.2-1 to 5.2-7 are separated by sub-basin and table cells are shaded lightly if between 10 and 20 percent of the samples collected did not meet the applicable water quality standard for that parameter, darkly if greater than 20 percent of the samples did not meet the standard, or not at all if less than 10 and greater than zero percent of the samples exceeded the standard. If no samples exceeded a standard, then the cell in the table would reflect that as a 0.0. If no data were collected for a specific parameter, no percentage could be calculated, and the cell was left blank. For example, Table 5.2-1 shows that 30 percent of the water samples collected from the Okanogan mainstem at Mallott failed to meet the dissolved oxygen standard for Class AA waters, but only 6 percent did not meet the legally applicable Class A standard at this station.

## Table 5.2-1 Proportion of Samples Exceeding Numeric Water Quality Criteria in the Mainstem Okanogan and Similkameen Rivers*

| Stream | Temperature Continuous (A) | Temperature Continuous (A) | Temperature Grab (AA) | Temperature Grab (A) | Turbidity | Dissolved Oxygen (AA) | Dissolved Oxygen (A) | pH | Fecal Coliform (AA) | Fecal Coliform (A) | Arsenic - Acute | Arsenic - Chronic | Cadmium - Acute | Cadmium - Chronic | Chromium - Acute | Chromium - Chronic | Copper - Acute | Copper - Chronic | Lead - Acute | Lead - Chronic | Mercury - Acute | Mercury - Chronic | Selenium - Acute | Selenium - Chronic | Silver - Acute | Zinc - Acute | Zinc - Chronic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Similkameen River | | | 0.18 | 0.12 | 0.01 | 0.14 | 0.00 | 0.05 | 0.02 | 0.01 | | | | | | | | | | | | | | | | | |
| Okanogan River at Oroville | | | 0.33 | 0.27 | 0.00 | 0.30 | 0.06 | 0.10 | 0.01 | 0.00 | | | | | | | | | | | | | | | | | |
| Okanogan River at Malott | | | 0.26 | 0.19 | 0.02 | 0.28 | 0.05 | 0.04 | 0.19 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 |

x > 0.20
0.10 > x > 0.20
x < 0.10

1 Okanogan Conservation District
2 Colville Tribe
D Detection Limit Higher Than Water Quality Standard

* Black shading indicates that greater than 20 percent of the samples exceeded numeric criteria while gray shading indicates between 10 and 20 percent of the samples exceeded criteria. Calculated proportions are listed in the table.

## Table 5.2-3: Proportion of Samples Exceeding Numeric Water Quality Criteria in the Joseph Subbasin*

| Stream | Temperature Continuous (A) | Temperature Continuous (A) | Temperature Grab (AA) | Temperature Grab (A) | Turbidity | Dissolved Oxygen (AA) | Dissolved Oxygen (A) | pH | Fecal Coliform (AA) | Fecal Coliform (A) | Arsenic - Acute | Arsenic - Chronic | Cadmium - Acute | Cadmium - Chronic | Chromium - Acute | Chromium - Chronic | Copper - Acute | Copper - Chronic | Lead - Acute | Lead - Chronic | Mercury - Acute | Mercury - Chronic | Selenium - Acute | Selenium - Chronic | Silver - Acute | Zinc - Acute | Zinc - Chronic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper Chiliwist Creek | | | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | | | | | | | | | | | | | | | | | | | | |
| Lower Chiliwist Creek | 0.18 | 0.07 | 0.00 | 0.00 | 0.03 | 0.03 | 0.00 | | | | | | | | | | | | | | | | | | | | |

x > 0.20
0.10 > x > 0.20
x < 0.10

1 Okanogan Conservation District
2 Colville Tribe
D Detection Limit Higher Than Water Quality Standard

* Black shading indicates that greater than 20 percent of the samples exceeded numeric criteria while gray shading indicates between 10 and 20 percent of the samples exceeded criteria. Calculated proportions are listed in the table.

## Table 5.2-4: Proportion of Samples Exceeding Numeric Water Quality Criteria in the Omak Subbasin*

| Stream | Temperature Continuous (A) | Temperature Continuous (A) | Temperature Grab (AA) | Temperature Grab (A) | Turbidity | Dissolved Oxygen (AA) | Dissolved Oxygen (A) | pH | Fecal Coliform (AA) | Fecal Coliform (A) | Arsenic - Acute | Arsenic - Chronic | Cadmium - Acute | Cadmium - Chronic | Chromium - Acute | Chromium - Chronic | Copper - Acute | Copper - Chronic | Lead - Acute | Lead - Chronic | Mercury - Acute | Mercury - Chronic | Selenium - Acute | Selenium - Chronic | Silver - Acute | Zinc - Acute | Zinc - Chronic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trail Creek TRA33A | | | 0.01 | 0.00 | 0.03 | 0.10 | 0.00 | 0.04 | | | | | | | | | | | | | | | | | | | |
| Omak Creek OMK026 | | | 0.02 | 0.00 | 0.07 | 0.33 | 0.05 | 0.03 | | | | | | | | | | | | | | | | | | | |
| Omak Creek OMK32A | | | 0.08 | 0.02 | 0.03 | 0.33 | 0.05 | 0.00 | 0.00 | | | | | | | | | | | | | | | | | | |
| Stapaloop Creek SAP15A | | | 0.06 | 0.02 | 0.01 | 0.16 | 0.04 | 0.03 | | | | | | | | | | | | | | | | | | | |
| Omak Creek OMK013 | | | 0.12 | 0.05 | 0.08 | 0.29 | 0.00 | 0.00 | 0.00 | | | | | | | | | | | | | | | | | | |
| Omak Creek OMKF12 | | | 0.14 | 0.08 | 0.12 | 0.25 | 0.01 | 0.01 | 0.00 | | | | | | | | | | | | | | | | | | |
| Omak Creek OMK009 | | | 0.28 | 0.18 | 0.12 | 0.29 | 0.03 | 0.02 | 0.00 | | | | | | | | | | | | | | | | | | |
| Mill Creek MIL008 | | | 0.15 | 0.07 | 0.03 | 0.15 | 0.07 | 0.00 | | | | | | | | | | | | | | | | | | | |
| Wanacut Creek WANF10 | | | 0.25 | 0.18 | 0.06 | 0.21 | 0.04 | 0.05 | | | | | | | | | | | | | | | | | | | |
| Upper Tunk Creek1 | 0.32 | 0.19 | 0.06 | 0.00 | 0.00 | 0.14 | 0.03 | 0.31 | 0.56 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.14 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 0.00 | D | 0.00 | 0.00 |
| Lower Tunk Creek1 | 0.24 | 0.07 | 0.00 | 0.00 | 0.00 | 0.17 | 0.03 | 0.25 | 0.56 | 0.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | D | 0.00 | 0.00 |
| Lower Tunk Creek (395)2 | | | 0.37 | 0.11 | 0.11 | 0.58 | 0.42 | 0.16 | | | | | | | | | | | | | | | | | | | |

x > 0.20
0.10 > x > 0.20
x < 0.10

1 Okanogan Conservation District
2 Colville Tribe
D Detection Limit Higher Than Water Quality Standard

* Black shading indicates that greater than 20 percent of the samples exceeded numeric criteria while gray shading indicates between 10 and 20 percent of the samples exceeded criteria. Calculated proportions are listed in the table.

## Table 5.2-5 Proportion of Samples Exceeding Numeric Water Quality Criteria in the Salmon Subbasin*

| Stream | Temperature Continuous (AA | Temperature Continuous (A) | Temperature Grab (AA) | Temperature Grab (A) | Turbidity | Dissolved Oxygen (AA) | Dissolved Oxygen (A) | pH | Fecal Coliform (AA) | Fecal Coliform (A) | Arsenic - Acute | Arsenic - Chronic | Cadmium - Acute | Cadmium - Chronic | Chromium - Acute | Chromium - Chronic | Copper - Acute | Copper - Chronic | Lead - Acute | Lead - Chronic | Mercury - Acute | Mercury - Chronic | Selenium - Acute | Selenium - Chronic | Silver - Acute | Zinc - Acute | Zinc - Chrnic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper Loup Loup Creek1 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.17 | 0.03 | 0.00 | | | | | | | | | | | | | | | | | | | |
| Middle Loup Loup Creek (208)2 | | | 0.00 | 0.00 | 0.25 | 0.67 | 0.58 | 0.00 | | | | | | | | | | | | | | | | | | | |
| Lower Loup Loup Creek1 | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.25 | | | | | | | | | | | | | | | | | | | |
| Upper Tallant Creek1 | 0.41 | 0.28 | 0.19 | 0.08 | 0.00 | 0.18 | 0.00 | 0.29 | | | | | | | | | | | | | | | | | | | |
| Lower Tallant Creek1 | 0.35 | 0.14 | 0.20 | 0.00 | 0.00 | 0.20 | 0.00 | 0.80 | | | | | | | | | | | | | | | | | | | |
| Upper Salmon Creek (552)2 | | | 0.73 | 0.45 | 0.00 | 0.91 | 0.91 | 0.36 | | | | | | | | | | | | | | | | | | | |
| Upper-Middle Salmon Creek (376)2 | | | 0.57 | 0.29 | 0.00 | 1.00 | 1.00 | 0.29 | | | | | | | | | | | | | | | | | | | |
| Lower-Middle Salmon Creek (360)2 | | | 0.30 | 0.20 | 0.00 | 1.00 | 1.00 | 0.10 | | | | | | | | | | | | | | | | | | | |
| Lower Salmon Creek (36)2 | | | 0.50 | 0.13 | 0.00 | 1.00 | 0.88 | 0.13 | | | | | | | | | | | | | | | | | | | |
| Upper Johnson Creek | 0.50 | 0.26 | 0.06 | 0.00 | 0.00 | 0.06 | 0.00 | 0.14 | | | | | | | | | | | | | | | | | | | |
| Lower Johnson Creek | | | 0.11 | 0.07 | 0.00 | 0.15 | 0.04 | 0.41 | | | | | | | | | | | | | | | | | | | |

x > 0.20
0.10 > x > 0.20
x < 0.10

1 Okanogan Conservation District
2 Colville Tribe
D Detection Limit Higher Than Water Quality Standard

* Black shading indicates that greater than 20 percent of the samples exceeded numeric criteria while gray shading indicates between 10 and 20 percent of the samples exceeded criteria. Calculated proportions are listed in the table.

## Table 5.2-6: Proportion of Samples Exceeding Numeric Water Quality Criteria in the Osooyos Subbasin*

| Stream | Temperature Continuous (A/ | Temperature Continuous (A) | Temperature Grab (AA) | Temperature Grab (A) | Turbidity | Dissolved Oxygen (AA) | Dissolved Oxygen (A) | pH | Fecal Coliform (AA) | Fecal Coliform (A) | Arsenic - Acute | Arsenic - Chronic | Cadmium - Acute | Cadmium - Chronic | Chromium - Acute | Chromium - Chronic | Copper - Acute | Copper - Chronic | Lead - Acute | Lead - Chronic | Mercury - Acute | Mercury - Chronic | Selenium - Acute | Selenium - Chronic | Silver - Acute | Zinc - Acute | Zinc - Chronic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bonaparte Creek Upper K1 | 0.13 | 0.05 | 0.00 | 0.00 | 0.07 | 0.07 | 0.22 | 0.07 | 0.62 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | D | 0.00 | 0.00 | 0.00 |
| Bonaparte Creek #1 | | | | | | | | | 0.38 | 0.15 | | | | | | | | | | | | | | | | | |
| Bonaparte Creek #2 | | | | | | | | | 0.38 | 0.31 | | | | | | | | | | | | | | | | | |
| Bonaparte Creek Upper Reach1 | 0.28 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.30 | 0.48 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | D | 0.00 | 0.00 | 0.00 |
| Bonaparte Creek #3 | | | | | | | | | 0.69 | 0.62 | | | | | | | | | | | | | | | | | |
| Bonaparte Creek #4 | | | | | | | | | 0.85 | 0.62 | | | | | | | | | | | | | | | | | |
| Bonaparte Creek #5 | | | | | | | | | 0.92 | 0.62 | | | | | | | | | | | | | | | | | |
| Bonaparte Creek Lower Reach2 | | | 0.37 | 0.16 | 0.16 | 0.74 | 0.58 | 0.79 | | | | | | | | | | | | | | | | | | | |
| Bonaparte Creek Lower Reach1 | 0.49 | 0.34 | 0.11 | 0.08 | 0.06 | 0.14 | 0.03 | 0.43 | 0.50 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | D | 0.00 | 0.00 | 0.00 |
| Upper Siwash Creek1 | 0.07 | 0.01 | 0.00 | 0.00 | 0.00 | 0.09 | 0.03 | 0.17 | | | | | | | | | | | | | | | | | | | |
| Middle Siwash Creek2 | | | 0.12 | 0.00 | 0.12 | 0.94 | 0.65 | 0.16 | | | | | | | | | | | | | | | | | | | |
| Lower Siwash Creek1 | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | | | | | | | | | | | | | | | | | | | |
| Upper Antoine Creek1 | | | 0.50 | 0.25 | 0.00 | 0.75 | 0.25 | 0.25 | | | | | | | | | | | | | | | | | | | |
| Lower Antoine Creek2 | | | 0.47 | 0.13 | 0.20 | 0.87 | 0.60 | 0.13 | | | | | | | | | | | | | | | | | | | |
| Lower Antoine Creek1 | 0.41 | 0.20 | 0.03 | 0.00 | 0.03 | 0.19 | 0.00 | 0.42 | | | | | | | | | | | | | | | | | | | |
| Upper Tonasket Creek1 | | | 0.10 | 0.00 | 0.07 | 0.17 | 0.13 | 0.27 | | | | | | | | | | | | | | | | | | | |
| Middle Tonasket Creek2 | | | 0.62 | 0.54 | 0.15 | 0.85 | 0.69 | 0.54 | | | | | | | | | | | | | | | | | | | |
| Lower Tonasket Creek2 | | | 0.83 | 0.50 | 0.00 | 0.50 | 0.33 | 1.00 | | | | | | | | | | | | | | | | | | | |
| Lower Tonasket Creek1 | | | 0.09 | 0.00 | 0.17 | 0.13 | 0.04 | 0.35 | | | | | | | | | | | | | | | | | | | |
| Upper Ninemile Creek1 | 0.20 | 0.12 | 0.00 | 0.00 | 0.04 | 0.29 | 0.00 | 0.36 | | | | | | | | | | | | | | | | | | | |
| Upper Ninemile Creek2 | | | 0.14 | 0.00 | 0.07 | 0.71 | 0.57 | 0.29 | | | | | | | | | | | | | | | | | | | |
| Lower Ninemile Creek1 | 0.22 | 0.07 | 0.00 | 0.00 | 0.00 | 0.17 | 0.03 | 0.34 | | | | | | | | | | | | | | | | | | | |
| Lower Ninemile Creek2 | | | 0.24 | 0.00 | 0.12 | 0.82 | 0.71 | 0.12 | | | | | | | | | | | | | | | | | | | |

x > 0.20
0.10 > x > 0.20
x < 0.10

1 Okanogan Conservation District
2 Colville Tribe
D Detection Limit Higher Than Water Quality Standard

* Black shading indicates that greater than 20 percent of the samples exceeded numeric criteria while gray shading indicates between 10 and 20 percent of the samples exceeded criteria. Calculated proportions are listed in the table.

## Table 5.2-7: Proportion of Samples Exceeding Numeric Water Quality Criteria in the Sinlahekin Subbasin*

| Stream | Temperature Continuous (A) | Temperature Continuous (A) | Temperature Grab (AA) | Temperature Grab (A) | Turbidity | Dissolved Oxygen (AA) | Dissolved Oxygen (A) | pH | Fecal Coliform (AA) | Fecal Coliform (A) | Arsenic - Acute | Arsenic - Chronic | Cadmium - Acute | Cadmium - Chronic | Chromium - Acute | Chromium - Chronic | Copper - Acute | Copper - Chronic | Lead - Acute | Lead - Chronic | Mercury - Acute | Mercury - Chronic | Selenium - Acute | Selenium - Chronic | Silver - Acute | Zinc - Acute | Zinc - Chronic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper Sinlahekin Creek | 0.58 | 0.53 | 0.08 | 0.00 | 0.00 | 0.33 | 0.03 | 0.00 | 0.19 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | D | 0.00 | 0.00 |
| Lower Sinlahekin Creek | 0.48 | 0.41 | 0.19 | 0.17 | 0.00 | 0.33 | 0.06 | 0.03 | 0.78 | 0.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | D | 0.00 | 0.00 |

x > 0.20
0.10 > x > 0.20
x < 0.10

1 Okanogan Conservation District
2 Colville Tribe
D Detection Limit Higher Than Water Quality Standard

* Black shading indicates that greater than 20 percent of the samples exceeded numeric criteria while gray shading indicates between 10 and 20 percent of the samples exceeded criteria. Calculated proportions are listed in the table.

# Chapter 6.0: Aquatic Habitat Assessment

Habitat may be generally defined as the place occupied by an organism, population, or community. It is the *niche*, the physical part of the community structure in which an organism finds its home, and includes the sum total of all the environmental conditions present in the specific place occupied by an organism. Habitat is the physical template upon which communities express themselves. The distribution of species and biological communities across the landscape is a direct response to the distribution of habitat types.

Previous efforts to assess aquatic habitat in the Okanogan basin, notably ((e.g., ENTRIX and Golder 2001, NWPPC 2004), relied largely on site specific knowledge and expert opinion to describe habitat quality. However, quantitative data characterizing habitat types, using standardized repeatable methods, exist for only a limited number of sites. In recent years, great progress has been made in characterizing certain elements of habitat (i.e., water quantity, water quality) and these data are described in greater detail in other sections of this document. Other important elements of habitat such as stream bed configuration, substrate characteristics, bank characteristics, hydraulic properties, channel geometry, etc. remain uncharacterized throughout the basin. The first objective of the Aquatic Habitat Assessment provided in this section was to provide a comprehensive representation of the type, proportion, and distribution of channel types, and thus habitats, in the Okanogan basin. The structure and variability of stream channel habitat is predominantly a function of channel slope (gradient), which is largely determined by topography (Montgomery 1999). Therefore, it was possible to broadly classify the types of stream habitat that might occur at a given location using maps of the stream channel location and widely available elevation models that portray basin topography. These methods are described in greater detail in Appendix E.

A second objective of the Aquatic Habitat Assessment was to summarize newly acquired information on site specific locations and provide an assessment of the relative quality of the habitat. In the summer of 2004, the CCT began collecting information on physical habitat conditions in the mainstem Okanogan River, the Similkameen River, and various subbasin tributaries as part of a long term status and trend monitoring program known as Okanogan Baseline Monitoring and Evaluation Program (OBMEP). Figure 6.1-1 reflects these habitat sampling locations. The objective of this program is to collect the required information necessary to adaptively manage aquatic resources in the Okanogan Basin and this program is based on the EPA Environmental Monitoring and Assessment Program (EMAP). Information collected by the Colville Tribe includes data characterizing channel dimensions (e.g., wetted width, bankful width, etc.), habitat type (e.g., glides, riffles, pools, etc.), substrate (e.g., bedrock, boulder, cobble, gravel, etc.), riparian vegetation, and wood loading.

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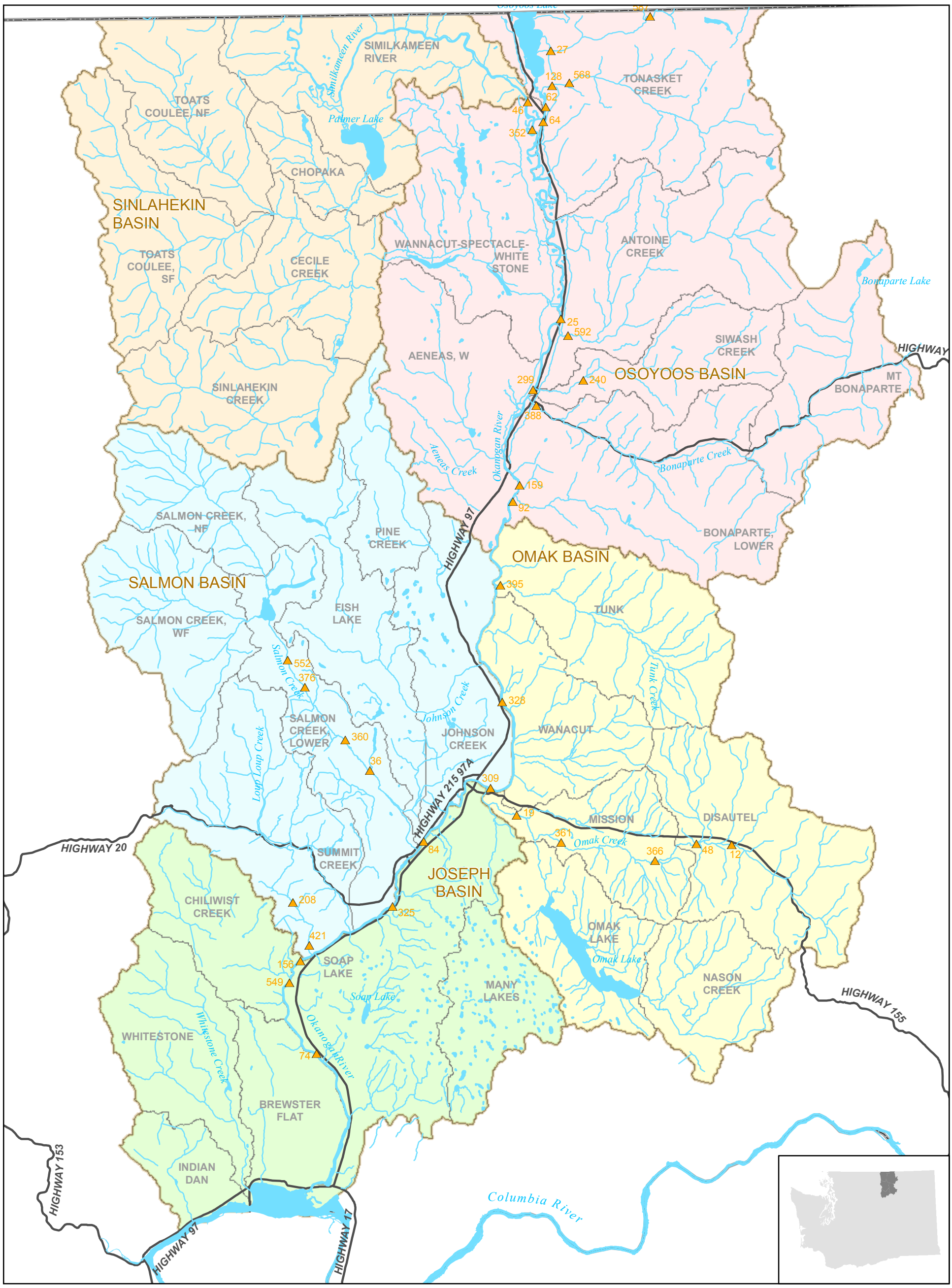
# WRIA 49 - Habitat Sampling Location




Okanogan County
Highway
Basin Boundary
WAU Boundary
Habitat Sampling Location (Colville Tribe)

N

5 2.5 0 5 10 Miles

Stateplane 4601 NAD27 Feet

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While these data were not collected for use in this Level 1 assessment, and were therefore not in a form readily interpretable through habitat criteria such as those provided in Attachment 3, it was possible to use some of the information collected by the Colville Tribe to develop a rudimentary understanding of the quality of stream and riparian habitat conditions at specific locations within the Okanogan basin. That information is reflected in the following text, and in the maps Further analysis of these data, unavailable until late in the Level 1 assessment process, is recommended under Level 2.

## 6.1 MAINSTEM STREAM CHANNEL ASSESSMENT

Approximately 99 percent of the mainstem Okanogan and Similkameen River can be classified as low-gradient valley or pool-riffle reaches (Table 6.1-1, see also Attachment 2 — Map Atlas, Gradient and Channel Characteristics). These gently sloping stream channels are punctuated at intervals by relatively high gradient reaches. Cascades were the next most abundant reach type. More than half of the pool riffle reaches are located in the Similkameen River (eleven miles). The mainstem Okanogan and Similkameen Rivers, within the United States, are heavily utilized by steelhead trout for spawning. Roughly 75 percent of the observed redds (gravel “nests” where salmon deposit their eggs during spawning) have been recorded in one of these two waterbodies (Arterburn et al. 2005). Of the spawning that occurs in the mainsteam rivers, redd densities are highest near the confluence of the Similkameen and Okanogan Rivers. While spawning occurs throughout the mainstem Okanogan, redds appear to be concentrated in areas immediately downstream of mainstem-tributary confluences (e.g., Omak Creek, Tunk Creek, and Bonaparte Creek). The role that tributaries may play in maintaining mainstem spawning habitat, either through transport and deposition of sediment or altered hydraulic properties is as topic that merits further investigation.

**Table 6.1-1: Proportion of Stream Length Classified by Reach Type, Mainstem Okanogan and Similkameen Rivers**

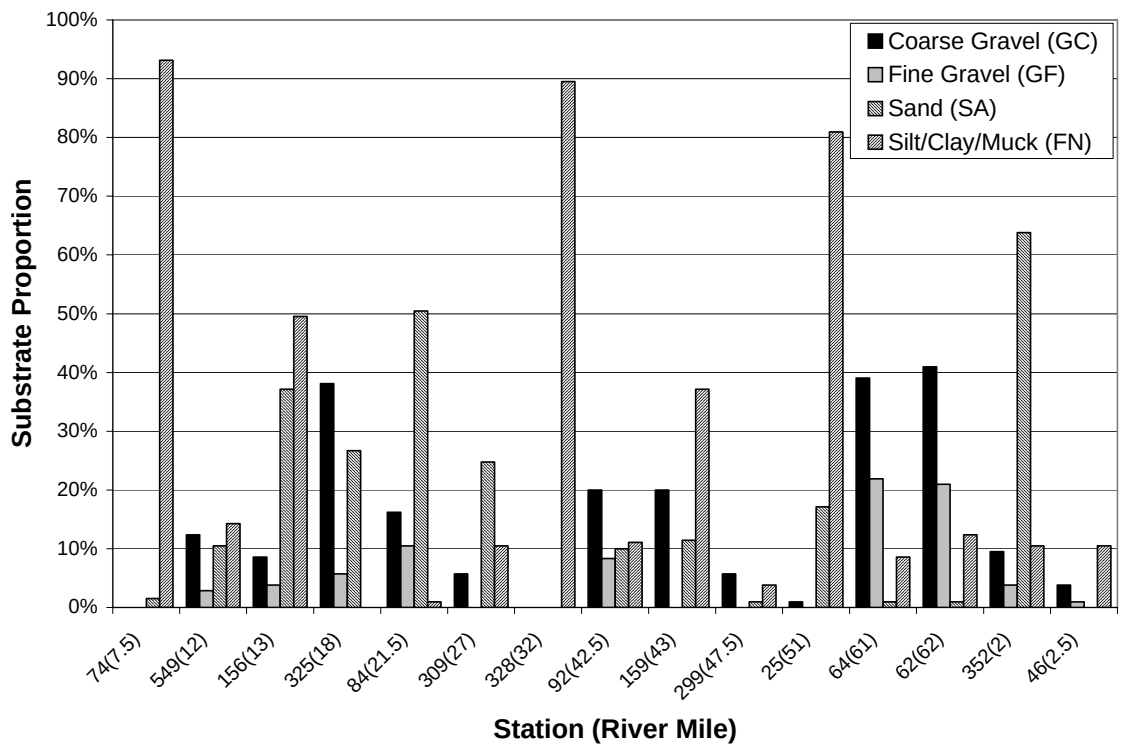
| SUBBASIN NAME | REACH TYPE | LENGTH (MILES) | PERCENT OF TOTAL |
|---|---|---|---|
| Mainstem | Low-gradient valley | 88.45 | 81% |
| Mainstem | Pool-riffle | 20.02 | 18% |
| Mainstem | Plane_bed | 0.31 | 0% |
| Mainstem | Step_pool | 0.35 | 0% |
| Mainstem | Cascade | 0.64 | 1% |
| | Total | 109.77 | |

## 6.2 SITE SPECIFIC HABITAT ASSESSMENT– MAINSTEM

As depicted earlier in Figure 6.1-1, the Colville Tribe sampled site specific habitat conditions at thirteen locations on the Okanogan River (Stations 74, 549, 156, 325, 84, 309, 328, 92, 159, 299, 25, 64, and 62) and two locations on the Similkameen River

(Stations 46 and 352) (please refer to Attachment 2 — Map Atlas Gradient and Channel Characteristics). Fine sediments comprised a relatively large proportion of the substrate types at all of the mainstem study locations (Figure 6.2-1). This is typical of large low-gradient rivers. In all but four of the sites (299, 64, 62 and 46), fine sediments comprised more than 20 percent of the substrate. In five of the survey reaches, fine sediments comprised more than 70 percent of the total substrate (74, 156, 328, 25, and 352). Fine and coarse gravel were relatively abundant and comprise more than 40 percent of the total substrate at stations 325, 64, and 62. Between 20 and 30 percent of the substrate was comprised of gravel at stations 159, 92, and 84. Stations 64 and 62 appear to be heavily utilized by steelhead trout for spawning (Colville Tribe 2005) while stations 84, 325, 159, and 92 are used less intensively. Although gravel comprised only five percent of the total substrate at station 46 on the Similkameen River, this reach is intensively used for steelhead trout spawning.

**Figure 6.2-1: Proportion of Substrates Smaller than 65 mm at Sample Locations in the Mainstem Okanogan and Similkameen Rivers**




Wood loading was ranked as poor for all mainstem study reaches (Table 6.2-1). However, it should be noted that while the evaluation criteria used in this assessment have been applied to Eastern Washington streams, as originally used in the Okanogan LFA (ENTRIX and Golder 2001) they were originally developed for small streams (<15 m in width) in western Washington. However, the evaluation criteria do not consider ecoregional differences in riparian stand density or in potential tree size, both of which

are important factors in determining whether wood pieces delivered to the stream influence channel morphology. As such, the criteria may be overly conservative and suggest that "poor" conditions exist in circumstances where wood loading is appropriate. The structure of eastside riparian forests under natural conditions have not been systematically characterized in the same manner as riparian forests in western Washington (Collins and Montgomery 2002, Collins et. al. 2003) and is an information gap that could be addressed in future studies. Another information gap for eastern Washington streams in the role of wood in larger low-gradient streams. Contrary to conventional wisdom, large wood pieces can, and do, affect channel morphology through the formation of floodplain islands, wood jams and rafts, and channel avulsion (Fetherston 1995, Abbe and Montgomery 2003) and thus play a critical role in structuring aquatic habitats.

**Table 6.2-1 Large Woody Debris Loading at Sample Locations in the Mainstem Okanogan and Similkameen Rivers**

| SUBBASIN | STREAM | STATION ID (RM) | TOTAL REACH LENGTH (M) | LWD COUNT | LWD PIECES / METER | RATING |
|---|---|---|---|---|---|---|
| Mainstem | Okanogan River | 74 (7.5) | 630 | 92.0 | 0.1 | Poor |
| Mainstem | Okanogan River | 549 (12) | 500 | 161.0 | 0.3 | Poor |
| Mainstem | Okanogan River | 156 (13) | 500 | 39.0 | 0.1 | Poor |
| Mainstem | Okanogan River | 325 (18) | 500 | 136.0 | 0.3 | Poor |
| Mainstem | Okanogan River | 84 (21.5) | 500 | 114.0 | 0.2 | Poor |
| Mainstem | Okanogan River | 309 (27) | 500 | 53.0 | 0.1 | Poor |
| Mainstem | Okanogan River | 328 (32) | 500 | 54.0 | 0.1 | Poor |
| Mainstem | Okanogan River | 92 (42.5) | 860 | 64.0 | 0.1 | Poor |
| Mainstem | Okanogan River | 159 (43) | 500 | 55.0 | 0.1 | Poor |
| Mainstem | Okanogan River | 299 (47.5) | 500 | 29.0 | 0.1 | Poor |
| Mainstem | Okanogan River | 25 (51) | 500 | 165.0 | 0.3 | Poor |
| Mainstem | Okanogan River | 64 (61) | 500 | 41.0 | 0.1 | Poor |
| Mainstem | Okanogan River | 62 (62) | 500 | 81.0 | 0.2 | Poor |
| Mainstem | Similkameen River | 352 (2) | 500 | 76.0 | 0.2 | Poor |
| Mainstem | Similkameen River | 46 (2.5) | 500 | 36.0 | 0.1 | Poor |

The percentage of surface area comprised of pool habitat at the mainstem study reaches sampled ranged between 42 and 100 percent (Table 6.2-2). One of the sites ranked as "fair" is intensively used for spawning by steelhead trout (Colville Tribe 2005). Seven of the study reaches lacked riffles altogether.

**Table 6.2-2 Pool Characteristics at Sample Stations in the Omak Creek Subbasin**

| SUBBASIN | STREAM | STATION ID (RM) | POOL SURFACE AREA RATING | TOTAL POOLS | TOTAL RIFFLES | WETTED WIDTH AVERAGE (M) | POOL RIFFLE RATIO |
|---|---|---|---|---|---|---|---|
| Mainstem | Okanogan River | 74 (7.5) | Good | 100% | 0% | 100 | NR |
| Mainstem | Okanogan River | 549 (12) | Good | 100% | 0% | 81 | NR |
| Mainstem | Okanogan River | 156 (13) | Good | 100% | 0% | 102 | NR |
| Mainstem | Okanogan River | 325 (18) | Good | 70% | 29% | 68 | 2.4 |
| Mainstem | Okanogan River | 84 (21.5) | Good | 100% | 0% | 83 | NR |
| Mainstem | Okanogan River | 309 (27) | Fair | 49% | 51% | 93 | 0.9 |
| Mainstem | Okanogan River | 328 (32) | Good | 93% | 7% | 89 | 13.4 |
| Mainstem | Okanogan River | 92 (42.5) | Fair | 42% | 63% | 66 | 0.7 |
| Mainstem | Okanogan River | 159( 43) | Good | 85% | 15% | 55 | 5.7 |
| Mainstem | Okanogan River | 299 (47.5) | Good | 56% | 44% | 55 | 1.3 |
| Mainstem | Okanogan River | 25 (51) | Good | 100% | 0% | 79 | NR |
| Mainstem | Okanogan River | 64 (61) | Good | 75% | 25% | 36 | 3.0 |
| Mainstem | Okanogan River | 62 (62) | Fair | 49% | 48% | 49 | 1.0 |
| Mainstem | Similkameen River | 352 (2) | Good | 100% | 0% | 70 | NR |
| Mainstem | Similkameen River | 46 (2.5) | Good | 100% | 0% | 55 | NR |

NR = not reported

### 6.2.1 Joseph Subbasin Habitat

#### SUBBASIN WIDE STREAM CHANNEL ASSESSMENT

Stream channel habitat in the Joseph Subbasin totaled approximately 220 miles in length (Table 6.2-3). Many of the streams drain to terminal basins and do not connect to the mainstem Okanogan River (See Attachment 2, Map Atlas — Joseph Basin). The

composition of habitat types was dominated by reaches with gradients greater than two percent.

**Table 6.2-3: Proportion of Stream Length Classified by Reach Type, Joseph Subbasin**

| SUBBASIN NAME | REACH TYPE | LENGTH (MILES) | PERCENT OF TOTAL |
|---|---|---|---|
| JOSEPH | Low-gradient valley | 8.36 | 4% |
| JOSEPH | Pool-riffle | 40.72 | 19% |
| JOSEPH | Plane_bed | 54.00 | 25% |
| JOSEPH | Step_pool | 65.73 | 30% |
| JOSEPH | Cascade | 50.69 | 23% |
| | | 219.50 | |

### SITE SPECIFIC HABITAT ASSESSMENTS

Very little is known about stream habitat in this subbasin and no systematic survey of aquatic habitat has been conducted. However, water quality was sampled in Chiliwist Creek by the Okanogan Conservation District and numeric water quality exceedances were infrequent at both stations although flow was often absent at the upper sampling site. Steelhead smolts have been observed in the lower reach (ENTRIX and Golder 2001) and further investigation of habitat conditions is warranted to determine the relative value of this creek for fisheries resources.

## 6.2.2 Omak Subbasin

### SUBBASIN WIDE STREAM CHANNEL ASSESSMENT

The Omak Subbasin contains the most stream miles of the five subbasins in the Okanogan watershed. As depicted in Table 6.2-4, more than 70 percent of the total stream length in the Omak Creek subbasin was classified as step-pool or cascade (see also Attachment 2 — Map Atlas Gradient and Channel Characteristics). Omak Creek is the largest catchment in the Omak Subbasin and the mainstem Omak is predominately classified as a pool-riffle reach although higher gradient sections occur sporadically along its length. The reach of Tunk Creek downstream of McAllister Falls (approximately three quarters to one mile from the Okanogan confluence) is apparently used by steelhead trout but chinook and sockeye salmon are not known to occur in this waterbody (ENTRIX and Golder 2001).

Most reaches in Tunk Creek upstream of the falls, were classified as plane-bed although some sections had slopes (gradients) characteristic of pool-riffle reaches. The lower portion of Wannacut Creek has slopes that generally yield characteristic of pool-riffle reaches that have been found to be accessible to anadromous salmonids in other systems. Culverts are present in some reaches of Wannacut Creek (ENTRIX 2001) but it isn't clear where they occur in relation to this reach. Brook trout, an introduced

species, are the only fish species recorded in Wannacut Creek, both currently and historically (CCT 1997) although rainbow trout may occur in the upper reaches. The stream is not currently stocked, but the presence of brook trout suggests that it was stocked in the past.

**Table 6.2-4: Proportion of Stream Length Classified by Reach Type, Omak Subbasin**

| SUBBASIN NAME | REACH TYPE | LENGTH (MILES) | PERCENT OF TOTAL |
|---|---|---|---|
| OMAK | Low-gradient valley | 11.77 | 3% |
| OMAK | Pool-riffle | 42.51 | 9% |
| OMAK | Plane_bed | 76.40 | 17% |
| OMAK | Step_pool | 135.83 | 30% |
| OMAK | Cascade | 190.21 | 42% |
| | | 456.71 | |

## SITE SPECIFIC HABITAT ASSESSMENTS

The Colville Tribe sampled site specific habitat conditions at five locations on Omak Creek (Stations 19, 361, 366, 48, and 12) and one location on Tunk Creek (Station 395) (please refer to Attachment 2 — Map Atlas Gradient and Channel Characteristics). Substrates at stations in the lower portion of Omak Creek (19, 36, and 366) were comprised primarily of coarse substrates greater than 65 mm in diameter (Figure 6.2-2). The absence of small diameter substrates at station 19 is somewhat surprising given the lower position in the drainage basin and the fact that this portion of the channel was classified as a pool-riffle reach type. Stations 361 and 366 both appear to be to be in higher gradient (higher energy) reaches. Gravel was relatively scarce and fine sediments comprised no more than 34 percent of the total substrate. For the uppermost stations, fine sediments comprised between 71 and 81 percent of the total substrate while gravel comprised between seven and eleven percent. Thus substrates larger than 65 mm were virtually absent at these sites. The Tunk Creek station is located near the confluence with the Okanogan River and approximately 64 percent of the substrates were comprised of particles less than 65 mm in diameter with 33 percent comprised of fine sediments. Coarse gravel (12-65 mm) accounted for approximately 31 percent of the substrate area and fine gravel was absent.

Large woody debris was rated as “poor” (< 0.4 pieces/meter) at stations 19, 361, and 12 on Omak Creek and station 395 on Tunk Creek while stations 366 and 48 on Omak Creek were rated as “good” (Table 6.2-5). Despite the relative abundance of wood pieces at station 366 and the increased channel roughness (resistance to flow and sediment movement such that pools may form) that wood pieces would provide, fine sediments were not abundant.

**Figure 6.2-2: Proportion of Substrates smaller than 65 mm at Sample locations in Omak Creek**

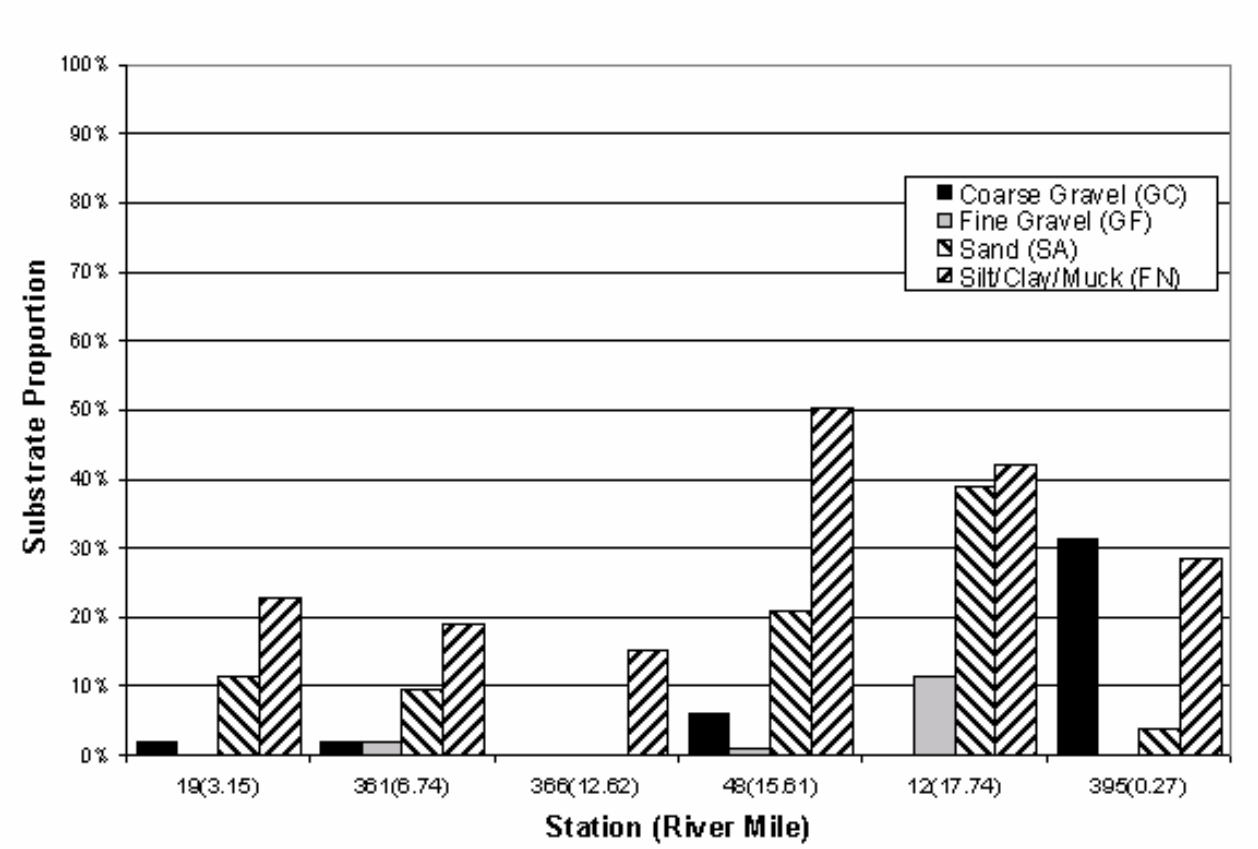



**Table 6.2-5: Large Woody Debris Loading at Sample Stations in the Omak Creek Subbasin**

| SUBBASIN | STREAM | STATION ID (RM) | TOTAL REACH LENGTH (M) | LWD COUNT | LWD PIECES / METER | RATING |
|---|---|---|---|---|---|---|
| Omak | Omak Creek | 19 (3.15) | 150 | 36.0 | 0.2 | Poor |
| Omak | Omak Creek | 361 (6.74) | 208 | 48.0 | 0.2 | Poor |
| Omak | Omak Creek | 366 (12.62) | 170 | 97.0 | 0.6 | Good |
| Omak | Omak Creek | 48 (15.61) | 160 | 166.0 | 1.0 | Good |
| Omak | Omak Creek | 12 (17.74) | 150 | 14.0 | 0.1 | Poor |
| Omak | Tunk Creek | 395 (0.27) | 90 | 18.0 | 0.2 | Poor |

**Table 6.2-6: Pool Characteristics at Sample Stations in the Omak Creek Subbasin**

| SUBBASIN | STREAM | STATION ID (RM) | POOL SURFACE AREA RATING | TOTAL POOLS | TOTAL RIFFLES | WETTED WIDTH AVERAGE (M) | POOL RIFFLE RATIO |
|---|---|---|---|---|---|---|---|
| Omak | Omak Creek | 19 (3.15) | Poor | 20% | 79% | 5 | 0.3 |
| Omak | Omak Creek | 361 (6.74) | Poor | 0% | 100% | 7 | 0.0 |
| Omak | Omak Creek | 366 (12.62) | Poor | 11% | 89% | 5 | 0.1 |
| Omak | Omak Creek | 48 (15.61) | Good | 66% | 34% | 6 | 1.9 |
| Omak | Omak Creek | 12 (17.74) | Poor | 2% | 98% | 4 | 0.0 |
| Omak | Tunk Creek | 395 (0.27) | Poor | 12% | 0% | 0 | NR |

NR = not reported

### 6.2.3 Salmon Subbasin

#### SUBBASIN-WIDE STREAM CHANNEL ASSESSMENT

The Salmon Creek Subbasin includes one large catchment (Salmon Creek), a number of smaller catchments (e.g., Tallant, Loup Loup, and Johnson Creeks) and terminal basins that do not drain to the mainstem Okanogan River. This subbasin is characterized by fairly steep stream channels, as indicated by the fact that 39 percent of the total channel length has slopes exceeding eight percent (Table 6.2-7). Salmon Creek, Johnson Creek, and Talant Creek all rise steeply away from the confluence with the Okanogan River (please refer to Attachment 2 — Map Atlas Gradient and Channel Characteristics). Salmon Creek and Johnson Creek transition to lower gradient pool-riffle reaches and these mainstem segments account for the majority of the pool-riffle reach type that occurs in the subbasin. Channels in Tallant Creek are greater than 4 percent through most of the basin. The Loup Loup Creek stream channel near the confluence exhibits a gradient characteristic of a pool-riffle channel.

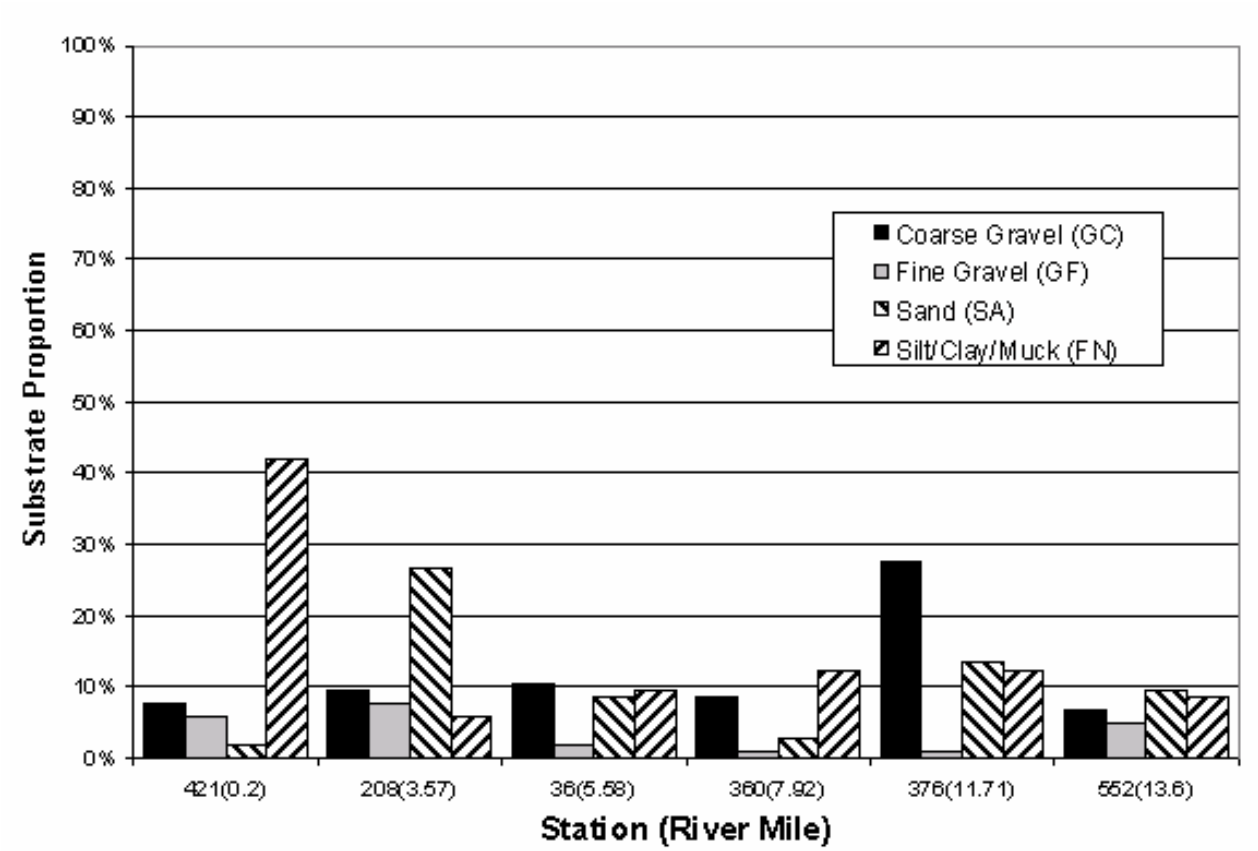
**Table 6.2-7: Proportion of Stream Length Classified by Reach Type, Salmon Subbasin**

| SUBBASIN NAME | REACH TYPE | LENGTH (MILES) | PERCENT OF TOTAL |
|---|---|---|---|
| SALMON | Low-gradient valley | 9.24 | 3% |
| SALMON | Pool-riffle | 61.06 | 18% |
| SALMON | Plane_bed | 51.84 | 15% |
| SALMON | Step_pool | 84.58 | 25% |
| SALMON | Cascade | 132.83 | 39% |
| | | 339.55 | |

## SITE SPECIFIC HABITAT ASSESSMENT

The Colville Tribe characterized habitat conditions at two locations on Loup Loup Creek (Stations 421 and 208), and four locations in Salmon Creek (Stations 36, 360, 376, and 552). At the Loup Loup Creek sites, fine sediments comprised between 33 and 42 percent of the total substrate while gravel comprised less than 20 percent of the substrate (Figure 6.2-3). Sediment particles less than 65 mm in diameter at the Salmon Creek locations comprised between 25 and 54 percent of the total substrate with fine sediments accounting for between 15 and 25 percent of the total. Station 376 contained nearly three times more coarse gravel than any of the other Salmon Creek stations.

**Figure 6.2-3: Proportion of Substrates Smaller than 65 mm at Sample Locations in Salmon Creek**




Between 12 and 122 pieces of wood were observed in Loup Loup Creek and Salmon Creek and the number of pieces per meter ranged between 0.1 and 0.8 (Table 6.2-8). One station in Loup Loup Creek (208) and one station in Salmon Creek (36) exhibited wood loading considered “good”. The remaining study reaches had fewer than 0.4 pieces per meter and were considered “poor”. Pool surface area at station 360 comprised approximately 75 percent of the total surface area and habitat conditions for this indicator were ranked as “good” (Table 6.2-9). Two stations, were ranked as “fair” (36 and 376) and the remainder were categorized as “poor”.

**Table 6.2-8: Large Woody Debris Loading at Sample Stations in the Salmon Creek Subbasin**

| SUBBASIN | STREAM | STATION ID (RM) | TOTAL REACH LENGTH (M) | LWD COUNT | LWD PIECES / METER | RATING |
|---|---|---|---|---|---|---|
| SALMON | Loup Loup Creek | 421 (0.2) | 150 | 23.0 | 0.2 | Poor |
| SALMON | Loup Loup Creek | 208 (3.57) | 150 | 63.0 | 0.4 | Good |
| SALMON | Salmon Creek | 36 (5.58) | 150 | 122.0 | 0.8 | Good |
| SALMON | Salmon Creek | 360 (7.92) | 218 | 75.0 | 0.3 | Poor |
| SALMON | Salmon Creek | 376 (11.71) | 220 | 12.0 | 0.1 | Poor |
| SALMON | Salmon Creek | 552 (13.6) | 208 | 44.0 | 0.2 | Poor |

**Table 6.2-9: Pool Characteristics at Sample Stations in the Salmon Creek Subbasin**

| SUBBASIN | STREAM | STATION ID (RM) | POOL SURFACE AREA RATING | TOTAL POOLS | TOTAL RIFFLES | WETTED WIDTH AVERAGE (M) | POOL RIFFLE RATIO |
|---|---|---|---|---|---|---|---|
| SALMON | Loup Loup Creek | 421 (0.2) | Poor | 0% | 0% | 0 | NR |
| SALMON | Loup Loup Creek | 208 (3.57) | Poor | 22% | 78% | 2 | 0.3 |
| SALMON | Salmon Creek | 36 (5.58) | Fair | 52% | 48% | 5 | 1.1 |
| SALMON | Salmon Creek | 360 (7.92) | Good | 75% | 30% | 7 | 2.5 |
| SALMON | Salmon Creek | 376 (11.71) | Fair | 49% | 51% | 4 | 0.9 |
| SALMON | Salmon Creek | 552 (13.6) | Poor | 40% | 55% | 4 | 0.7 |

### 6.2.4 Osoyoos Subbasin

#### SUBBASIN-WIDE STREAM CHANNEL ASSESSMENT

Streams in the Osoyoos Subbasin total approximately 450 miles in length (Table 6.2-10). Channels with slopes less than 0.1 percent are very rare (please refer to Attachment 2 — Map Atlas Gradient and Channel Characteristics). Stream channels with gradients characteristic of streams with pool-riffle and plane bed habitat account for approximately 41 percent of the total length. Step-pool and cascade reaches combine for 56 percent of the total length. In general, the lower gradient reaches occur along the mainstem of the major tributaries (e.g., Bonaparte Creek and Antoine Creek). However, Bonaparte Creek has more pool-riffle channels (20 miles) than any other single tributary

and accounts for 21 percent of the total length. With the exception of Mosquito Creek and Tonasket Creek, all of the tributaries have slopes greater than four percent near the confluence with the Okanogan River. The relatively steep slopes of tributaries near their confluence with the mainstem are a natural feature of many of the Okanogan tributaries. Recent surveys (Arterburn 2005) indicate Bonaparte Creek and Nine Mile Creek are intensively used by steelhead trout for spawning but less is known about use in the other tributaries.

**Table 6.2-10: Proportion of Stream Length Classified by Reach Type, Osoyoos Subbasin**

| SUBBASIN NAME | REACH TYPE | LENGTH (MILES) | PERCENT OF TOTAL |
|---|---|---|---|
| OSOYOOS | Low-gradient valley | 9.74 | 2% |
| OSOYOOS | Pool riffle | 90.97 | 2% |
| OSOYOOS | Plane bed | 97.09 | 21% |
| OSOYOOS | Step pool | 124.40 | 27% |
| OSOYOOS | Cascade | 132.38 | 29% |
| | | 454.58 | |

## SITE SPECIFIC HABITAT ASSESSMENT

The Colville Tribe characterized habitat conditions in Bonaparte Creek (Station 388), Siwash Creek (Station 240), Antoine Creek (Station 592), Tonasket Creek (Station 128 and 568), and Nine Mile Creek (Station 27 and 587). Fine sediments comprised 57 percent of the total substrate at the Siwash Creek station and 64 percent at the lower of the two Nine Mile Creek stations (Figure 6.2-4). Gravel was most abundant at Antoine Creek and the two Tonasket Creek stations comprising between 25 and 30 percent of the total substrate.

Large woody debris loading was ranked as “poor” for all of the reaches surveyed (Table 6.2-11). The number of pieces per meter ranged between 0.1 and 0.3. Siwash Creek was the only tributary in the Osoyoos Subbasin to receive a “good” ranking for pool surface area. Pool surface area for the remaining tributaries ranged between eleven and 30 percent, well below the 40 percent threshold for a “fair” ranking (Table 6.2-12).

**Figure 6.2-4 Proportion of Substrates Smaller than 65 mm at Sample Locations in Osoyoos Subbasin**

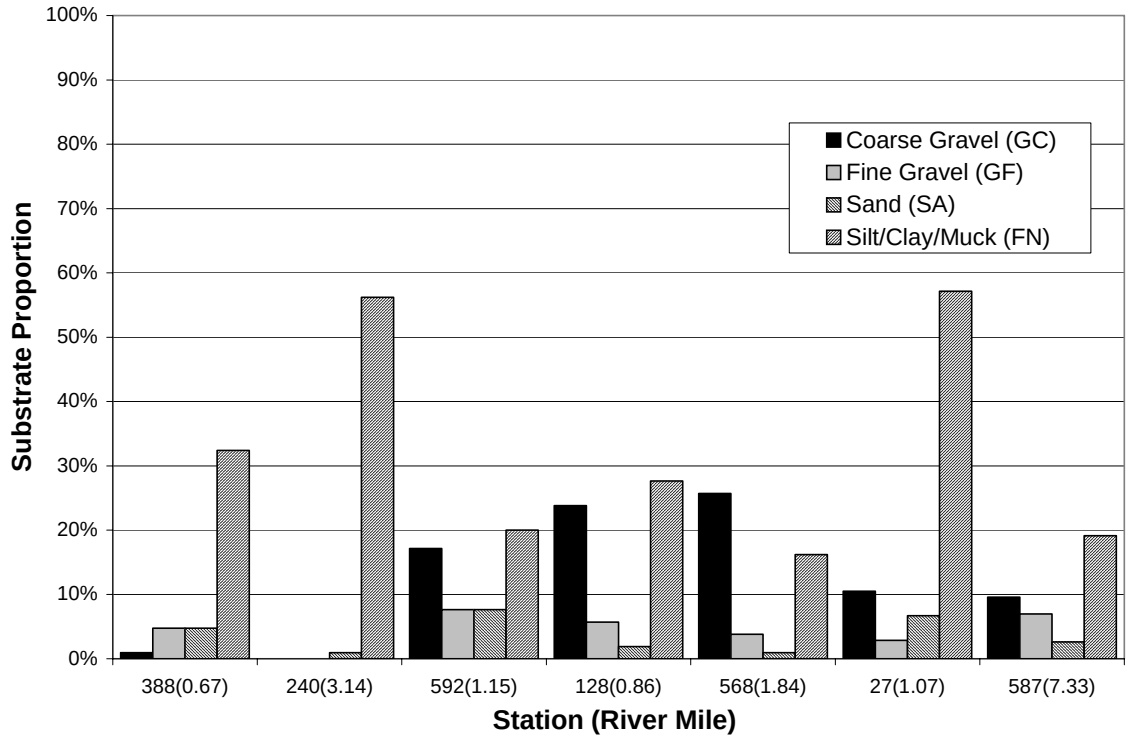



**Table 6.2-11 Large Woody Debris Loading at Sample Stations in the Osoyoos Subbasin**

| SUBBASIN | STREAM | STATION ID (RM) | TOTAL REACH LENGTH (M) | LWD COUNT | LWD PIECES / METER | RATING |
|---|---|---|---|---|---|---|
| OSOYOOS | Bonaparte Creek | 388 (0.67) | 150 | 14.0 | 0.1 | Poor |
| OSOYOOS | Siwash Creek | 240 (3.14) | 150 | 15.0 | 0.1 | Poor |
| OSOYOOS | Antoine Creek | 592 (1.15) | 150 | 29.0 | 0.2 | Poor |
| OSOYOOS | Tonasket Creek | 128 (0.86) | 150 | 38.0 | 0.3 | Poor |
| OSOYOOS | Tonasket Creek | 568 (1.84) | 150 | 22.0 | 0.1 | Poor |
| OSOYOOS | Nine Mile Creek | 27 (1.07) | 150 | 42.0 | 0.3 | Poor |
| OSOYOOS | Nine Mile Creek | 587 (7.33) | 150 | 52.0 | 0.3 | Poor |

**Table 6.2-12: Pool Characteristics at Sample Stations in the Osoyoos Subbasin**

| SUBBASIN | STREAM | STATION ID (RM) | POOL SURFACE AREA RATING | TOTAL POOLS | TOTAL RIFFLES | WETTED WIDTH AVERAGE (M) | POOL RIFFLE RATIO |
|---|---|---|---|---|---|---|---|
| OSOYOOS | Bonaparte Creek | 388 (0.67) | Poor | 22% | 76% | 2 | 0.3 |
| OSOYOOS | Siwash Creek | 240 (3.14) | Good | 84% | 16% | 2 | 5.3 |
| OSOYOOS | Antoine Creek | 592 (1.15) | Poor | 11% | 89% | 2 | 0.1 |
| OSOYOOS | Tonasket Creek | 128 (0.86) | Poor | 25% | 2% | 0 | 12.5 |
| OSOYOOS | Tonasket Creek | 568 (1.84) | Poor | 15% | 85% | 2 | 0.2 |
| OSOYOOS | Nine Mile Creek | 27 (1.07) | Poor | 15% | 83% | 2 | 0.2 |
| OSOYOOS | Nine Mile Creek | 587 (7.33) | Poor | 30% | 69% | 0 | 0.4 |

### 6.2.5 Sinlahekin Subbasin

#### SUBBASIN-WIDE STREAM CHANNEL ASSESSMENT

The Sinlahekin Subbasin contains approximately 330 miles of stream habitat. With the exception of the mainstem Sinlahekin Creek, very little of the total stream length has slopes characteristic of low-gradient valley, pool-riffle, or plane bed channels (Table 6.2-13; Attachment 2 — Map Atlas Gradient and Channel Characteristics]). Channels with slopes in excess of 8 percent account for over half of the total length in the subbasin and channels with slopes greater than 4 percent account for 78 percent of the total length (Table 6.2-13).

**Table 6.2-13: Proportion of Stream Length Classified by Reach Type, Sinlahekin Subbasin**

| SUBBASIN NAME | REACH TYPE | LENGTH (MILES) | PERCENT OF TOTAL |
|---|---|---|---|
| SINLAHEKIN | Low-gradient valley | 11.01 | 3% |
| SINLAHEKIN | Pool-riffle | 33.16 | 10% |
| SINLAHEKIN | Plane_bed | 29.12 | 9% |
| SINLAHEKIN | Step_pool | 89.99 | 27% |
| SINLAHEKIN | Cascade | 170.34 | 51% |
| | | 333.61 | |

## SITE SPECIFIC HABITAT ASSESSMENT

Streams in this subbasin were not explicitly covered in earlier reviews of habitat conditions (e.g., ENTRIX and Golder 2001) because the upper limit of anadromy is many miles downstream at the falls below Enloe Dam. A review of available information produced no new systematic studies of aquatic habitat in this Subbasin.

# Chapter 7.0: Data Gaps and Recommendations

This section presents data gaps and recommendations for water quantity, water storage, water quality, aquatic habitat, and GIS/mapping. The gaps and recommendations are intended to provide a beginning point for Planning Unit consideration as possible options for Level 2 work and as possible foci for watershed planning. They are not listed in any order of priority.

## 7.1 WATER QUANTITY

### 7.1.1 Water Availability Potential Areas for Consideration

1. Improve estimates of stream flows and diversions during low flow seasons for over-appropriated streams.
2. Refine groundwater recharge estimates for subbasins of concern (Joseph, Osoyoos, Salmon).

### 7.1.2 Water Quantity Potential Areas for Consideration

1. Develop a factor to account for unknown amounts of appropriation under water claims in assessing subbasins of concern.
2. Define amount of water conserved in current agricultural and municipal/domestic use (data gap).

### 7.1.3 Water Rights Potential Areas for Consideration

1. Investigate use of large water rights diverting from over-appropriated streams.
2. Use GIS to identify sources for large surface water rights on unnamed streams.
3. Refine estimates of appropriations to account for inflows (e.g., Okanogan River) for subbasins of concern (Joseph, Osoyoos, Salmon).
4. Further work to quantify water claims to clean up database.
5. Further work to quantify water rights.

### 7.1.4 Water Wells Potential Areas for Consideration

1. Filter wells database for water-righted wells and errors.
2. Improve exempt well withdrawal estimate.
3. Plot and analyze well withdrawals by depth, static water level, and volume of withdrawal.

### 7.1.5 Agricultural Water Use Potential Areas for Consideration

1. Consider more in-depth analyses of WRIA 49 irrigation districts' water balances, similar to that available for Okanogan Irrigation District.
2. Define acreage by crop type (and possibly by subbasin) to improve water use estimate.
3. Reconcile disparity in Omak subbasin water-righted acres v. County Assessor records.
4. Estimate the rate at which farmland conversion is occurring, taking land out of production and reducing the overall future water demand for agriculture.
5. Identify uses to which farmland is being converted and estimate water demand for lands converted from farmland to other use.

### 7.1.6 Municipal Water Use Potential Areas for Consideration

1. Reconcile US Census data, County Assessor parcel data, Group A and B water system connections, and exempt well data sets to improve estimate of municipal/domestic water use.
2. Improve estimate of seasonal residences for municipal/domestic water use.
3. Develop buildout analysis by subbasin for municipal and domestic water use and farmland conversion.
4. Define commercial, industrial, and institutional water use from WSCP's for large Group A water systems and by contacting owners of large water rights with these purposes.

### 7.1.7 Potential Future Water Supply Strategies for Consideration

1. Develop sector-specific future water supply strategies (FWSS) for WRIA 49.
2. Develop FWSS targeted to specific subbasins and incorporated areas of concern (over-appropriated or high growth areas).

## 7.2 WATER STORAGE

1. Prepare a primer explaining different storage concepts – how they work, contraints to development.
2. Better quantify surface water storage potential by subbasin.
3. Identify potential for small off-stream storage projects (amount and locations of potential storage).
4. Explore examples or case studies of small storage project development elsewhere in Eastern Washington (e.g., Rosa-Sunnyside), including funding approaches used.
5. Estimate aquifer storage potential for WRIA 49 aquifers.

### 7.2.1 Precipitation

1. Estimate the accuracy of the NRCS maps and the effect of data uncertainty on water balance calculations.

Rationale: Water balance calculations rely on the NRCS precipitation contour map, which was apparently developed from station data and a model to fill in areas with no station data. The station location distribution is preferential to valley bottoms and towns, so there is very little data for high elevations and non/low-populated areas, where the majority of rain and snow occur.

2. Confirm the locations of all precipitation stations and determine the most appropriate time period for statistical calculations.

Rationale: Although, the precipitation data were readily available from three different data sources, there may be other sources that have not reported their data to the National Climate Data Center. Further, statistics such as mean annual precipitation is generally not comparable among stations because they may reflect different periods of record.

### 7.2.2 Evapotranspiration (ET)

1. Check the calculations for ET using equations based on independent means.

Rationale: Water balance calculations assumed ET as an unknown, and ET data are not readily available.

### 7.2.3 Groundwater

1. Research and analyze existing groundwater database to assess short and long-term water well production by area

Rationale: The water well database provides a significant amount of data about a well when it was first drilled but there are no follow-up data.

2. Establish a groundwater-monitoring network in areas of concern to provide data that could be used to determine if any trends are apparent.

Rationale: Water balance calculations assume that the long-term change in groundwater storage is zero but no long term groundwater level records were identified for use in Level 1 so this assumption cannot be validated.

1. Conduct a systematic survey of existing well owners to help clarify the usefulness of the WRATS database for estimating water withdrawals.

Rationale: Using only the WRATS database probably overestimates total withdrawals.

2. ndependently check water balance assumptions by using various process models that consider, for example, soil/rock type, infiltration potential, moisture availability, or performing groundwater budget analyses for smaller or local zones or areas or aquifers where more data exist, and then extrapolating the results to larger areas.

Rationale: Water balance calculations assumed that recharge could be calculated as a percentage of precipitation ranging from 1 percent to 5 percent depending on the subbasin. However, there are no recharge data available to validate this assumption. Further, water balance calculations assumed that groundwater discharge was equal to groundwater recharge, but there are no data to support this assumption.

### 7.2.4 Streamflow

1. Validate the estimates of mean annual flow for those basins with little or no data.
2. Conduct additional research with county and irrigation district records to evaluate and estimate annual and monthly irrigation withdrawals from streams in areas of concern.
3. In drainage basins of concern, conduct field studies and water budgets to identify gaining and losing stream reaches (level of hydraulic continuity), and the locations of discharge from groundwater and springs into streams. Further, inventory and quantify the effect of reservoir and lake storage on streamflow budgets.
4. Examine flows in systems where never measured to establish, at a minimum, base, peak and mean annual flows (e.g., Chopaka, Sarsapkin, Cecile, Chewiliken, Mosquito, Aeneas Creeks, Swamp, Whitestone).
5. Expand measurements in systems where only point measurements have been made to provide for estimates of flow under multiple stage conditions (e.g., Antoine, Siwash, Loup Loup, Tallant, Tunk, Omak and Chiliwist Creeks).
6. Where streamflow measurements were only conducted downstream of a diversion, expand the monitoring such that the natural flows upstream of the diversion are also measured.
7. Expand monitoring in systems where only short periods of record are available to ensure that a baseline of the annual hydrograph of the tributary can be established (e.g., Ninemile Creek).
8. Install pressure transducers and develop stage discharge relationships at water quality monitoring where continuous temperature monitoring devices are in use.

Rationale: This information can be used to examine the relationship between streamflow and temperature in a more rigorous fashion than is currently possible.

## 7.3 WATER QUALITY

1. Sample tributary temperatures to capture afternoon "worst case" condition for temperature.

Rationale: Much of the temperature sampling conducted by the OCD to date is biased in that sampling was nearly always done before noon, for consistency – per Ecology guidance). Alternatively, explore expanded use of continuous monitoring devices.

2. Sample for metals and organic pollutants in tributary systems where baseline data are lacking to enable better characterization of source(s) where problems with water quality exceedances have been identified (particularly in the mainstem).

3. Examine whether silver exceeds the water quality criteria in the mainstem by measuring silver in water with analytical limits of detection appropriate to the water quality criteria.

4. Establish baseline data for conventional parameters in tributaries where few or no data have been collected (e.g., Chewiliken, Wannacut, Whitestone, Aenias).

5. Sample mainstem upstream of Mallot, between the next upstream sampling station, to better understand trend in decreasing water quality and potential sources of parameters exceeding water quality criteria (e.g., fecals).

6. Establish water quality sample stations across tributary basins such that they are stationed at positions that capture roughly equivalent surface area for drainage upstream.

Rationale: This approach would allow for better cross basin comparisons of the parameters analyzed.

7. Clarify the relationship between streamflow and water quality exceedances (where identified) and investigate potential remedies, as available.

8. Continue all monitoring programs established in recent years with the objective of transitioning from baseline data collection to effectiveness monitoring program.

## 7.4 AQUATIC HABITAT ASSESSMENT, INSTREAM FLOW AND FISHERIES

1. Establish aerial photographic coverage of mainstem and tributaries at a scale that allows for a broad scale assessment of riparian coverage.

Rationale: Existing aerial photographic coverage is out of date, incomplete, and/or at a scale that is not essentially useful.

2. Refine analysis of CCT habitat data for more accurate characterization of the tributary systems that were sampled under the EMAP program.

Rationale: Raw data were received from CCT too late to fully consider, and many analytical interpretations are beyond Level 1.

3. Refine assessment of what would constitute "properly functioning conditions" for fish habitat specific to the Okanogan basin's range of altitude, climate, gradients, and historical riparian conditions.

Rationale: Such a system would greatly improve the value of habitat data interpretations.

4. Characterize relationship between instream flow and usable habitat area in tributary streams supporting salmonids; with one exception, this has not been done throughout the basin.

Rationale: Given overallocation of surface waters, it is useful to understand where only minor increases in flow could have substantial increases in habitat benefit.

5. Collect physical habitat data from the tributaries draining the western portion of the watershed, where habitat data are almost completely lacking.

Rationale: Data collection by the CCT under the EMAP program has focused only on Salmon Creek, Loup Loup Creek, and tributaries draining the eastern basin.

6. Analyze site-specific habitat data collected near and around areas where mainstem steelhead spawning occurs to improve understanding of conditions that may be unique to the Okanogan basin.

Rationale: Steelhead spawning surveys in 2005 document noteworthy concentrations of redds [nests] short distances downstream of the more significant tributary confluences.

7. Consult with the CCT to ensure that any additional habitat data collection and/or analysis conducted through watershed planning represents value added, and not replication of effort.

8. Refine analysis of stream channel slope data to include channel confinement, sinuosity, etc. as a means to identify those reaches most likely to exhibit a response to anthropogenic impacts and to identify areas that may be responsive to habitat improvements such as wood placement.

## 7.5 GIS AND MAPS

1. Correct erroneous information that is retained in existing maps. E.g., irrigation flumes and canals that have not been in existence for more than 30 years, connection between Whitestone and Spectacle Lake, etc.
2. Map potential fish habitat, especially in upper tributaries.

3. Some maps show anadromous fish habitat in non-connecting streams. Correlate barrier survey with fish habitat mapping, including potential fish habitat.

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# Methow Watershed, WRIA 48

This focus sheet provides information on the availability of water for new uses in the Methow Watershed. This information provides a starting point for potential water users in determining the best strategies for securing water for a future project or proposal in this area.

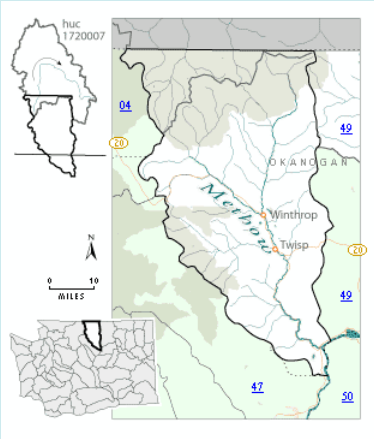
Many areas of central Washington are arid, receiving less than 20 inches of rain annually. Most of this precipitation arrives during the winter months when water demands are the lowest. During the summer, the snowpack is gone, there is little rain, and naturally low stream flows are dependent on groundwater inflow. At the same time the demand for water for human uses, including irrigation are at the yearly maximum. This means that groundwater and surface water are least available when water demands are the highest.

Much of the water in the Methow Watershed has already been spoken for. Increased demands from population growth, endangered fish species and impacts from climate change are adding to the challenge of managing water in Water Resource Inventory Area 48.

## Factors affecting water availability

In 2004, the U.S. Bureau of Reclamation filed notice with the Department of Ecology that the United States intends to make examinations and surveys for the utilization of the unappropriated waters of the Columbia River and its tributaries above Priest Rapids Dam, pursuant to Section 90.40.030 of the Revised Code of Washington. The withdrawal of these waters from future appropriations is currently in effect until December 23, 2014, with an exemption for a limited quantity of water.

Ecology cannot process any applications filed after December 28, 2004 for new rights to surface water or connected groundwater unless the applicant first obtains a release from the Bureau of Reclamation or until the withdrawal has expired. The withdrawal may be extended, and Ecology expects BOR to request an extension before the withdrawal expires.




### Definitions

**Adjudication** is a legal process conducted through a superior court to determine the extent and validity of existing water rights.

**Instream flows** are flow levels adopted into rule that create a water right for the stream to protect fish, wildlife, stock watering, recreational uses, and other instream uses and values.

**WRIA:** Water Resources Inventory Area; also known as a watershed or river basin. For environmental administration and planning purposes, Washington is divided up into 62 major watersheds, or WRIAs. WRIAs were defined by Chapter 173-500 WAC in 1976.

**Subbasins** are smaller drainage basins that together make up a WRIA. Subbasins are generally named for the principle creek or other surface water that runoff flows to.

Stream flows are a significant limiting factor in this basin. A water resource management program for the basin, Chapter 173-548 WAC (http://apps.leg.wa.gov/WAC/default.aspx?cite=173-548&full=true), was developed in 1976, and amended in 1991.

The water management rule:

- Sets instream flows (http://apps.leg.wa.gov/WAC/default.aspx?cite=173-548-020, referred to as "base flows") throughout the basin.
- Reserves a quantity of water for future uses.
- Closes numerous streams and lakes in the watershed to new uses.
- Restricts use under the permit exemption established in RCW 90.44.050 (see http://apps.leg.wa.gov/rcw/default.aspx?cite=90.44.050) for smaller groundwater withdrawals.
- States that groundwater hydraulically connected to surface waters is subject to the same conditions as the affected surface waters.

Applications for surface water withdrawals from the mainstem Columbia River are subject to the Instream Resource Protection Program for the Columbia River, as are any proposed groundwater withdrawals determined to have a significant and direct impact on the Columbia River. (See http://apps.leg.wa.gov/WAC/default.aspx?cite=173-563)

Numerous adjudications have taken place in the basin. Prior adjudications are an indication that most, if not all, of the available water has already been allocated. Adjudicated subbasins include:

- Bear Creek and Davis Lake
- Beaver Creek
- Black Canyon Creek
- Gold Creek
- Libby Creek
- McFarland Creek
- Wolf Creek.

## Water supply available for new uses

Surface water and groundwater availability is currently very limited throughout the basin, especially in light of the Bureau of Reclamation's withdrawal. WAC 173-548 identifies minimum flow levels for the mainstem Methow and its largest tributary streams, and established closures for smaller tributary streams. Water demand conflicts under existing rights are acute in the closed tributary streams. In those closed basins, specific requirements restrict even proposed permit-exempt groundwater uses. WAC 173-548- 030 reserved 2 cfs in 7 reaches of the Methow River and its largest tributaries for new single domestic or stock watering uses .

The Office of Columbia River (OCR) is aggressively pursuing water supply development opportunities throughout the Columbia Basin. You may find further information on these efforts on the OCR Web Page: www.ecy.wa.gov/programs/wr/cwp/crwmp.html. Some projects are being studied in WRIA 48 that could make water available in the future. Additionally, OCR has developed supplies on the Columbia River mainstem that may satisfy surface water and adjacent groundwater applications in WRIA 48 (e.g. Lake Roosevelt Incremental Storage Release Project and Sullivan Lake Water Supply Project).

The 1980 Columbia River Rule, WAC 173-563-020, requires a consultation process for any new surface water application (or groundwater application that would have significant and direct impacts on the Columbia River). The purpose of the consultation process is to inform Ecology whether "the use of such waters will be, if deemed necessary, subjected to instream flow protection or mitigation conditions determined on a case-by-case basis through the evaluation conducted with the agencies and tribes." The OCR projects described above are using this consultation process to develop mitigation projects that allow Ecology to issue new water right permits. New applications in the consultation process not covered by OCR mitigation would likely require independent mitigation to address fishery impacts.

Additional options for finding a water supply include:

- Connecting to an established water supplier. This is the fastest and simplest option.
- Processing a change application on an existing pre-1977 water right through the Okanogan County Water Conservancy Board.
- Processing your application through the Cost Reimbursement Program. Refer to www.ecy.wa.gov/pubs/0511016.pdf. The applicant will likely need to develop a mitigation strategy to offset any impacts their water use would have on existing water rights and adopted instream flow water rights.

For more information on these and other options, refer to "Alternatives for Water Right Application Processing" www.ecy.wa.gov/pubs/1111067.pdf.

## Pending water right applications in this watershed

Washington water law is based on the "prior appropriation" system, often called "first in time, first in right." Applications for water from the same source must be processed in the order they are received. (There are certain exceptions, see "Additional options for processing water right applications" below.)

Ecology asks anyone who needs a water right (new, change, or transfer) to submit the pre-application consultation form and meet with us to review your water supply needs and project proposal.

- Apply for a New Water Right
  http://www.ecy.wa.gov/programs/wr/rights/newrights.html
- Apply to Change or Transfer a Water Right or Claim
  http://www.ecy.wa.gov/programs/wr/rights/change_transfer_use.html

The map in this document shows some of the factors that will be considered when evaluating water right permit applications. Here are some additional information sources to assist you with your research:

- Locate and research water rights on land parcels anywhere in the state (Water Resource Explorer)
  http://www.ecy.wa.gov/programs/wr/info/webmap.html
- Pending Water Right Applications by County
  http://www.ecy.wa.gov/programs/wr/rights/tracking-apps.html

- Subscribe to a water right application RSS feed for a county or WRIA
  http://www.ecy.wa.gov/programs/wr/rights/wr_app_rss.html
- WRIA map showing the total number of water right claims, certificates, permits and applications
  http://www.ecy.wa.gov/programs/wr/rights/Images/pdf/waterright_wria_opt.pdf
- Search and view well reports using a variety of search tools
  http://apps.ecy.wa.gov/welllog/

## Further Information

Ecology Central Regional Office
15 West Yakima Ave -- Suite 200
Yakima, WA 98902-3452
509-575-2490

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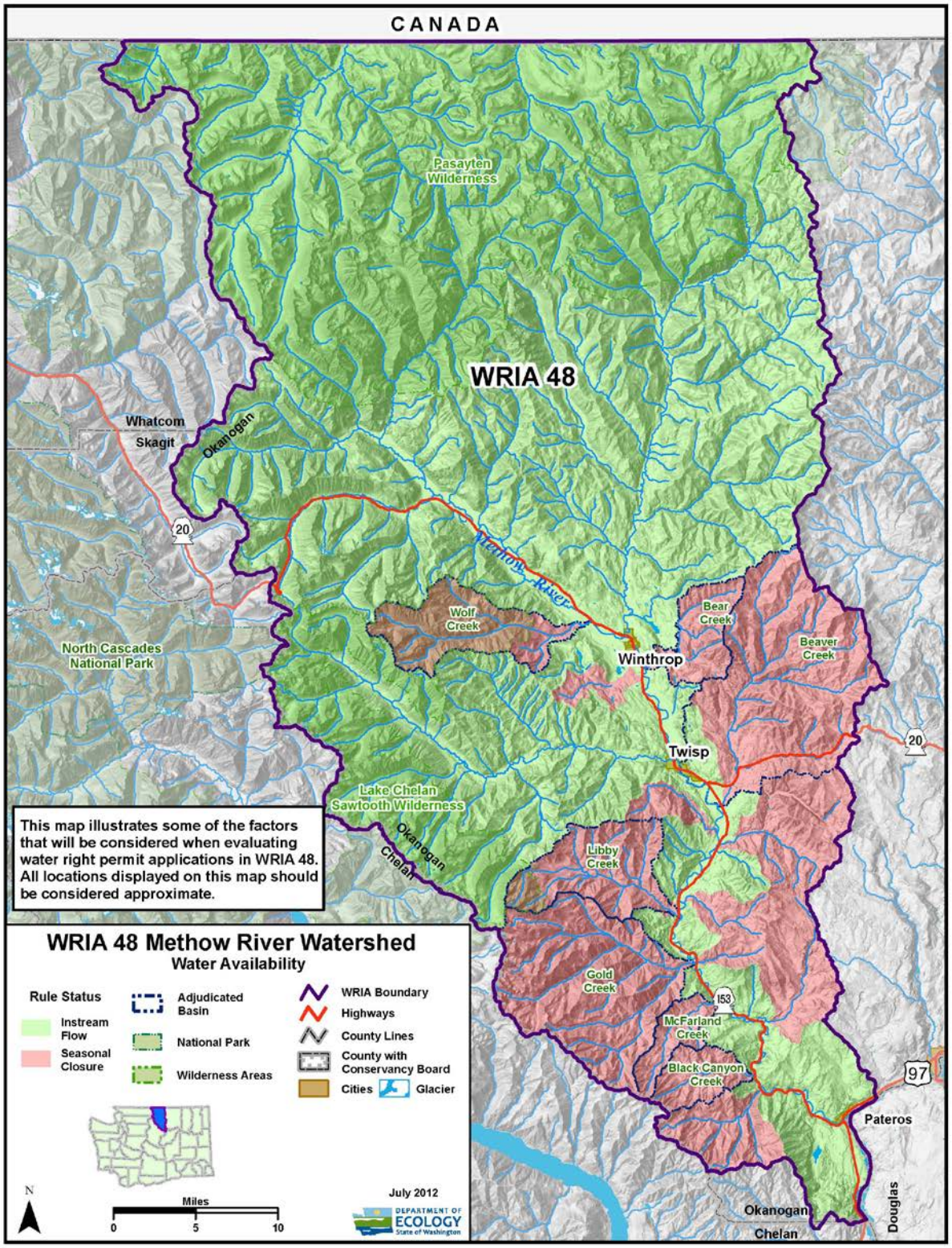
CANADA
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WRIA 48
Whatcom
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Methow River
Wolf Creek
Bear Creek
Beaver Creek
Winthrop
North Cascades National Park
Twisp
20
Lake Chelan Sawtooth Wilderness
Okanogan
Chelan
Libby Creek
This map illustrates some of the factors that will be considered when evaluating water right permit applications in WRIA 48. All locations displayed on this map should be considered approximate.
WRIA 48 Methow River Watershed
Water Availability
Rule Status
Instream Flow
Seasonal Closure
Adjudicated Basin
National Park
Wilderness Areas
WRIA Boundary
Highways
County Lines
County with Conservancy Board
Cities
Glacier
Gold Creek
153
McFarland Creek
Black Canyon Creek
97
Pateros
N
Miles
0
5
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July 2012
DEPARTMENT OF ECOLOGY State of Washington
Okanogan
Chelan
Douglas

# Okanogan Watershed, WRIA 49

This focus sheet provides information on the availability of water for new uses in the Okanogan Watershed. This information provides a starting point for potential water users in determining the best strategies for securing water for a future project or proposal in this area.

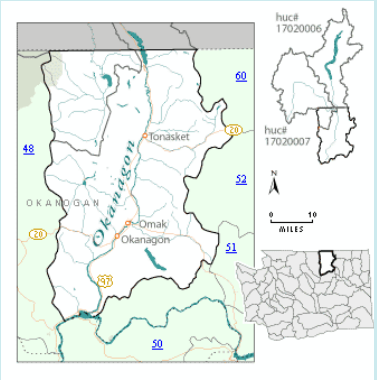
Many areas of central Washington are arid, receiving less than 20 inches of rain annually. Most of this precipitation arrives during the winter months when water demands are the lowest. During the summer, the snowpack is gone, there is little rain, and naturally low stream flows are dependent on groundwater inflow. At the same time the demand for water for human uses, including irrigation are at the yearly maximum. This means that groundwater and surface water are least available when water demands are the highest.

Much of the water in the Okanogan Watershed has already been spoken for. Increased demands from population growth, endangered fish species and impacts from climate change add to the challenge of finding new water supplies in Water Resource Inventory Area 49, especially during the summer months.

## Factors affecting water availability

In 2004, the U.S. Bureau of Reclamation filed notice with the Department of Ecology that the United States intends to make examinations and surveys for the utilization of the unappropriated waters of the Columbia River and its tributaries above Priest Rapids Dam, pursuant to Section 90.40.030 of the Revised Code of Washington. The withdrawal of these waters from future appropriations is currently in effect until December 23, 2014, with an exemption for a limited quantity of water.

Ecology cannot process any applications filed after December 28, 2004 for new rights to surface water or connected groundwater unless the applicant obtains a release from the Bureau of Reclamation or until the withdrawal has expired. The withdrawal may be extended, and Ecology expects BOR to request an extension before the withdrawal expires.




### Definitions

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A water resource management program for the basin, Chapter 173-549 WAC, was developed in 1976. The program:

- Sets instream flows (referred to as "base flows") throughout the basin. (See WAC 173-549-020, http://apps.leg.wa.gov/WAC/default.aspx?cite=173-549-020.)
    - Seasonally closes all perennial streams in the basin, except those with instream flows, to new water uses from May 1 to October 1.
    - Contains specific closures related to lakes within the basin.
    - Makes groundwater hydraulically connected to surface waters subject to the same conditions as the affected surface waters.

Applications for surface water withdrawals from the mainstem Columbia River are subject to the Instream Resource Protection Program for the Columbia River, as well as proposed groundwater withdrawals determined to have a significant and direct impact on the Columbia River. (See http://apps.leg.wa.gov/WAC/default.aspx?cite=173-563 for more information.)

The Colville Tribal Reservation covers a portion of the southern end of the basin. The legal availability of water in these areas is undetermined as the related Federally Reserved Rights have not been quantified.

The Okanogan County Commissioners approved the Okanogan Basin Watershed Plan in 2010. (The plan is available at www.ecy.wa.gov/programs/eap/wrias/Planning/49.html.) The Planning Unit, led by local governments and landowners, worked cooperatively with stakeholders groups, and state and federal agencies to develop local solutions to protect senior water rights, maintain basin ecosystems, and to meet water resource management objectives. Ecology encourages you to consult the Watershed Plan for additional information regarding water availability and efforts under way to increase the water supply in the basin.

Numerous adjudications have also taken place in the basin. Prior adjudications in an area are an indication that most if not all of the available water has already been allocated. Adjudicated areas include:

- Bonaparte Creek and Lake
- Chiliwist Creek
- Duck Lake Groundwater Area
- Johnson Creek
- Lower Antoine Creek
- North Fork of Salmon Creek
- Similkameen River
- Sinlahekin Creek
- Whitestone Lake

## Water supply available for new uses

Surface water and groundwater availability for new uses is very limited throughout the basin, particularly in light of the Bureau of Reclamation's withdrawal. WAC 173-549, referenced above, means new surface water appropriations, and ground water in significant hydraulic continuity with rivers and stream, are subject to conditions that make a new permit very unreliable. Eighty- two irrigation rights based on permits issued after adoption of WAC 173-549 are curtailed at some time during most years when the adopted flows are not met. An active compliance program for minimum flow conditioned permits was instituted in the 1980s.

The Office of Columbia River (OCR) is aggressively pursuing water supply development opportunities throughout the Columbia Basin. You may find further information on these efforts on the OCR Web page at www.ecy.wa.gov/programs/eap/wrias/Planning/49.html.

Some projects are being studied in WRIA 49 that could make water available in the future. Additionally, OCR has developed supplies on the Columbia River mainstem that may satisfy surface water and adjacent groundwater applications in WRIA 49 (e.g. Lake Roosevelt Incremental Storage Release Project and Sullivan Lake Water Supply Project).

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- Processing a n new application through the Cost Reimbursement Program. www.ecy.wa.gov/pubs/0511016.pdf. The applicant will likely need to develop a mitigation strategy to offset any impacts their water use would have on existing water rights and adopted instream flow water rights.
- Prospective water users within the Colville Reservation should contact the Water Code Administrator for the Confederated Tribes of the Colville Reservation. http://www.colvilletribes.com/contact.php

For more information on these and other options, refer to "Alternatives for Water Right Application Processing" www.ecy.wa.gov/pubs/1111067.pdf.

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- WRIA map showing the total number of water right claims, certificates, permits and applications http://www.ecy.wa.gov/programs/wr/rights/Images/pdf/waterright_wria_opt.pdf
- Search and view well reports using a variety of search tools http://apps.ecy.wa.gov/welllog/

## Further Information

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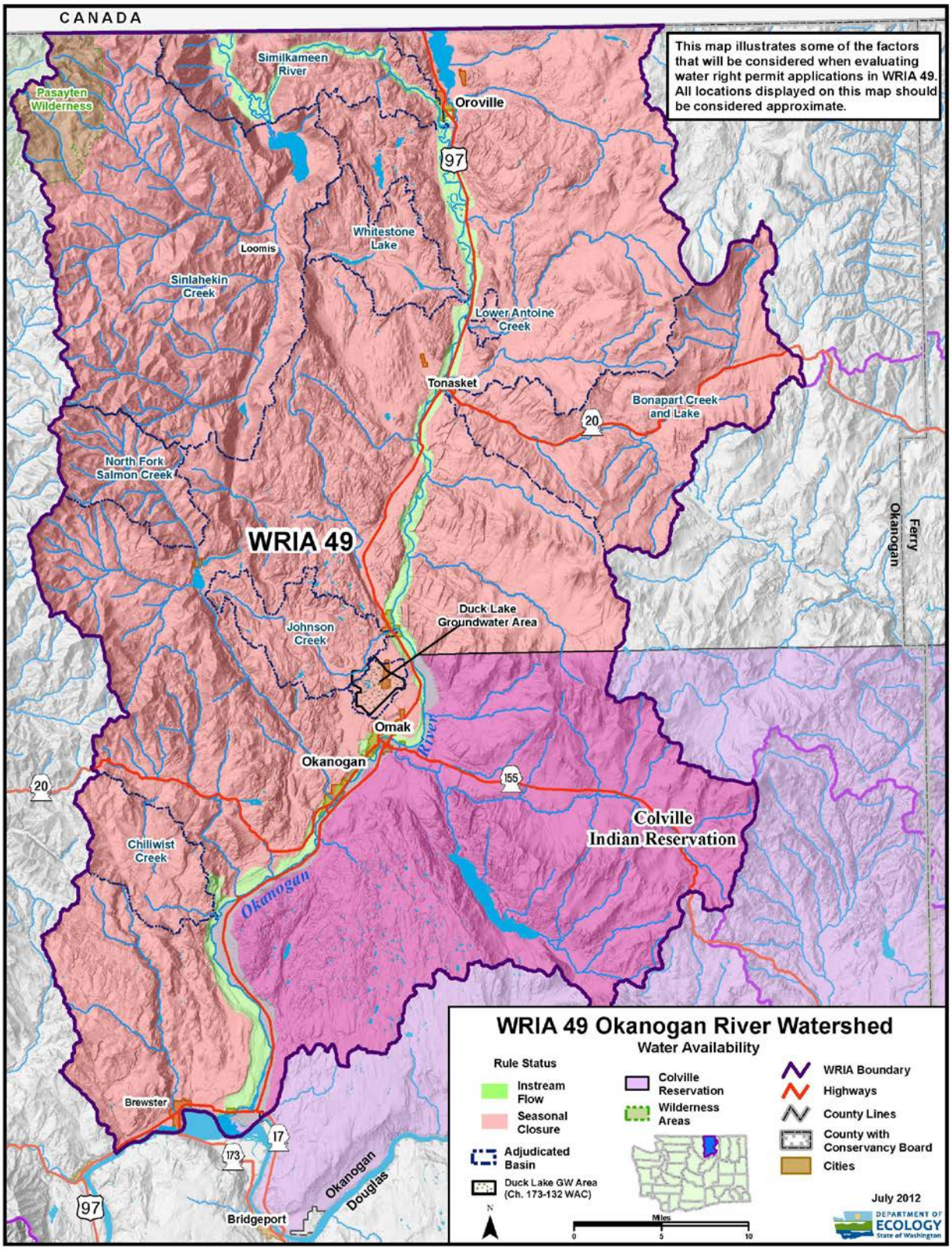
*If you need this document in a version for the visually impaired, call the Water Resources Program at 360-407-6872. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341*


CANADA
This map illustrates some of the factors that will be considered when evaluating water right permit applications in WRIA 49. All locations displayed on this map should be considered approximate.
Similkameen River
Pasayten Wilderness
Oroville
97
Whitestone Lake
Loomis
Sinlahekin Creek
Lower Antoine Creek
Tonasket
Bonapart Creek and Lake
20
North Fork Salmon Creek
WRIA 49
Okanogan
Ferry
Duck Lake Groundwater Area
Johnson Creek
Omak
Okanogan
River
155
Colville Indian Reservation
Chiliwist Creek
Okanogan
Brewster
17
173
Okanogan
Douglas
Bridgeport
WRIA 49 Okanogan River Watershed
Water Availability
Rule Status
Instream Flow
Seasonal Closure
Adjudicated Basin
Duck Lake GW Area (Ch. 173-132 WAC)
Colville Reservation
Wilderness Areas
WRIA Boundary
Highways
County Lines
County with Conservancy Board
Cities
N
Miles
0
5
10
July 2012
DEPARTMENT OF ECOLOGY State of Washington

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
*15 W Yakima Ave, Ste 200 • Yakima, WA 98902-3452 • (509) 575-2490*

April 7, 2011

Perry Huston
Okanogan County Planning
123 Fifth Avenue North, Suite 130
Okanogan, WA 98840

**RE: Addendum A – Okanogan County Comprehensive Plan Revisions**

Dear Mr. Huston:

Thank you for the opportunity to comment on the revisions proposed in Addendum A – Okanogan County Comprehensive Plan, dated February 11, 2011. Ecology appreciates the opportunity and cooperative effort that Okanogan County is providing the public, government agencies, and interested stakeholders to review and comment on the Comprehensive Plan. The public review process is essential to assure quality environmental protection is considered and valued in the proposed revisions to the Comprehensive Plan.

Ecology recommends that clarification be provided concerning the association between the current review and the SEPA environmental review process. The use of the term Addendum may confuse reviewers on the method of review for the Comprehensive Plan revisions, Shorelines Master Program, Critical Areas Ordinance, Okanogan County Code 17 – Zone, and Okanogan County Code 16-Subdivisions. Ecology advises the use of the term Expanded Scoping be used for this process leading up to the issuance of the Draft EIS.

We have reviewed the document(s) and have the following comments:

## A. WATER QUALITY

Ground Water

1. Minimum Requirement District that will be Rural-High Density (1 acre minimum), please describe how potential impacts to ground water from this density of on-site septic systems will be assessed to insure that groundwater quality will not be affected.

2. Within the high density zones, please describe how areas of higher risk to ground water contamination from on-site septic systems will be identified, based on geology, soil types, water table characteristics, proximity to water bodies, groundwater monitoring, etc., be

identified. Please explain how local ordinances will be developed to mitigate the risk by specifying required system type, location, etc.

3. Please describe the need for mitigating (if any) affects of on-site septic systems on ground water quality will be identified. Please explain how appropriate requirements will be identified.

Surface Water

1. Within the high density zone designations, please describe how areas of higher risk to surface water contamination from development activities and/or installation of on-site septic systems will be identified, based on geology, soil types, water table characteristics, proximity to water bodies, etc. Please explain how ordinances will be developed to mitigate the risk by specifying stormwater construction requirements or best management practices, required septic system type or technology, location, etc.

2. Please describe how the need for mitigating the affects of on-site septic systems on surface water quality will be identified. Please explain how appropriate requirements will be identified.

If you have any questions or would like to respond to these Water Quality comments, please contact Charlie McKinney at (509) 457-7107.

## B. WATER RESOURCES

Environmental review of zone designations should analyze the likely impacts of the development allowed within that zone. Water use is an environmental impact which varies based on water availability and is essential for development. The information contained in Addendum A – Okanogan County Comprehensive Plan does not provide sufficient information to evaluate water availability or the adequacy of water rights if necessary.

It must be noted this Comprehensive Plan Revision action involves areas that may be subject to the Instream Resources Protection Plan for the Methow River basin (WAC 173-548), Okanogan River basin (WAC 173-549) and Columbia River (WAC 173-563).

Addendum A to the Environmental Impact Statement (EIS) states the resulting Comprehensive Plan will provide an overall decrease in density. Based on the information provided, Ecology is unable to determine if the result intended will have more or less of an impact to water resources in areas subject to revision from this process. However, Ecology is concerned about impacts to senior water rights and instream flows resulting from any density.

Ecology regularly sends out Administrative Orders under RCW 90.03 alerting water right holders they will be curtailed in favor of instream flows for the Methow and Okanogan Rivers. This has been a common occurrence in Okanogan County where users were curtailed or shut off four out of the last five years on the Methow and three out of the last five years on the Okanogan during times of low flow.

Therefore, development projects resulting from this action will require new water use, being within the proximity of the Methow, Okanogan, and Columbia Rivers, and could be subject to instream flows (WAC 173-548 Methow River, WAC 173-548 Okanogan River, and WAC 173-563 Columbia River). In addition, if Ecology determines there is significant hydraulic continuity between surface water and the proposed ground water source, any permit exempt ground water use or ground water right shall be subject to the same instream flow conditions as affected surface waters.

Zone changes are proposed within the Methow Closed Basin. The Methow Rule (WAC 173-548-030) currently limits the reservation for exempt ground water use in the Methow Basin to single domestic use, and stock water. The reservation does not include new industrial uses nor group or multiple domestic uses that are required for subdivisions. In *Ecology v. Campbell & Gwinn*, 146 Wn2d 1 (2002), the Supreme Court held that lots of a subdivision that are jointly planned to use the exemption are group uses limited to a single group domestic exemption of 5,000 gallons per day (gpd). Because group domestic use is not covered under the reservation in the existing rule, WAC 173-548, group domestic uses begun after the rule would be subject to permitting requirements, instream flows and interruption. Once reserves provided under WAC 173-548 are exhausted, then all uses will be subject to permitting requirements.

Demands of new water use reduce water legally available for existing, senior water rights including instream flows. Where hydraulic continuity is shown with surface water, new domestic uses established under RCW 90.44.050 are subject to curtailment to meet the needs of more senior water rights in water short years. If water supply becomes limited, water use could be curtailed by those with senior water rights, which includes instream flows established in Chapters 173-548, 173-549 and 173-563 WAC.

Department of Health does not consider interruptible water rights an adequate and reliable water source consistent with WAC 246-290-420. For these reasons, future water source plans will likely not be a reliable supply for year round residential use and may be subject to interruption due to conflict with instream flows. As such, it will be questionable whether a plan would provide an appropriate provision for potable water supply under RCW 58.17.

Ecology understands the proposed Comprehensive Plan amendments will result in a large transformation of land through zone changes. The proposed plan will create a significant increase in development through, for example, creating a "Rural High Density" (RHD) zone.

Ecology has concerns with the immense expansion of one acre minimum zoning, such as the proposed RHD zone. The proposed RHD zone will result in a considerable increase of development in a localized area and therefore an increased need for water that may result in localized impacts to groundwater levels impacting existing users. Similar projects in areas of limited water supply across Ecology's Central Region have proposed to augment water supply by bringing senior water rights to the project to reduce or fully mitigate water resource impacts.

Addendum A does not address water use, water rights, and water availability. We respectfully request that the County address these environmental impacts as part of the Comprehensive Plan revisions. Ecology's Water Resources program is concerned for senior water right holders/users, which includes existing groundwater exempt uses. In addition to possible impairment to instream flows, senior water right holders and existing exempt uses, Ecology fears the potential misuse of the groundwater exemption resulting from future developments as a consequence of the zone changes. Ecology has cautioned the County a number of times through SEPA comments regarding the misuse of groundwater exemption.

Water is a finite resource. Particularly, with the effects of climate change resulting in more frequent droughts as we have experienced in north Central Washington. Without water, communities cannot grow and thrive. Because water users are already regularly being curtailed in the Methow and Okanogan River basins, it is critical the County carefully consider how to evaluate water availability and legal water supply sources to support and sustain growth in the Okanogan County.

If you have any questions or would like to respond to these Water Resources comments, please contact Breean Zimmerman at (509) 454-7647.

## C. SHORELANDS & ENVIRONMENTAL ASSISTANCE

Addendum A frequently includes the statement "The proposed policies and land use designation in the Comprehensive Plan will result in a net decrease in overall density from the existing comprehensive plan". No Documentation was given or cited to support this statement.

Rural Resource High and Rural Resource Low Density should be assigned with the draft Shoreline Master Program and the available Channel Migration Zones (CMs) in mind. Allowing smaller subdivisions without the consideration of the existence of the CMZs could give a false impression of safe developable land, especially concerning areas surrounding dynamic river systems such as the Methow, Twisp, Chewuch and Stimilkimeen. Flooding considerations should be applied when assigning these High/Low designations on the Okanogan River.

If you have any questions or would be to respond to the Shorelands & Environmental Assistance comments, please contact Clynda Case at (509) 457-7125.

## D. AIR QUALITY

We encourage Okanogan County to evaluate the long term impacts to breathing air quality of the plan that is being proposed, and to assure that the development will not place the County in a non-attainment status with respect to federal air quality standards. Non-attainment status places a heavy financial burden on affected communities, and makes it more difficult for business and industry to locate in the area. Okanogan County airsheds are particularly susceptible to PM2.5 air pollution (fine particles) buildup, especially during times of air stagnation in the fall and winter. The primary sources of PM2.5 are outdoor burning, indoor burning, and other combustion sources such as diesel generators and industrial processes. With the known health effects of PM2.5 and the upcoming tightening of the PM2.5 standard by the federal government, this is an excellent time for Okanogan County to review its future trajectory and map a course that preserves healthy breathing air for future generations.

If you have any questions about the Air Quality comments please contact Sue Billings at (509)575-2486.

Thank you for the opportunity to provide comments on the Addendum A-Revisions to the Okanogan County Comprehensive Plan.

Sincerely,

Gwen Clear

Gwen Clear
Environmental Review Coordinator
Central Region Office
(509) 575-2012

GC:TT (110401 / 236)

COPY

Methow Watershed Council
The RiverBank Building, Ste 101
206 Glover Street, PO Box 278
Twisp, Washington 98856
509.997.0640 x266
www.methowwatershed.com

June 14, 2011

Okanogan County Commission
123 Fifth Avenue North, Room 150
Okanogan, Washington 98840

Re: Okanogan Comprehensive Plan and watershed planning

Dear Commissioners:

Land use planning and water management planning are closely linked. Over the past decade, the Methow Watershed Council (MWC) has collected and compiled an extensive amount of information about past and present water uses in the Methow Watershed and is presently developing a process to estimate future demands on our water supply. The MWC is seeking to analyze is if and when water adequacy will determine the intensity of future development in the Methow. The MWC takes the position that the comprehensive plan must be responsive to this data. It is clear that the level of development permitted in the comprehensive plan and subsequent zone code will greatly affect when water supply becomes an issue. Conversely, where areas in the watershed are already showing increasing demand in terms of water supply there is little reason to designate those areas to support more intense development.

At present, land use planning and water management planning in the Methow are on separate tracks and we believe that it would serve our mutual interests to bring these tracks closer together. The MWC suggests that you develop the Okanogan County Comprehensive Plan (Comp Plan) only after due consideration of our information on current water use and anticipated future permit-exempt domestic and stock use based on existing lot sizes so that it supports zoning and development review processes responsive to this information. It would be counterproductive to propose, now or in the future, a Comp Plan which results in an over-allocation of permit-exempt use under WAC 173-548, the rule that currently restricts total permit-exempt groundwater withdrawals post 1977 in any of 7 reaches to 2 c.f.s (898 gals/min. To our knowledge there is no additional, non interruptible, water available above the amounts allowed in WAC 173-548.).

The MWC recently developed a database incorporating current parcel size regulations, individual parcel information, metered water use data, and other relevant information, obtained primarily from Okanogan County, in our development of a water use tracking system. We are

using this information as we recommend revisions to WAC 173-548. As a result, the MWC now has the capability to estimate the effects of current parcel size regulations and possible Comp Plan parcel size revisions on the Methow's available water supply as defined by WAC 173-548.

Recently, the MWC received a DRAFT *Instream Flow Reservation Tracking Database* report prepared at our request. Each stage of the tracking database development was closely reviewed by our Technical Subcommittee and approved by the full MWC. The report includes the rationales and assumptions applied to the data to arrive at estimates of current and future permit-exempt water use. Three scenarios estimating maximum consumptive permit-exempt use were presented: current (existing) conditions, future build-out assuming no change in the number of existing parcels under existing parcel size regulations, and lastly future build-out assuming all possible parcels are developed (i.e. by further subdivision) to the maximum extent allowable under existing parcel size regulations. All scenarios assumed a maximum monthly average consumptive use of 710 gallons/day (gpd) per parcel. This maximum consumptive use is expected to occur in July, when irrigation demands (outdoor uses) are highest.

Assuming current conditions, all seven reaches defined by RCW 173-548[1] have water remaining in their reserve, ranging from 100% (Early Winters) to 48% (Lower Methow).

Assuming future build-out with no new parcels and existing parcel size regulations, 6 reaches would have water remaining in their reserves. The Lower Methow would exceed its reserve, leaving 1,092 presently existing parcels out of a total of 2,913 presently existing parcels unable to be supplied by a well.

Assuming full build-out of all possible parcels under present zoning, 5 reaches would have water remaining in their reserve. The Upper Methow and Lower Methow would exceed their reserves. The Upper Methow would have 127 parcels unable to be supplied by permit-exempt wells out of a total of 1,948 possible parcels. The Lower Methow would have 24,313 parcels out of a total of 26,133 possible parcels unable to be supplied by wells.

Even considering the fact that these are DRAFT estimates of water use based on conservative assumptions which could over-estimate water use, the MWC position is that they are accurate enough to conclude that, under existing parcel size regulations, possibly the Upper Methow and almost certainly the Lower Methow reaches are over-allocated for water with respect to WAC 173-548. This applies to the Lower Methow even if no further subdivision of existing parcels is allowed.

As partners in planning for smart and sustainable growth, we feel it would serve residents in the Methow Watershed if the MWC's work

[1] *Headwaters, Early Winters, Upper Methow, Chewuch, Middle Methow, Twisp River, Lower Methow*

informs your land use planning and results in a revised Comp Plan and a revised WAC 173-548 that work together to ensure an adequate future water supply in the Methow.

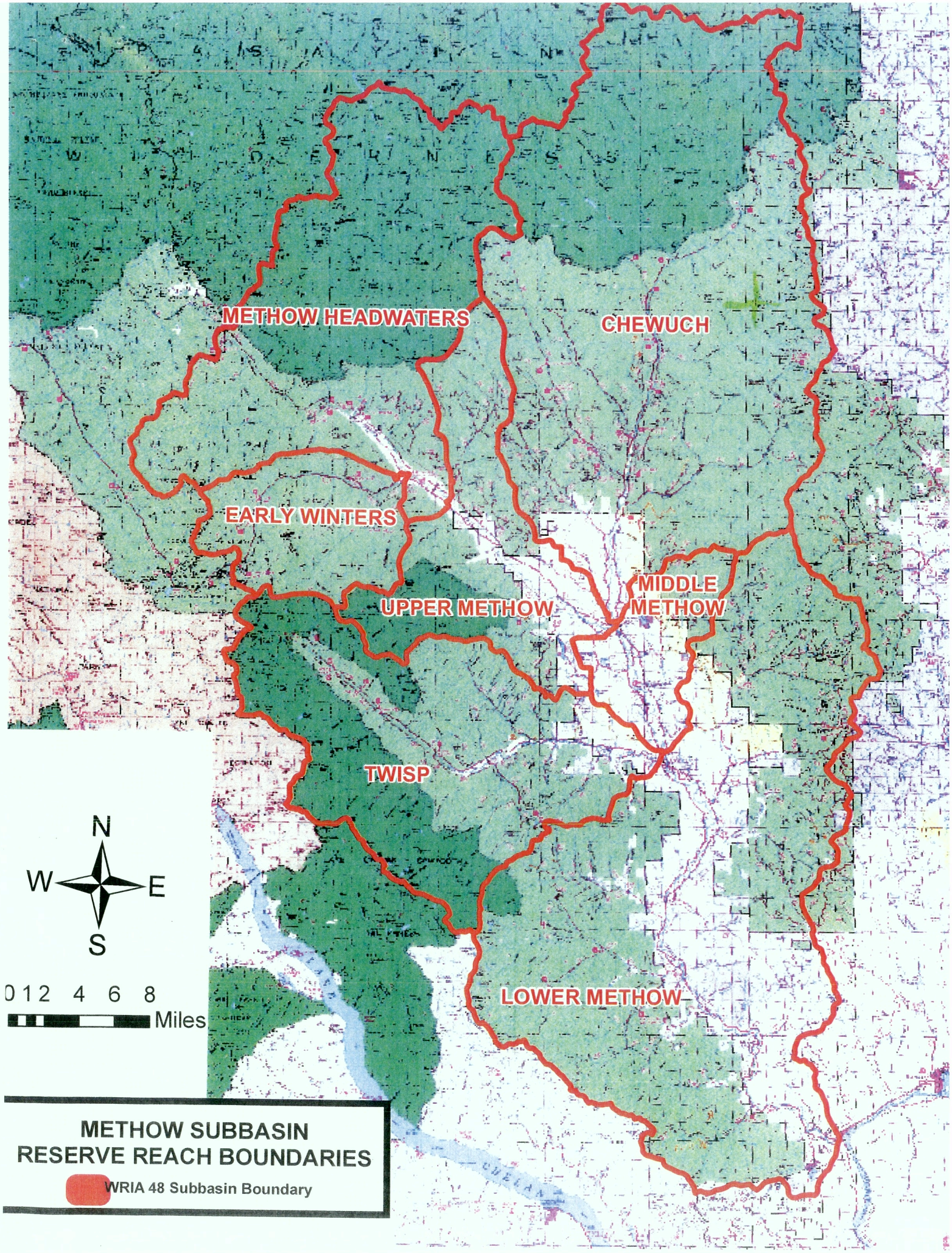
A copy of this DRAFT report has been provided to your representative on the MWC and has been forwarded to the Washington State Department of Ecology for their review and comment. After your review, if you have any questions or wish to pursue more detailed discussions about our tracking database and these DRAFT results, please feel free to contact our Secretary Jackie Moriarty (509-997-4081) at the Twisp Town Hall to make arrangements. ,

Sincerely,

The Methow Watershed Council

For the Council
Greg Knott - Methow Watershed Council Chair

[1] *Headwaters, Early Winters, Upper Methow, Chewuch, Middle Methow, Twisp River, Lower Methow*


METHOW HEADWATERS
CHEWUCH
EARLY WINTERS
UPPER METHOW
MIDDLE METHOW
TWISP
LOWER METHOW
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W
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S
0 1 2 4 6 8
Miles
METHOW SUBBASIN
RESERVE REACH BOUNDARIES
WRIA 48 Subbasin Boundary

DEPARTMENT OF ECOLOGY State of Washington http://www.ecy.wa.gov



**Department of Ecology News Release - March 26, 2010**

**10-054**

## Water concerns prompt appeal of subdivision approval

YAKIMA – Prompted by water supply concerns, the Washington Department of Ecology (Ecology) is appealing the environmental approval of a large development in the Okanogan Valley.

In the action filed with the Okanogan County Board of Commissioners, Ecology is challenging the environmental approval of Silver Spur North Ranch because the project, which has no water rights, will draw more water than is allowed under the state's groundwater permit exemption.

Silver Spur North Ranch proposes to develop approximately 766 acres, creating 220 individual lots, a 15-site recreational vehicle park, an equestrian center, and recreational center with swimming pools. The first phase of the project estimates it will use 18,800 gallons of water per day, relying on the drilling of permit-exempt wells for its water supply.

That is well in excess of 5,000 gallons of water per day, the limit allowed by common subdivisions without water rights, as confirmed by the state Supreme Court's opinion in the "Campbell and Gwinn" case. Under the law, the project will require a water right for use in excess of 5,000 gallons per day.

"Water supplies are a continuing concern in the Okanogan Valley, where streamflows are already low this year and where water users routinely come up short in an average year," explained Mark Schuppe, Ecology water resources manager in Yakima. "Approving a large development such as this without an adequate water supply puts both current and future water users in jeopardy."

Ecology believes the county should have considered the cumulative impacts of the Silver Spur North Ranch subdivision with the existing project, the adjacent Silver Spur (South) development, and any future planned development in a single environmental review when the county conducted its State Environmental Policy Act (SEPA) review.

According to Washington Administrative Code 197-11-060, proposals that relate to each other are to be evaluated in the same environmental document.

In making environmental review comments on the project, Ecology noted that the project does not appear to have water right authorization, and there isn't any agreement for an outside water service to provide water to the development.

Schuppe notes that the county and Ecology have attempted to find environmentally sound ways to allow other development to occur relying on groundwater, but a recent Attorney General Opinion issued in the fall of 2009 has limited the flexibility to develop under the permit exempt provision.

# # #

**Media contact:** Dan Partridge, water resources communications manager, 360-407-7139

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# Okanogan County

**Resolution 10 - 2011**

**APPROVING THE DEVELOPMENT AGREEMENT FOR SILVER SPUR NORTH RANCH AND ADOPTIONG FINDINGS OF FACT AND CONCLUSIONS OF LAW**

**Whereas:** Lynn and Marlene Barnett of Caribou LLC agree to develop and subdivide a 766 acre ranch into a recreational/residential/resort community. Development includes 220 lots units, equestrian center, recreational vehicle park, recreation area, and trail system, and

**Whereas:** Development Agreements are authorized by RCW 36.70B "Local Project Review" and OCC 18.05 "Development Agreements", and

**Whereas:** All procedural requirements have been met which include public notification, SEPA review, public hearing, and decision by the Board of Okanogan County Commissioners, and

**Whereas:** On May 11, 2010 the Board of Okanogan County Commissioners granted conditional approval of Silver Spur North Ranch Development Agreement 2009-1, and

**Whereas:** The proponent submitted the final draft of said development agreement meeting all conditions of approval. The final draft is approved "as to form" by Okanogan County's Chief Civil Deputy.

**Be it therefore Resolved:** The Board of Okanogan County Commissioners approve Silver Spur North Ranch Development Agreement 2009-1 (attachment c) subject to the attached findings of fact (attachment a) and conclusions of law (attachment b).

DATED at Okanogan, Washington this 11th day of January, 2011.

COUNTY COMMISSIONERS SEAL OKANOGAN CO., WASHINGTON

**BOARD OF COUNTY COMMISSIONERS**
**OKANOGAN, WASHINGTON**

Andrew Lampe, Chair

Jim Detro, Member

ABSENT

Don (Bud) Hover, Member

**ATTEST:**

Brenda Crowell, Clerk of the Board

01/14/2011 11:18:50 AM 3160992
Recording Fee $288.00 Page 1 of 227
Resolution ERLANDSEN & ASSOCIATES
Okanogan County Washington

Attachment A

Findings of Fact

1. Caribou LLC proposes a development agreement to develop and subdivide property. The development proposal is titled Silver Spur North Ranch Development Agreement 2009-1.
2. The subject property is identified by tax parcel numbers 3125190008, 3125190009, 3125192005, 3125192006, 3125192010, 3125192011, 3125192012, 3125200001, 3125200005, 3125200006, 3125200007, 3125200008, 3125200009, 3125200010, 3125201003, 3125201004, 3125201005, 3125201006, 3125201007, 3125201008, 3125202001, 3125202002, 3125202003, 3125202004, 3125202005, 3120202006, 3125202008, 3125203001, 3125203002, 3125203003, 3125203005, 3125203006, 3125204006, 3125204007, 3125204008, 3125204009, 3125204010, 3125204011, 3125204012, 3125204013, 3125300023 and is located at 577-A Old Highway 97. The development agreement includes legal descriptions of all property involved.
3. The comprehensive plan designations are Unclassified and Intensive Agricultural.
4. The zoning designation of the property is Minimum Requirement.
5. Okanogan County Code Chapter 18.05 and RCW 36.70B identifies the authority for adoption and review of development agreements.
6. On October 22, 2009 an application for a planned development was vested.
7. On October 28, 2009 notice of application and threshold SEPA determination was mailed to adjacent landowners and commenting agencies for their respective review and comment.
8. On October 29, 2009 notice of application and threshold SEPA determination was published in the Oroville Gazette Tribune (Okanogan County's periodical of record) and the Quad City Herald.
9. On November 13, 2009 the comment period ended for the threshold SEPA determination.
10. On January 20, 2010 notice of revised application and threshold SEPA determination was mailed to adjacent landowners and commenting agencies for their respective review and comment.
11. On January 21, 2010 notice of revised application and threshold SEPA determination was published in the Oroville Gazette Tribune (Okanogan County's periodical of record) and the Quad City Herald.
12. On February 5, 2010 the comment period ended for the threshold SEPA determination.
13. On March 10, 2010 notice of the public hearing and final SEPA determination was mailed to adjacent landowners, interested public, and commenting agencies.
14. On March 11, 2010 notice of public hearing and final SEPA determination was published in the Oroville Gazette Tribune (Okanogan County's periodical of record) and the Quad City Herald.
15. On March 26, 2010 an appeal of the final SEPA determination was received by the Board of Okanogan County Commissioners from the Washington State Department of Ecology.
16. On March, 2010 the appeal period for the final SEPA determination ended.
17. On April 9, 2010 the appeal of the final SEPA determination was withdrawn by Washington State Department of Ecology.
18. On or before April 16, 2010 notice of the public hearing must be physically posted. An affidavit of public notice was submitted to Planning and Development prior to the hearing.
19. On April 26, 2010, the Okanogan County Regional Planning Commission conducted a public hearing for this project. At this hearing, public was given opportunity to enter testimony into the record.
20. On May 11, 2010 the Board of Okanogan County Commissioners held a closed record meeting in order to review the proposal. At this time the Board considered the recommendation from the

**Attachment B**

Conclusions of Law

1. Caribou LLC propose a development agreement for phased development of 41 existing properties (approximately 766 acres), create 220 individual lots, a 15-site RV park, an equestrian center with stalls and stables, a recreational center with swimming pool and tennis facilities, constructing internal roads, constructing a trail system, and creating a minimum of 400 acres of open space.
2. All procedural requirements have been met in accordance OCC 18.05 "Development Agreements" and RCW 36.70B. The development agreement functions as a legal document used to adopt regulations and processes which are specific only to this development. The development agreement is a contract between the landowner and Okanogan County.
3. The development agreement is consistent with the Okanogan County Comprehensive Plan.
4. The development agreement is consistent with the Okanogan County Zone Code.
5. A threshold SEPA determination was issued by the Okanogan County SEPA responsible official. All comments received during the comment period were considered. The application and SEPA checklist were revised. A second threshold SEPA determination was issued by the Okanogan County SEPA responsible official. All comments received during the comment period were evaluated for consideration of the final SEPA determination. A final SEPA determination was issued by the Okanogan County SEPA responsible official. An appeal was received by the Washington State Department of Ecology. Clarification of the final SEPA determination was offered to the Department of Ecology. The Department of Ecology withdrew the appeal. The determination stands. All procedural SEPA requirements have been met.
6. Comments from the public and state, federal, and local agencies were received, reviewed, and considered in analysis of this proposal.
7. The conditions imposed are not unnecessarily onerous.
8. The conditions imposed will protect public health, safety, morals, and general welfare.
9. The development agreement application was granted conditional approval by the Board of Okanogan County Commissioners.
10. The final draft development agreement has been reviewed in accordance with the conditions of approval. All conditions of approval have been met.

01/14/2011 11:18:50 AM 3160992
Recording Fee $288.00 Page 6 of 227
Resolution ERLANDSEN & ASSOCIATES
Okanogan County Washington

# DEVELOPMENT AGREEMENT BY AND BETWEEN OKANOGAN COUNTY AND CARIBOU LLC, FOR THE SILVER SPUR NORTH RANCH DEVELOPMENT

THIS DEVELOPMENT AGREEMENT is made and entered into this 23 day of DECEMBER, 2010, by and between OKANOGAN COUNTY, a Washington municipal corporation, hereinafter the "County," and CARIBOU LLC, a Washington limited liability company, hereinafter "Owner." The County and Owner are sometimes referred to herein individually as "Party" and collectively as the "Parties".

## RECITALS

WHEREAS, in recognition of the need to strengthen the public planning process and to reduce the economic costs of development, the Washington State Legislature authorized the execution of a development agreement between a local government and a person having ownership or control of real property within its jurisdiction (RCW 36.70B.170(1) and OCC 18.05); and

WHEREAS, a development agreement must set forth the development standards and other provisions that shall apply to, govern and vest the development, use and mitigation of the development of the real property for the duration specified in the agreement (RCW 36.70B.170(1)); and

WHEREAS, for the purposes of this Development Agreement, "development standards" includes, but is not limited to, all of the standards listed in RCW 36.70B.170(3); and

WHEREAS, a development agreement must be consistent with the applicable development regulations adopted by a local government planning department under chapter 36.70B.170(1); and

WHEREAS, this Development Agreement by and between Okanogan County and Owner (hereinafter the "Agreement"), relates to the development known as SILVER SPUR NORTH RANCH, legally described in Exhibit A, which is attached hereto and incorporated herein by this reference (hereinafter the "Property"); and

WHEREAS, Owner owns the Property in fee simple and desires and intends to develop the Property as Silver Spur North Ranch, including, but not limited to: i) single family residential building sites; ii) equestrian center; iii) overnight recreational vehicle parking with water, electric and septic disposal; and iv) open space including recreational activity trails; and

**Section 11**. ***Vested Rights.*** Owner shall have the vested right to develop the Project pursuant to the Existing Land Use Regulations, provided, however, that the County reserves authority to impose new or different regulations on the Project to the extent required by a serious threat to public health and safety. Any new or different regulations imposed by the County as required by a serious threat to public health and safety shall be limited to the minimum necessary to avoid the consequences posed by the serious threat. The Parties agree that the County shall advise Owner when the County believes any such circumstances arise and shall consult Owner regarding the proposed modification(s). Owner shall have the right, at its sole discretion and subject to the attorney fee provision set forth in Section 26 of this Agreement to administratively or judicially contest any new or different regulations deemed necessary by the County, or to appeal any administrative decision or judicial determination, that would authorize or require the County to modify Owner's vested rights under this Agreement. Owner may also, at its discretion, agree to indemnify the County for the financial consequences of any final and binding decision of an administrative agency or court of competent jurisdiction in lieu of the County modifying Owner's vested rights under this Agreement in response to any such final and binding decision.

**Section 12. Water Supply.** Owner engaged in multiple pre-application meetings with the Washington State Department of Ecology ("Ecology") to discuss water availability for the project. Ecology expressed two primary concerns: 1) whether the aquifer is physically capable of providing a sustainable supply of groundwater, and 2) the need for legal authority to divert or withdraw water for beneficial uses at Silver Spur North Ranch.

In order to respond to the concerns expressed by Ecology, Owner hired the Water & Natural Resource Group, Inc. (WNR), to evaluate the aquifer's physical parameters and to identify off-site sources of water as necessary. WNR completed an extensive review of the aquifer including full pump tests that are attached as Exhibit G to the Owner's application. In addition, WNR located a water right from an off-site source believed to be available for transfer and use by Silver Spur North Ranch.

The primary source of domestic water supply for Silver Spur North Ranch shall be from an off-site water right. In recognition of the ground water report prepared by WNR, the County agrees to process a phase one plat that relies upon new ground water wells constructed by Owner, provided that the number of units to be served shall not exceed 11 and total groundwater withdrawals from all such wells shall not exceed 5,000 gallons per day for domestic water supply. At Owner's option an off-site water right may be used to supply domestic water for phase one. No further plats or approvals shall be accepted or considered unless or until Owner acquires an off-site source of water sufficient (in combination with

the domestic groundwater supply described in this paragraph) to meet any and all water supply needs for Silver Spur North Ranch.

With the exception of the groundwater use described in the preceding paragraph, Owner agrees to accept plat conditions for all phases of the Development, in a form to be agreed upon by the Owner and County, prohibiting property owners from using permit exempt wells for domestic water supply purposes within the platted area. Owner further agrees that recorded covenants and all deeds, indentures or grants of any kind conveying building lots within Silver Spur North shall include express reference to said plat conditions.

**Section 13. Wildland Fire Protection and CC&Rs.** Fire protection measures and particularly Wildland Fire Protection measures will be identified and required of each owner with specific requirements detailed in the CC&Rs. In addition, the Development shall include an on-site water reservoir with a capacity of 10,000 gallons dedicated for fire protection use. The location and design of the storage will be coordinated with Fire District 5 Fire Chief to insure the reservoir is located acceptably to the district and compatible with its equipment. **The reservoir must be installed prior to final approval of Phase 1.**

**Section 14. Open Space or Common Area.** Silver Spur North Ranch will include a minimum of 400 acres of open space and common area. The open space and common area shall be established consistent with the General Site Plan. Precise boundaries and locations of open space and common area may be modified in the discretion of Owner so long as the total number of building sites is not increased and so long as the open space or common area includes not less than 400 acres. So long as the total number of building sites is not increased, no approval shall be denied based on any condition related to open space or common area. The open space and/or common areas shall be owned by the Silver Spur Homeowners Association upon completion of the Development. Use, maintenance and management of the open space and/or common areas shall be controlled by the Association pursuant to the Declaration of Covenants, Conditions and Restrictions for Silver Spur recorded with the Okanogan County Auditor on October 30, 2006, under Auditor's filing number 3110654 ("Silver Spur CC&Rs"). An amendment to the Silver Spur CC&Rs, encumbering Silver Spur North Ranch, will be recorded in the Okanogan County Auditor's Office prior to conveyance of any lot created in Silver Spur North Ranch pursuant to the terms of this Development Agreement. The amendment shall provide for Wildland Fire Protection Measures, water management issues, noxious weed control, and common area use and management issues unique to Silver Spur North Ranch. Owner shall draft this amendment to the CC&Rs for Silver Spur North Ranch as the Development reveals all additional issues that must be addressed.

**Section 15. Transportation and Access.** Kittelson & Associates, Inc. completed a Transportation and Access assessment of the Development in July

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
*15 W Yakima Ave, Ste 200 • Yakima, WA 98902-3452 • (509) 575-2490*

March 23, 2009

Perry Huston
Okanogan County Planning
123 Fifth Ave N Ste 130
Okanogan WA 98840

Re: Eagle Canyon Estates

Dear Mr. Huston:

I am writing this letter to clarify the Department of Ecology's position on the above referenced development proposal and to respond to comments attributed to Okanogan County Planning staff in the Okanogan Valley Gazette-Tribune. In a December 29, 2008, letter from the Department of Ecology (Ecology) to Okanogan County Planning commenting on the mitigated determination of nonsignificance for the Eagle Canyon Development, it was stated, in part:

> This project requires water rights.
>
> The Attorney General's Opinion, (AGO 1997 No. 6) regarding the status of exempt ground water withdrawals, states that a group of wells drilled by the same person or group of persons, at or about the same time, in the same area, for the same purpose or project should be considered a single withdrawal and would not be exempt from the permitting requirement contained in RCW 90.44.050, if the total amount withdrawn for domestic use exceeds 5,000 gallons per day or if a total of more than .5 acre of lawn and garden are irrigated.
>
> The Attorney General's opinion suggests that caution should be used in finding developments to be exempt from needing a water right permit if the possibility exists that the development of the project will result in the ultimate withdrawal of water in excess of 5,000 gallons per day or the irrigation of more than .5 acre of lawn and garden.

**Ecology has not retracted those comments.**

In a February 26, 2009, article in the Okanogan Valley Gazette-Tribune one of your staff, Ben Rough, is quoted as making the following statement at a SEPA appeal hearing:

> WSDOE very commonly addresses the need for a water right during the comment period. This is often followed up with a meeting with WSDOE and the proponent at which time the determination of needing a water right is overturned. The proponent for this project did have discussions with WSDOE and it was decided that eight exempt withdrawals is acceptable.

While I did have two telephone conversations with the project proponent's representative, at no time was the project's need for a water right "overturned". On the contrary, I stated that Ecology would not retract its SEPA comments as these comments were consistent with the law. I did state that, given the lack of staff resources, it was not likely that Ecology would appeal the County's SEPA threshold determination or land use decision. Ecology's exercise of discretion in its enforcement authority should not be construed to mean that "eight exempt withdrawals is acceptable".

As an administrator of a government agency with enforcement authority, I am confident you understand the need to weigh many factors before you decide to pursue enforcement. To date, correspondence between Okanogan County Planning and Department of Ecology regarding the Eagle Canyon development has been through SEPA comments. I urge Okanogan County Planning staff to first contact the Department of Ecology before presuming Ecology has taken a position contrary to our comments stated in our SEPA letter mentioned above.

The current budget climate has placed Ecology in the position where I must prioritize my existing resources. In the context of our SEPA review for developments proposing to rely on the domestic exemption, I plan to continue to comment on development proposals and advise counties and developers on whether the use of the exemption is appropriate. In cases where Ecology believes that an exemption is inappropriate and an immediate threat to public health and safety, impairment of senior water right holders, or environmental harm will result, then I will direct my staff to engage to prevent such an action. An example of where Ecology is implementing this approach is in the Kittitas basin. However, in the absence of the threat of immediate harm, I must rely on counties to appropriately condition developments based on water availability under current law. If a county chooses to approve a project in a manner other than recommended by Ecology through our SEPA comments, then both the county and the developer are at risk in proceeding with the development.

As indicated in Director Manning's February 17, 2009 letter to the Legislature on a similar controversy around exempt stock watering uses, we plan to continue to work with stakeholders and the Legislature on a global solution to confusion surrounding the exemption. I believe this approach, along with targeted intervention by Ecology on projects that create significant impairment risk, is appropriate in the current budget climate.

Please understand if the county approves 8 exempt wells for the project that risk still exists for the project. While Ecology doesn't currently have enough resources dedicated to enforcement of exempt well use, we cannot speak to future situations.

I recognize it can be difficult when dealing with the groundwater exemption. I appreciate your patience and cooperation. If you have any questions please call me at (509) 454-4258.

Sincerely,

Mark C. Schuppe, Acting Section Manager
Water Resources Program

MCS:gg/090324
cc: Scott DeTro
Robert Harris
Patrick Williams, Center for Environmental Law and Policy

DEPARTMENT OF
ECOLOGY
State of Washington

# Permit-Exempt Domestic Well Use in Washington State

February 2015
Publication no. 15-11-006

## Publication and Contact Information

This report is available on the Department of Ecology's website at
https://fortress.wa.gov/ecy/publications/SummaryPages/1511006.html

For more information contact:

Water Resources Program
P.O. Box 47600
Olympia, WA 98504-7600

Phone: 360-407-6872

Washington State Department of Ecology - www.ecy.wa.gov

- Headquarters, Olympia 360-407-6000
- Northwest Regional Office, Bellevue 425-649-7000
- Southwest Regional Office, Olympia 360-407-6300
- Central Regional Office, Yakima 509-575-2490
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# Permit-Exempt Domestic Well Use in Washington State

*by*
*Tom Culhane and Dave Nazy*

Water Resources Program
Washington State Department of Ecology
Olympia, Washington

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# Executive Summary

Washington State's groundwater permit exemption allows for single or group domestic[1] well water use up to 5,000 gallons per day without first obtaining water right permits. The purpose of this study is to evaluate the significance of these wells by looking at the number of such wells and their associated consumptive[2] water use. Analyses were conducted for wells that fall under the category of "self-supplied domestic use," which includes both permit-exempt domestic wells and a small number of Group B[3] water system wells that use water under water right permits.

Two methods were used to estimate the increase in the number of permit-exempt domestic wells: one based on Department of Ecology (Ecology) well construction data, and a second using a combination of Washington Department of health (WDOH) Group A Public Water Supply system data and U.S. Census Bureau data. Study results suggest data from Ecology's well construction database provide the best estimates of the number of new permit-exempt domestic wells. Using various assumptions, we conclude approximately 17,200 permit-exempt domestic wells were drilled statewide from 2008 through September 4, 2014, ranging from about 17 wells in Garfield County to 1,238 wells in Okanagan County.

Consumptive water use estimates were based on 2005 USGS total water use estimates (Lane, 2009), and many assumptions. Some key assumptions regarding permit-exempt domestic wells included: all outdoor water use occurred within a 4-month irrigation season, indoor water use equals 57.1 gallons per day per person, and 10 percent of indoor use and 80 percent of outdoor water use is consumptive. Based on these and other assumptions, Ecology estimates that statewide, during the irrigation season, self-supplied wells account for about 0.9 percent of the overall consumptive water use. However, according to our estimates even public water supply systems account for only about 4.6 percent of consumptive water use, and overall most consumptive water use is due to irrigation.

It is critical to view our study's consumptive use estimates in the context of method limitations. From a water management perspective, scenarios of greatest concern involve: (1) relatively small watersheds where many permit-exempt domestic wells are drilled in aquifers highly connected to small streams, (2) a considerable amount of outdoor watering, and/or (3) surface water depletion in endangered aquatic species habitat.

Consumptive water use in areas with high concentrations of permit-exempt domestic wells was not specifically addressed during this study. Nonetheless, our analysis indicates that the greatest return, from a water management perspective, would be gained by focusing on those areas where potential impacts are greatest.

---

[1] "Domestic" water use includes normal in-home uses such as drinking, cooking, bathing, washing dishes and clothes, and so on; and may include residential outdoor uses such as lawn and garden irrigation, and washing cars.
[2] "Consumptive" use is that portion of the withdrawal that is lost to the system, and is the difference between the quantity withdrawn and the quantity of return-flow from septic systems, and so on.
[3] Group B public water systems have less than 14 connections, whereas Group A systems have 15 or more.

# Introduction

The groundwater permit exemption provided in Section 90.44.050 of the Revised Code of Washington (RCW) allows certain uses of groundwater to be established without first obtaining water right permits. One such use includes single homes or groups of homes that use no more than 5,000 gallons per day. In this paper we use existing data and make simplifying assumptions to estimate the number of permit-exempt domestic wells in Washington, and the consumptive water use associated with those wells compared to other uses. This analysis does not address other types of permit-exempt groundwater uses, such as stockwatering and commercial industrial uses.

# Purpose

The purpose of this investigation is to provide insights into the potential impacts of domestic permit-exempt well use within Washington. In this study, we evaluate rates of well construction, and compare the relative water consumption by permit-exempt domestic wells with other consumptive uses. Our statewide and county-by-county analyses will help frame the Department of Ecology's (Ecology's) discussion on how to regulate permit-exempt domestic wells in the future. This study does not evaluate how consumptive water use by permit-exempt domestic wells actually affects streamflows, nor other hydrologic impacts from rural development such as altered streamflow resulting from land cover changes.

# Methodology

Although the goal of this analysis was to evaluate consumptive water use associated with permit-exempt domestic wells in Washington, due to data limitations the analyses conducted were for self-supplied domestic use. Self-supplied domestic use includes single and group domestic water use allowed under the permit exemption, and Group B water system use covered under a water right permit. Group B water systems may use water legally either under the exemption or through a water right permit, depending upon the quantity of use.

While this study made no distinction between permit-exempt domestic water use and some Group B system water use covered under water right permits, our analysis indicates that it mainly includes the former. From Washington State Department of Health (WDOH) data, there are only about 120,000 people served statewide by Group B systems. Our analysis suggests that about two thirds of these people are served by systems with 6 connections or less, and able to

make use of the permit-exemption. This suggests the remaining one third of the Group B self-supplied domestic population are likely served by systems with water right permits.

To place these numbers in perspective, according to the U.S. Geological Survey (USGS) Scientific Investigations Report (SIR) 2009–5128 (Lane, 2009) the state's total self-supplied domestic population in 2005 was about 904,000. Therefore statewide only about 4 percent (40,000 divided by 904,000) of the self-supplied domestic population is served water under a water right permit. For this reason we are using the term permit-exempt domestic wells to refer to self-supplied domestic wells throughout this document, although it also includes a small portion of permitted Group B public water systems.

# Predictors of Future Permit-Exempt Domestic Wells

Two methods were used to estimate the increase in permit-exempt domestic wells. The number of new wells per county was estimated by querying Ecology's Well Construction and Licensing System database for January 1, 2008 through September 4, 2014. We then refined the search results to eliminate wells for other purposes such as agricultural irrigation, municipal, or test wells. This analysis also attempted to discern whether water wells with a "no use" category reported were likely to be permit-exempt wells or fall under the category of construction dewatering wells. In addition, we estimated county populations using self-supplied domestic groundwater by subtracting the population served by Group A systems (WDOH 2013 data), for each county, from total county population numbers (as reported in 2013 U.S. Census Bureau data).

# U.S. Geological Survey Total Water Use Estimates

The consumptive water use estimates produced during this Ecology study are based on total water use estimates contained in the 2009 USGS publication, "Estimated Water Use in Washington, 2005" by R. C. Lane[4]. This report presents state and county estimates of self-supplied and public domestic water use, as well as irrigation, livestock, aquaculture, industrial, and mining water use in Washington in 2005. In 2014, the USGS indicated that the population values (used in public- and self-supplied estimates) published in the 2009 report were incorrect and republished a new data table in a web-only format. Those new numbers have been incorporated into our analysis.

The 2009 USGS study derived self-supplied and public-supplied domestic water use numbers from several sources. For public-supplied water use, the USGS obtained system-specific withdrawal and use information from representative Group A systems, which they used to calculate per-capita rates for each system. Using those results combined with population and data for the non-reporting systems, they estimated the total population served by public-supplied water for each county. Self-supplied domestic use was then estimated using the difference

[4] USGS Scientific Investigations Report (SIR) 2009–5128

between estimated populations served by Group A systems and U.S. Census Bureau population estimates. A weakness with this approach is that it relies on data reported by Group A water systems to WDOH, which may or may not be accurate.

The 2009 USGS investigation estimated irrigation of crops and golf courses based on representative water use data extrapolated to larger areas based on acreage. The report's industrial use data are the most suspect due to very limited source information; however, this does not affect the conclusions significantly because industrial use tends to be small compared to other uses.

# Total versus Consumptive Water Use

Total water use includes both consumptive water use (water lost to evaporation and transpiration), and unconsumed water (water that drains through the soil to recharge groundwater). When evaluating the relationship between total use and consumptive use, one key publication relied upon was the report, "Consumptive Water-Use Coefficients for the Great Lakes Basin and Climatically Similar Areas" by K. H. Shaffer and D. L. Runkle (USGS SIR 2007–5197, 2007). For the purposes of that study, consumptive water use was defined as:

> "…water that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from an immediate water environment (water body, surface- or ground-water source, basin). Water-resource planners and managers use consumptive water use to understand the effect of human use of water on the hydrologic system."

Two common methods of computing consumptive use are water-balance equations and consumptive-use coefficients. The Shaffer and Runkle study relied upon the latter. The report contains statistical analyses of coefficients generated by many other studies for the Great Lakes Basin (the focus of that study) and areas throughout the world with a similar climate (Figure 1). For this evaluation Ecology used the median values from this Shaffer and Runkle study. In keeping with the Great Lakes Basin medians, for irrigation and mining we used the round values of 90 percent and 10 percent, respectively. The selection of 5 percent consumptive use from aquaculture was simply a small number chosen to represent a small amount of consumptive loss from aquaculture operations.

# Outdoor Water Use

Generally the growing season for much of western Washington occurs from the latter half of April through mid-October, while a typical growing season in eastern Washington occurs April through September. Data in the 1985 Washington Irrigation Guide (WAIG) illustrates the varying length of irrigation schedules for pasture/turf for six Washington stations.[5] (Figure 2).

[5] From 1985 WAIG, Appendix B, crop water use tables (with tables provided in Attachment A in the USDA, National Engineering Handbook, WAIG, September 1997)

[Great Lakes Basin refers to basins, parts of states, and states in the Great Lakes Basin. Climatically similar areas are basins and states that are climatically similar in the Great Lakes Basin but not in the Great Lakes Basin. Great Lakes and climatically similar references are the combination of references from these two areas. References are only from publications after either 1975 (mining and commercial), 1980 (industrial, irrigation, thermoelectric, livestock), or 1985 (domestic and public supply) and do not include all the Canada coefficients, all the United States coefficients, or continent coefficients because these include areas that are not climatically similar to the Great Lakes. Minimum (min), median, maximum (max), the 25th percentile, and the 75th percentile are in percent. N is the number of references used in the statistical analysis]

| Water-use category | Statistics | | | | | |
|---|---|---|---|---|---|---|
| | Min | 25th | Median | 75th | Max | N |
| **Great Lakes Basin** | | | | | | |
| Domestic and Public Supply | 0 | 10 | 12 | 15 | 74 | 161 |
| Industrial | 0 | 7 | 10 | 14 | 35 | 122 |
| Thermoelectric Power | 0 | 1 | 2 | 2 | 21 | 141 |
| Irrigation | 70 | 90 | 90 | 96 | 100 | 95 |
| Livestock | 0[1] | 80 | 83 | 90 | 100 | 85 |
| Commercial | 4 | 8 | 10 | 15 | 26 | 29 |
| Mining | 0 | 7 | 10 | 25 | 58 | 58 |
| **Climatically similar areas** | | | | | | |
| Domestic and Public Supply | 6 | 10 | 15 | 20 | 70 | 68 |
| Industrial | 0 | 4 | 10 | 13 | 34 | 97 |
| Thermoelectric Power | 0 | 0 | 2 | 4 | 75 | 75 |
| Irrigation | 37 | 90 | 100 | 100 | 100 | 75 |
| Livestock[2] | 10[2] | 86 | 100 | 100 | 100 | 73 |
| Commercial | 3 | 8 | 10 | 13 | 33 | 61 |
| Mining | 0 | 10 | 14 | 20 | 86 | 83 |
| **Great Lakes Basin and climatically similar areas** | | | | | | |
| Domestic and public supply | 0 | 10 | 13 | 15 | 74 | 229 |
| Industrial | 0 | 6 | 10 | 13 | 35 | 219 |
| Thermoelectric power | 0 | 1 | 2 | 3 | 75 | 216 |
| Irrigation | 37 | 90 | 91 | 100 | 100 | 170 |
| Livestock[1,2] | 0[1,2] | 80 | 90 | 100 | 100 | 158 |
| Commercial | 3 | 8 | 10 | 13 | 33 | 90 |
| Mining | 0 | 8 | 13 | 22 | 86 | 141 |
| **World** | | | | | | |
| Domestic and public supply | 14 | 16 | 16 | 18 | 19 | 4 |
| Industrial | 9 | 10 | 10 | 11 | 11 | 4 |
| Agriculture | 65 | 65 | 68 | 72 | 78 | 4 |

[1] The livestock low coefficient minimum (0 percent) is from Great Lakes Commission (2005a) in which Minnesota reported 0.25 Mgal/d total withdrawn in 1998 and 0.0 Mgal/d consumptive use. The next lowest coefficient for the Great Lakes Basin was 66 percent.

[2] The livestock low minimum coefficients are from Solley and others (1988) and may be the result of their adding animal specialties, including fish farming, into the livestock water-use category. In previous and subsequent USGS reports, fish farming was in different water-use categories.

**Figure 1. Consumptive-use coefficients for water use categories for the Great Lakes Basin and the world (Table 9 in USGS SIR 2007–5197, 2007).**

Outdoor irrigation varies significantly across the state and on a month-by-month basis. For this investigation, however, Ecology assumed that outdoor permit-exempt domestic and public-supplied water use occurred at constant rates over a 4-month irrigation season. Obviously this is a simplification of a complex situation. However, this assumption is more accurate then assuming a constant rate throughout the year, as summer-season low stream flows are typically most influenced by peak water use during the summer.

# Consumptive Water Use Analysis Assumptions

Assumptions made when estimating consumptive water use fell into two categories: those associated with permit-exempt domestic water use, and those associated with other types of uses.

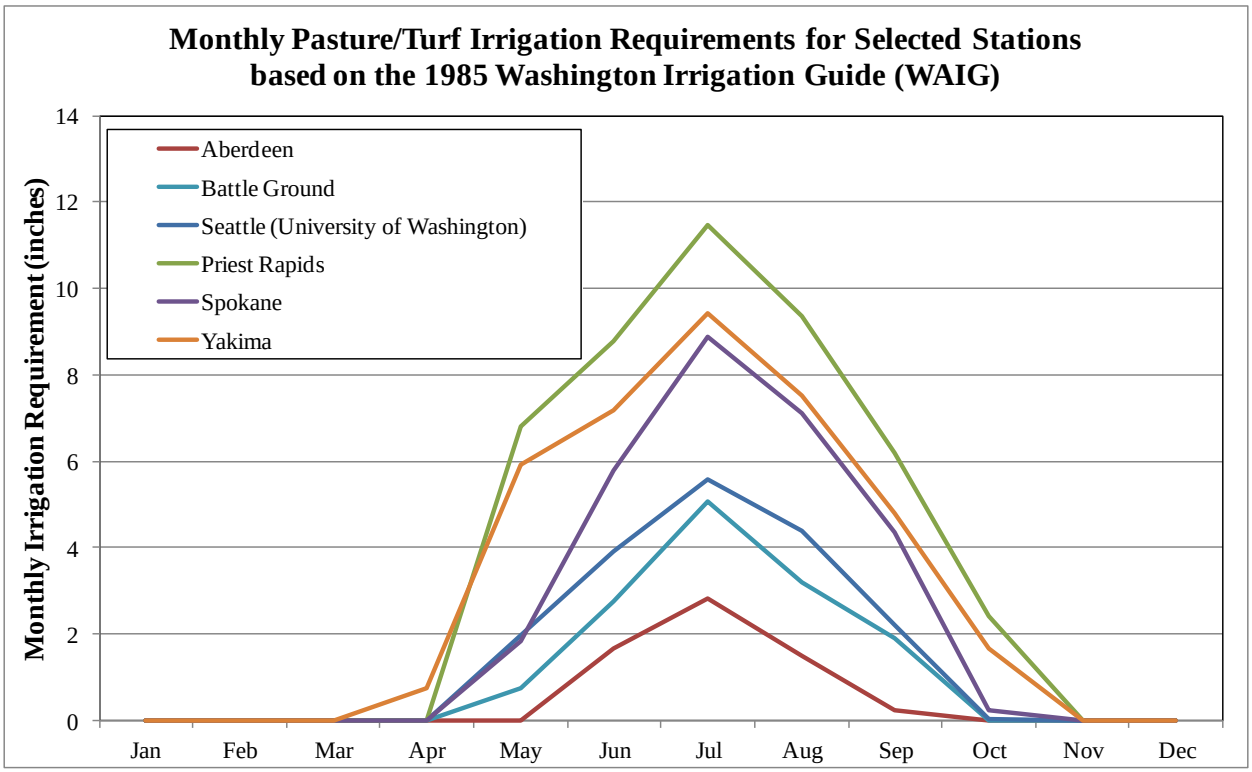


**Figure 2. Monthly pasture/turf irrigation requirements for selected Washington stations.**

Significant methods/assumptions made when estimating permit-exempt domestic well water consumptive use included:

- Estimates of populations and water use of individuals using permit-exempt domestic groundwater were derived from USGS SIR 2009-5128. This USGS investigation generated these estimates based on a subtraction of Group A Public Water Supply system population values from U.S. Census Bureau data.

- All outdoor water use occurred entirely within a 4-month irrigation season.

- Estimates of the number of people per household per county in 2011 were derived from the U.S. Census Bureau (2014), and ranged from 1.92 (San Juan County) to 3.36 (Franklin County) people per household.

- Indoor water use equals 57.1 gallons per day (gpd) per person based on *Residential End Uses of Water* by the American Water Works Association Research Foundation (Mayer and DeOreo, 1999). They derived this number based on actual logging of water use in 100 Seattle single-family homes (statistically selected to be representative).

- Volumetrically, 10 percent of indoor use is consumptive and 80 percent of outdoor water use is consumptive. These estimates are consistent with several Colorado studies including Oad, Lusk, Podmore (1997), and Oad and DiSpigno (1997).

When estimating consumptive use for other types of use (public-supplied domestic use, irrigation, livestock, aquaculture, industrial, and mining), significant methods/assumptions included:

- All outdoor water use occurred entirely within a 4-month irrigation season.

- On a county-by-county basis, public-supplied domestic consumptive use for both indoor and outdoor purposes was assumed to be the same percent as that calculated for permit-exempt domestic water use. This appears justified given similar per capita water use figures for permit-exempt and public-supplied water use.

- Percent consumptive water use values associated with total water use for other water use categories were based on the USGS Great Lakes Basin study. Consumptive water use compared to total water use for agricultural irrigation was assumed to be 90 percent as opposed to the 80 percent assumed for domestic outdoor water use, which reflects assumed greater efficiency in commercial operations.

# Findings

## Increase in Permit-Exempt Domestic Wells

A query of Ecology's Well Construction and Licensing System database indicates 33,434 entries representing all water wells installed from January 1, 2008 through September 4, 2014. Type of use entries in the database include: commercial, domestic, domestic single, group domestic, agricultural irrigation, individual irrigation, irrigation unknown, parks & recreation, stock water, municipal, other, or test well. However, during our analysis we determined that due to a high percentage of null entries, it is not always possible to precisely determine the number of wells drilled under the water right permit exemption (see Table 1).

The results in Table 1 indicate significant challenges in working with Ecology's Well Construction and Licensing System data. For example, statewide the sum of entries in the column labeled "Use categories assumed to result in permit-exempt domestic wells" yields a total of 15,852 wells, which is nearly the same as the number of wells listed as "null", (16,223). Since most "null" entries are likely associated with dewatering wells, a different database query was made with results reported in the column labeled "Dewatering wells reported in separate Ecology database". That query yielded a total of 14,918 dewatering wells statewide, which is close to but somewhat different than the 16,223 "null" entries.

## Table 1. Water wells by use category according to Ecology well construction data - January 1, 2008 through September 4, 2014.

| | Wells drilled by reported by use-types 2008 through August 2014 per Ecology Start Card database | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Potential permit-exempt well use categories | | | | | | | | Likely non-exempt well use categories | | | | | | | | |
| | Domestic | | | Other than domestic | | | | | | | | | | | | | |
| | Domestic | Domestic Single | Group Domestic | Commercial | Individual Irrigation | Irrigation Unknown | Parks & Recreation | Stock Water | Agricultural Irrigation | Municipal | Other | Test Well | Null (no use category reported) | Use categories assumed to result in permit-exempt domestic wells | Dewatering wells reported in separate Ecology data base | Null minus dewatering wells | Estimated permit-exempt domestic wells* |
| Adams | 42 | 30 | 6 | | 3 | 7 | | 19 | 14 | 2 | 2 | | 11 | 78 | 0 | 11 | 89 |
| Asotin | 22 | 60 | | 2 | | | | 3 | | | | | 5 | 82 | 0 | 5 | 87 |
| Benton | 239 | 298 | 18 | 7 | 2 | | 1 | 6 | 9 | 2 | 2 | 19 | 488 | 555 | 466 | 22 | 577 |
| Chelan | 220 | 302 | 39 | 7 | 3 | 3 | 8 | 3 | 21 | 2 | 2 | 16 | 124 | 561 | 114 | 10 | 571 |
| Clallam | 163 | 317 | 4 | 5 | 2 | 2 | 1 | | | 6 | 1 | 2 | 44 | 484 | 5 | 39 | 523 |
| Clark | 273 | 148 | 3 | 7 | 4 | 5 | 2 | | 7 | 3 | 6 | 1 | 164 | 424 | 49 | 115 | 539 |
| Columbia | 22 | 5 | | 1 | 4 | | | 4 | | | | | 5 | 27 | 0 | 5 | 32 |
| Cowlitz | 199 | 234 | 23 | 2 | 1 | | 2 | 1 | 4 | 4 | | 3 | 507 | 456 | 416 | 91 | 547 |
| Douglas | 57 | 133 | 29 | | 2 | 2 | | 13 | 16 | 3 | | 2 | 7 | 219 | 0 | 7 | 226 |
| Ferry | 88 | 148 | 2 | 1 | | 1 | 1 | 1 | 2 | 1 | | 2 | 24 | 238 | 0 | 24 | 262 |
| Franklin | 101 | 75 | 4 | 2 | 1 | 1 | | 9 | 5 | 1 | 3 | 2 | 22 | 180 | 0 | 22 | 202 |
| Garfield | 6 | 11 | | | | | | 1 | | | 1 | 1 | | 17 | 0 | 0 | 17 |
| Grant | 211 | 333 | 30 | 9 | 19 | 22 | | 19 | 46 | 5 | 5 | 31 | 400 | 574 | 376 | 24 | 598 |
| Grays Harbor | 58 | 92 | 7 | 1 | 3 | | | 3 | | 1 | 1 | 1 | 711 | 157 | 658 | 53 | 210 |
| Island | 91 | 163 | 20 | 2 | | | | | 2 | 1 | | 2 | 70 | 274 | 3 | 67 | 341 |
| Jefferson | 52 | 151 | 14 | 2 | 2 | 3 | 1 | | 1 | 2 | 7 | 5 | 34 | 217 | 0 | 34 | 251 |
| King | 115 | 279 | 18 | 13 | 65 | 18 | 3 | 3 | 9 | 78 | 18 | 3 | 4477 | 412 | 4,658 | -181 | 231 |
| Kitsap | 156 | 238 | 53 | 4 | 16 | 2 | | | 1 | 6 | 1 | 3 | 157 | 447 | 168 | -11 | 436 |
| Kittitas | 196 | 417 | 26 | 2 | 1 | 1 | 1 | 10 | | 14 | 1 | 1 | 20 | 639 | 12 | 8 | 647 |
| Klickitat | 145 | 231 | 9 | 6 | 1 | 1 | 1 | 7 | 1 | 3 | 1 | 2 | 9 | 385 | 0 | 9 | 394 |
| Lewis | 283 | 462 | 15 | 10 | 2 | 1 | 2 | 2 | 4 | 4 | 2 | 4 | 111 | 760 | 1 | 110 | 870 |
| Lincoln | 91 | 131 | 14 | 1 | | 1 | 1 | 8 | 9 | 1 | 3 | 2 | 14 | 236 | 0 | 14 | 250 |
| Mason | 152 | 286 | 53 | 5 | 3 | 1 | | | | 3 | | | 131 | 491 | 62 | 69 | 560 |
| Okanogan | 362 | 780 | 60 | 2 | 11 | 12 | 4 | 8 | 7 | 4 | 2 | 17 | 124 | 1,202 | 88 | 36 | 1,238 |
| Pacific | 42 | 99 | 1 | | 9 | 3 | 1 | | 3 | 1 | | 2 | 33 | 142 | 5 | 28 | 170 |
| Pend Oreille | 111 | 175 | 1 | | 1 | 1 | | | | 1 | | 2 | 21 | 287 | 0 | 21 | 308 |
| Pierce | 192 | 276 | 16 | 11 | 18 | 3 | 1 | | 3 | 23 | 1 | 4 | 2081 | 484 | 2,102 | -21 | 463 |
| San Juan | 59 | 164 | 7 | | 2 | | | 1 | | | | | 82 | 230 | 0 | 82 | 312 |
| Skagit | 130 | 233 | 2 | 1 | 8 | 1 | 1 | 7 | 6 | 1 | 2 | | 963 | 365 | 903 | 60 | 425 |
| Skamania | 61 | 58 | 11 | 1 | | 1 | 1 | | | | 3 | 5 | 18 | 130 | 0 | 18 | 148 |
| Snohomish | 234 | 445 | 33 | 2 | 11 | 4 | 2 | | 3 | 4 | 3 | 1 | 2627 | 712 | 2,746 | -119 | 593 |
| Spokane | 519 | 493 | 2 | 8 | 1 | | | 1 | | 8 | 6 | 1 | 155 | 1,014 | 0 | 155 | 1,169 |
| Stevens | 348 | 428 | 5 | 1 | 1 | | | 1 | | 4 | | 5 | 195 | 781 | 0 | 195 | 976 |
| Thurston | 334 | 350 | 16 | 9 | 10 | 2 | | 1 | | 8 | 2 | 7 | 411 | 700 | 271 | 140 | 840 |
| Wahkiakum | 11 | 16 | | | | | | | | | | | 30 | 27 | 21 | 9 | 36 |
| Walla Walla | 75 | 56 | 4 | 2 | 14 | 8 | 1 | 2 | 21 | 5 | | | 27 | 135 | 0 | 27 | 162 |
| Whatcom | 187 | 272 | 18 | 2 | 17 | 4 | | 2 | 20 | 5 | 1 | 3 | 1730 | 477 | 1,642 | 88 | 565 |
| Whitman | 43 | 63 | 1 | 1 | | | | 7 | 1 | 3 | | | 17 | 107 | 0 | 17 | 124 |
| Yakima | 433 | 689 | 24 | 2 | 2 | 9 | 2 | 11 | 17 | 13 | 1 | | 174 | 1,146 | 152 | 22 | 1,168 |
| **Totals** | **6,123** | **9,141** | **588** | **131** | **239** | **119** | **37** | **153** | **232** | **222** | **77** | **149** | **16,223** | **15,852** | **14,918** | **1,305** | **17,157** |

* Estimate made by adding "Use categories assumed to result in exempt wells" plus "Null minus dewatering wells"

Despite all these data limitations, we estimated the number of permit-exempt domestic wells drilled (the far right column in Table 1) by combining entries from "Use category assumed to result in permit-exempt domestic wells," plus "null minus dewatering wells". Based on this method we estimate that approximately 17,200 permit-exempt domestic wells were drilled statewide from 2008 through September 4, 2014. The numbers per county ranged from about 17 new wells drilled in Garfield County to 1,238 new wells drilled in Okanagan County.

Figure 3 depicts the significant drop in the number of new permit-exempt wells that followed the recession of 2009, and illustrates that permit-exempt domestic wells far outnumber wells for other permit-exempt use.

Ecology also subtracted 2013 WDOH Group A public water system population data from U.S. Census Bureau population numbers on a county-by-county basis to estimate the increase in permit-exempt domestic well users. Table 2 provides the results of that analysis, as well as 2005 "self-supplied domestic" results from SIR 2009–5128 (Lane, 2009) generated using a similar method. This table suggests that the population served in 2013 was actually less than the population served in 2005 for 19 of 39 counties.

Such trends are inconsistent with the results of our analysis based on driller entries in the Well Construction and Licensing System database. The well construction data analysis indicates an increase in the number of permit-exempt domestic wells for every county from 2008 through January 4, 2014. Since Ecology's well database information is more directly linked to actual wells drilled, Ecology concludes that the well construction data are likely a better indicator of increased permit-exempt domestic well use.

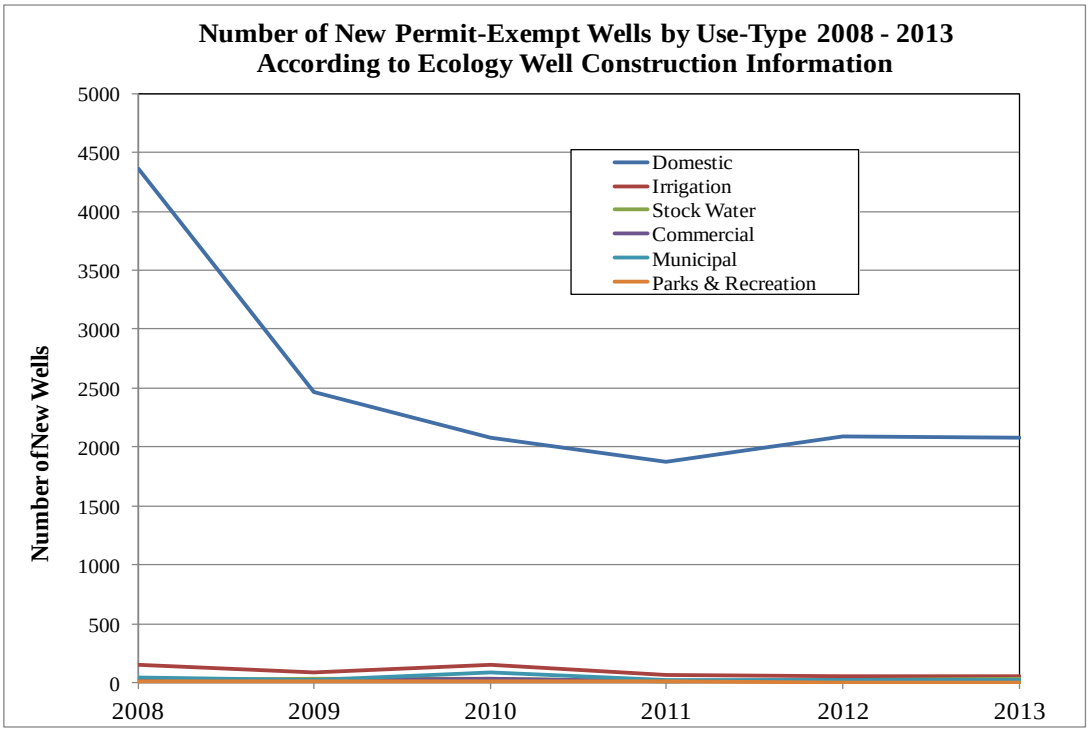


**Figure 3. Number of new permit-exempt wells drilled in Washington by use-type 2008 through 2013.**

**Table 2. Estimates of permit-exempt domestic groundwater populations, based on subtraction of WDOH Class A public-supply systems data from U.S. Census Bureau data.**

| | 2005 total popuation x 1000* | 2005 self-supplied population x 1000** | Percent self-supplied population in 2005 | 2013 total population x 1000* | 2013 self-supplied population x1000** | Percent self-supplied population in 2013 | Increase in self-supplied Population x 1000 |
|---|---|---|---|---|---|---|---|
| Adams | 16.8 | 4.82 | 29% | 19.2 | 6.4 | 34% | 1.6 |
| Asotin | 21.2 | 0.83 | 4% | 21.8 | 1.4 | 6% | 0.6 |
| Benton | 158 | 25.5 | 16% | 183.4 | 25.5 | 14% | 0.0 |
| Chelan | 69.8 | 14.4 | 21% | 73.6 | 12.8 | 17% | -1.6 |
| Clallam | 69.7 | 18.0 | 26% | 72.4 | 17.1 | 24% | -0.9 |
| Clark | 404 | 113 | 28% | 435.5 | 59.4 | 14% | -53.6 |
| Columbia | 4.13 | 1.24 | 30% | 4.1 | 1.2 | 30% | 0.0 |
| Cowlitz | 97.3 | 25.8 | 27% | 103.3 | 25.9 | 25% | 0.1 |
| Douglas | 35 | 4.58 | 13% | 39.3 | 6.7 | 17% | 2.1 |
| Ferry | 7.54 | 5.14 | 68% | 7.7 | 5.0 | 65% | -0.2 |
| Franklin | 63 | 12.7 | 20% | 84.8 | 25.0 | 29% | 12.3 |
| Garfield | 2.34 | 0.92 | 39% | 2.3 | 0.8 | 33% | -0.2 |
| Grant | 81.2 | 26.7 | 33% | 91.8 | 28.8 | 31% | 2.1 |
| Grays Harbor | 70.9 | 17.8 | 25% | 73.2 | 13.6 | 19% | -4.2 |
| Island | 79.3 | 12.1 | 15% | 79.7 | 12.2 | 15% | 0.1 |
| Jefferson | 28.7 | 8.32 | 29% | 30.3 | 5.4 | 18% | -2.9 |
| King | 1,790 | 31.5 | 2% | 1981.9 | 65.7 | 3% | 34.2 |
| Kitsap | 241 | 47.9 | 20% | 254.0 | 44.1 | 17% | -3.8 |
| Kittitas | 36.8 | 12.3 | 33% | 41.9 | 15.6 | 37% | 3.3 |
| Klickitat | 19.8 | 7.82 | 39% | 20.7 | 8.0 | 39% | 0.2 |
| Lewis | 72.4 | 37.8 | 52% | 76.2 | 37.2 | 49% | -0.6 |
| Lincoln | 10.4 | 4.09 | 39% | 10.7 | 4.3 | 40% | 0.2 |
| Mason | 54.4 | 20.1 | 37% | 61.8 | 23.2 | 38% | 3.1 |
| Okanogan | 39.8 | 19.8 | 50% | 41.5 | 20.5 | 49% | 0.7 |
| Pacific | 21.6 | 2.93 | 14% | 21.0 | 0.4 | 2% | -2.5 |
| Pend Oreille | 12.7 | 8.23 | 65% | 13.2 | 8.5 | 65% | 0.3 |
| Pierce | 754 | 50.5 | 7% | 814.5 | 48.3 | 6% | -2.2 |
| San Juan | 15.3 | 7.66 | 50% | 16.0 | 7.3 | 46% | -0.3 |
| Skagit | 113 | 21.3 | 19% | 118.6 | 25.4 | 21% | 4.1 |
| Skamania | 10.7 | 4.59 | 43% | 11.3 | 4.4 | 39% | -0.2 |
| Snohomish | 656 | 78.6 | 12% | 730.5 | 67.8 | 9% | -10.8 |
| Spokane | 441 | 65.3 | 15% | 480.0 | 50.9 | 11% | -14.4 |
| Stevens | 42 | 19.3 | 46% | 43.8 | 20.9 | 48% | 1.6 |
| Thurston | 229 | 54.6 | 24% | 260.1 | 53.0 | 20% | -1.6 |
| Wahkiakum | 3.85 | 0.97 | 25% | 4.0 | 0.4 | 10% | -0.6 |
| Walla Walla | 57.6 | 8.10 | 14% | 59.5 | 6.9 | 12% | -1.2 |
| Whatcom | 183 | 32.7 | 18% | 205.8 | 37.3 | 18% | 4.6 |
| Whitman | 40.2 | 2.95 | 7% | 46.0 | 5.2 | 11% | 2.2 |
| Yakima | 232 | 73.4 | 32% | 247.3 | 69.7 | 28% | -3.7 |

* Data from U.S. Census Bureau

** Calculated by subtracting WDOH Group A water system data from U.S. Census Bureau Total Population

# State-Wide and County-Wide Consumptive Use Analysis

During this study Ecology also conducted a 4-month irrigation season consumptive-use-rate analysis for various use categories within Washington. Figure 4 below provides the results on a statewide basis, while Figures 5 and 6 (both figures depict the same data at different scales) and Table 3 provide results on a county-by-county basis.

Ecology based its analysis on information found in the USGS SIR 2009–5128 report, that in part was based on WDOH Group A water system data. As discussed previously, there are a number of concerns regarding the WDOH Group A water system data, therefore use of these results requires exercising caution.

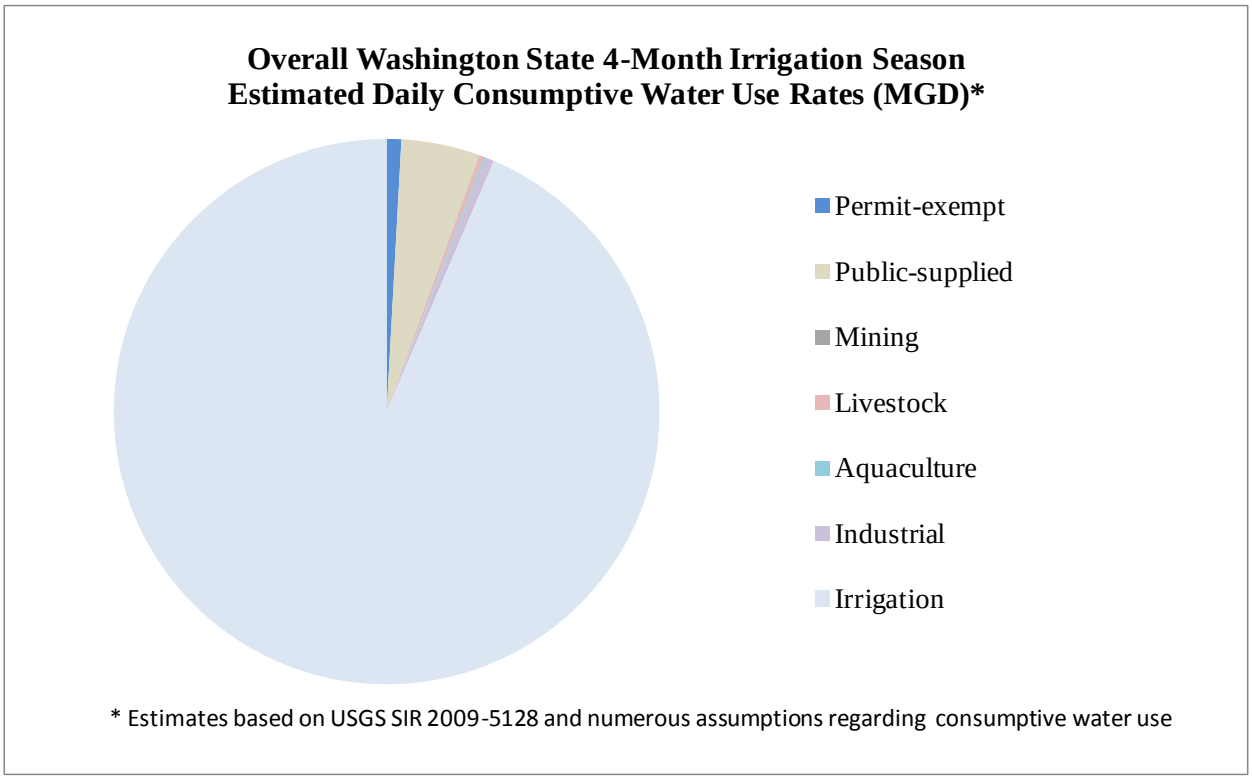


**Figure 4. Statewide Washington growing-season estimated consumptive use rates.**

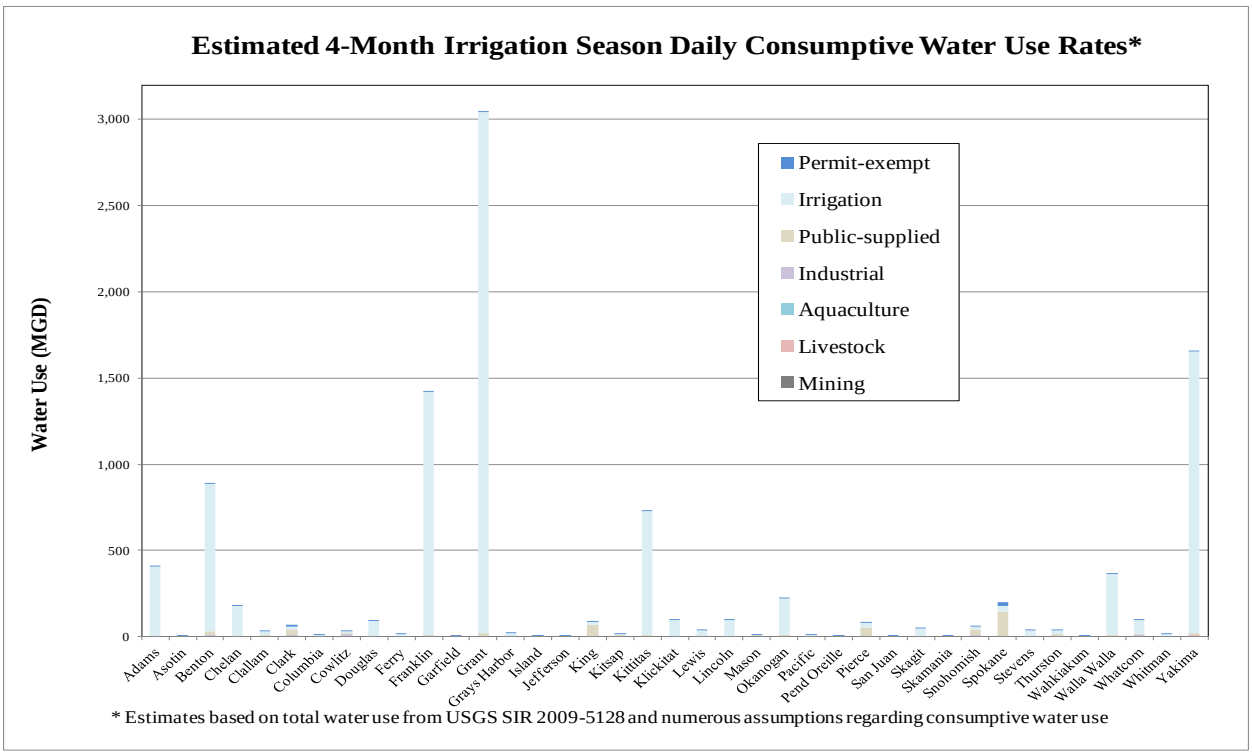


**Figure 5. Washington growing season estimated consumptive use rates (same as Figure 6, at different scale).**

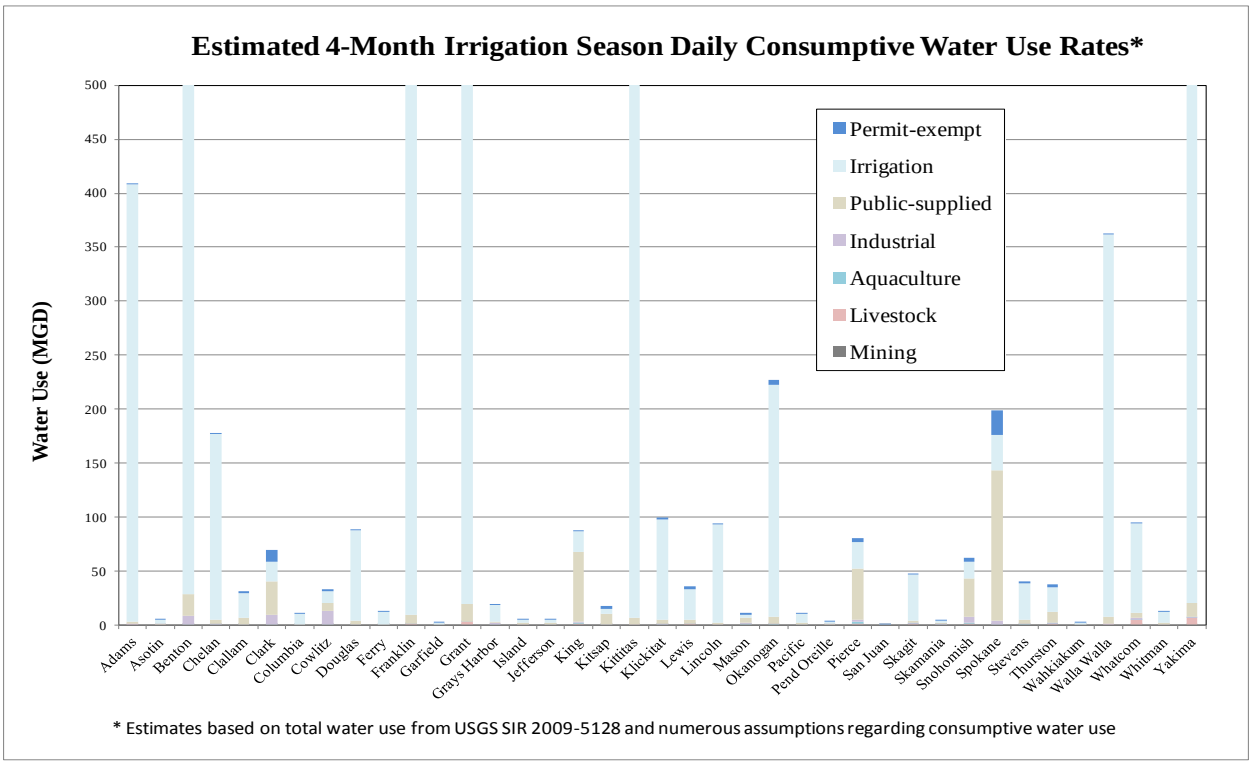


**Figure 6. Washington growing season estimated consumptive use rates (same as Figure 5, at different scale).**

**Table 3. Washington growing-season estimated consumptive use rates by county.**

| All values in Million Gallons per Day (MGD) | Existing Consumptive Use | | | | | | | | Estimated percent of total water use attributable to permit-exempt well use |
|---|---|---|---|---|---|---|---|---|---|
| | Permit-exempt | Public-supplied | Mining | Livestock | Aquaculture | Industrial | Irrigation | Total | |
| **Adams** | 0.7 | 2.2 | 0.00 | 0.8 | 0.0 | 0.3 | 405.0 | 409.3 | 0.2% |
| **Asotin** | 0.0 | 1.2 | 0.04 | 0.1 | 0.0 | 0.0 | 3.3 | 4.7 | 0.7% |
| **Benton** | 3.5 | 20.0 | 0.08 | 0.5 | 0.2 | 7.4 | 858.6 | 890.3 | 0.4% |
| **Chelan** | 0.5 | 3.7 | 0.00 | 0.0 | 0.4 | 1.0 | 172.3 | 177.9 | 0.3% |
| **Clallam** | 1.9 | 6.0 | 0.02 | 0.1 | 0.3 | 0.0 | 22.8 | 31.2 | 6.1% |
| **Clark** | 10.4 | 30.6 | 0.08 | 0.5 | 0.1 | 9.0 | 18.6 | 69.2 | 15.0% |
| **Columbia** | 0.1 | 0.2 | 0.01 | 0.1 | 0.1 | 0.0 | 10.3 | 10.8 | 0.7% |
| **Cowlitz** | 2.3 | 7.4 | 0.02 | 0.1 | 0.3 | 12.3 | 10.7 | 33.2 | 7.0% |
| **Douglas** | 0.5 | 3.8 | 0.03 | 0.1 | 0.2 | 0.2 | 83.4 | 88.3 | 0.6% |
| **Ferry** | 0.4 | 0.3 | 0.00 | 0.1 | 0.1 | 0.0 | 11.9 | 12.9 | 3.1% |
| **Franklin** | 1.9 | 7.8 | 0.06 | 0.9 | 0.2 | 0.4 | 1412.1 | 1423.3 | 0.1% |
| **Garfield** | 0.1 | 0.2 | 0.00 | 0.1 | 0.1 | 0.0 | 1.9 | 2.4 | 3.9% |
| **Grant** | 4.6 | 16.1 | 0.03 | 2.7 | 0.4 | 0.3 | 3024.0 | 3048.2 | 0.1% |
| **Grays Harbor** | 0.2 | 0.9 | 0.03 | 0.3 | 0.5 | 1.1 | 15.5 | 18.5 | 1.0% |
| **Island** | 0.3 | 2.0 | 0.02 | 0.1 | 0.0 | 0.0 | 2.8 | 5.3 | 6.2% |
| **Jefferson** | 0.4 | 1.3 | 0.05 | 0.1 | 0.1 | 0.2 | 3.4 | 5.6 | 7.5% |
| **King** | 0.9 | 64.9 | 0.50 | 1.0 | 0.4 | 0.8 | 18.8 | 87.4 | 1.0% |
| **Kitsap** | 2.6 | 10.2 | 0.05 | 0.0 | 0.3 | 0.1 | 4.1 | 17.4 | 15.0% |
| **Kittitas** | 1.5 | 6.0 | 0.05 | 0.4 | 0.0 | 0.1 | 720.9 | 729.0 | 0.2% |
| **Klickitat** | 1.9 | 3.6 | 0.05 | 0.3 | 0.5 | 0.1 | 92.9 | 99.3 | 1.9% |
| **Lewis** | 2.8 | 3.7 | 0.14 | 1.0 | 0.2 | 0.3 | 28.1 | 36.2 | 7.8% |
| **Lincoln** | 0.8 | 1.7 | 0.01 | 0.3 | 0.0 | 0.0 | 91.5 | 94.3 | 0.8% |
| **Mason** | 1.3 | 4.1 | 0.03 | 0.0 | 1.4 | 0.9 | 3.2 | 11.0 | 12.2% |
| **Okanogan** | 4.5 | 6.2 | 0.02 | 0.5 | 0.5 | 0.2 | 214.9 | 226.9 | 2.0% |
| **Pacific** | 0.5 | 1.9 | 0.02 | 0.2 | 0.1 | 0.1 | 8.2 | 11.0 | 4.1% |
| **Pend Oreille** | 0.7 | 0.7 | 0.12 | 0.1 | 0.0 | 0.1 | 1.9 | 3.6 | 20.7% |
| **Pierce** | 2.9 | 47.1 | 0.50 | 0.5 | 1.8 | 2.3 | 25.0 | 80.2 | 3.6% |
| **San Juan** | 0.2 | 0.3 | 0.01 | 0.0 | 0.0 | 0.0 | 0.3 | 0.9 | 25.8% |
| **Skagit** | 0.3 | 2.0 | 0.04 | 1.4 | 0.1 | 0.4 | 42.7 | 46.9 | 0.7% |
| **Skamania** | 0.1 | 0.3 | 0.00 | 0.0 | 0.8 | 0.7 | 2.0 | 4.0 | 3.6% |
| **Snohomish** | 3.9 | 35.8 | 0.20 | 1.3 | 0.3 | 5.5 | 15.1 | 62.2 | 6.3% |
| **Spokane** | 22.6 | 138.9 | 0.21 | 0.5 | 0.1 | 3.4 | 33.2 | 198.9 | 11.4% |
| **Stevens** | 2.5 | 4.3 | 0.05 | 0.5 | 0.4 | 0.0 | 32.9 | 40.8 | 6.2% |
| **Thurston** | 3.1 | 10.1 | 0.10 | 1.0 | 0.6 | 0.4 | 22.4 | 37.6 | 8.1% |
| **Wahkiakum** | 0.0 | 0.1 | 0.01 | 0.1 | 0.0 | 0.0 | 1.7 | 2.0 | 2.0% |
| **Walla Walla** | 1.0 | 6.5 | 0.00 | 0.3 | 0.0 | 1.1 | 353.7 | 362.6 | 0.3% |
| **Whatcom** | 0.6 | 4.5 | 0.06 | 4.8 | 0.1 | 2.2 | 82.9 | 95.2 | 0.7% |
| **Whitman** | 0.1 | 2.3 | 0.00 | 0.2 | 0.0 | 0.1 | 9.6 | 12.4 | 1.1% |
| **Yakima** | 5.0 | 13.2 | 0.02 | 6.4 | 0.1 | 0.7 | 1636.2 | 1661.6 | 0.3% |
| **Total** | 87.8 | 472.7 | 2.7 | 27.7 | 10.5 | 52.0 | 9498.7 | 10152.4 | 0.9% |

Taking into account the totals for all counties combined for the various use categories, the statewide percent of total water use due to permit-exempt domestic water use on a 4-month irrigation season consumptive use basis is estimated to be about 0.9 percent. However, it is critical to recognize that this result is skewed by the large consumptive water use due to irrigation. To help place this in perspective, the second largest water use category, public water supply, also makes up a relatively small portion of consumptive water use, at about 4.6 percent.

It is important to understand the method limitations when interpreting these results. Due to the source data used (Lane, 2009), the most specific consumptive water use estimates we provide are on a county-wide basis. However, even county-specific estimates do not account for the frequent clustering of wells within certain portions of counties.

An analysis based on a watershed or a sub-basin scale would be much more effective when evaluating the relative hydrological and ecological significance of permit-exempt domestic well use. Unfortunately, while the permit-exempt domestic well use data would lend itself to such detailed analyses, it would be difficult to geographically break out the total water use estimates for the other categories of use. However, since geographical distribution is important, we conducted GIS analyses to illustrate the distribution differences of three major categories of water use.

Figures 7 and 8 present the following information:

- Locations of domestic and other use wells (thus a statewide total of 17,800 wells versus the 17,200 permit-exempt domestic wells) drilled January 1, 2008 - September 4, 2014, that potentially are permit exempt
- USGS Hydrologic Unit Code (HUC) 12 boundaries
- Public Land Survey (PLS) sections with irrigated acreage
- Water system service areas
- County boundaries
- Water Resources Inventory Area (WRIA) boundaries

The PLS sections with irrigated acreage represent data presented in the 2010 WSDA Crop Distribution Geodatabase, created and maintained by the Washington State Department of Agriculture. These delineations do not represent exact areas where irrigation water was used, and instead represent PLS sections (typically 1 square mile areas) where at least some irrigation is occurring. Regarding water system service areas, it is important to bear in mind that the sources for these water systems may be located outside of the service area boundaries. The WRIA boundaries depicted in Figures 7 and 8 represent 63 watersheds designated by Ecology. The USGS HUC 12 boundaries represent subbasins within the watersheds, based on a multi-level, hierarchical drainage classification scheme that divides all watersheds in the United States according to hydrographic and topographic criteria.

While the information in Figures 4, 5 and 6 and Table 3 pertain to all permit-exempt domestic wells, well locations depicted in Figures 7 and 8 only pertain to those wells drilled since January 1, 2008.

Taken collectively, the permit-exempt domestic well locations, the polygons representing irrigated acreage and the water system service areas provide the geographic distribution of three major categories of water use.

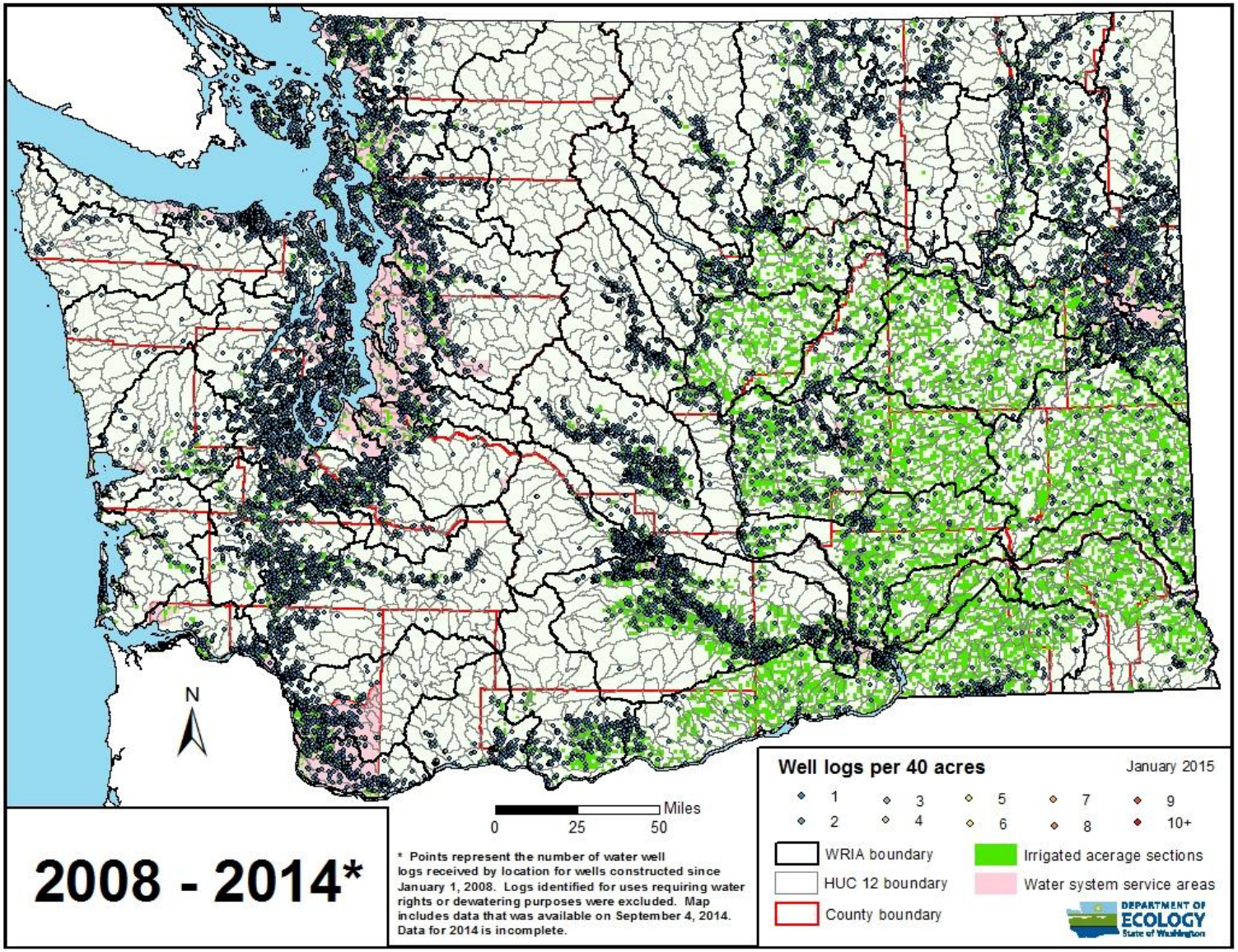


**Figure 7. Statewide permit-exempt wells (all types of use), irrigated acreage, and water system service areas.**

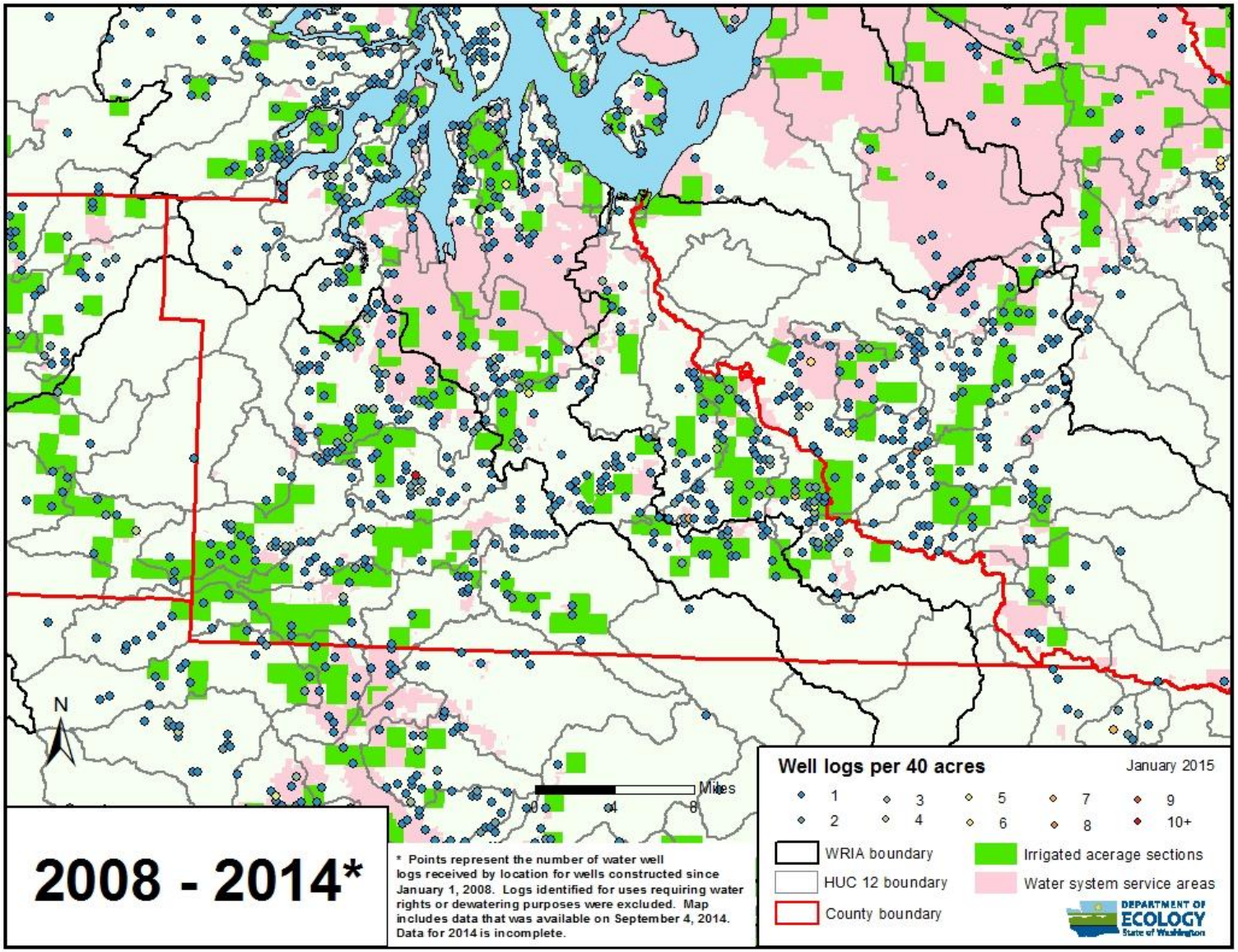


**Figure 8. Thurston County and vicinity permit-exempt wells (all types of use), irrigated acreage, and water system service areas.**

What is evident in Figures 7 and 8 is that county-wide results often miss critical detail with respect to the permit-exempt domestic use. This is indicated on the statewide map in counties where specific subbasins have greater densities of permit-exempt domestic wells. Figure 8, depicting Thurston County, illustrates that while certain HUC 12 subbasins are largely supplied by public water; other adjacent subbasins receive little or no public water and therefore have a greater number of permit-exempt domestic wells.

Differences in well distribution on a sub-basin basis are also seen in the Skagit River watershed (WRIA 3). A GIS analysis of the density of these wells was conducted using utility information in Skagit County parcel data; along with Ecology's land use parcel layer for portions of Lower Skagit, Fisher Creek, Everett Creek, and unassigned Upper Skagit subbasins in Snohomish County.

This analysis included a number of simplifying assumptions, such as grouping properties within subbasin boundaries based on property centroids[6] and parcel layer subsets. Based on this analysis and as shown in Table 4, the estimated density of Skagit County permit-exempt domestic wells ranged from 0.1 well per square mile in the Finney Creek and Illabot Creek subbasins, to 37 wells per square mile in the Fisher Creek subbasin. This range of permit-exempt well density for WRIA 3 – Lower Skagit Watershed is also shown in Figure 9.

**Table 4. Estimated well density in the Skagit River watershed subbasins.**

| Lower Skagit | Density (wells per square mile) | Middle Skagit | Density (wells per square mile) | Upper Skagit | Density (wells per square mile) |
|---|---|---|---|---|---|
| Fisher Creek | 37.0 | Alder Creek | 1.1 | Grandy Creek | 4.7 |
| Carpenter Creek | 6.2 | Anderson/Parker/Sorenson Creeks | 4.4 | Barr Creek | 1.1 |
| Hansen Creek | 20.0 | Careys Creek | 11.7 | Corkindale Creek | 2.0 |
| Nookachamps Creek - East Fork | 1.5 | Childs/Tank Creek | 17.5 | Diobsud Creek | 0.6 |
| Nookachamps Creek - Upper | 7.7 | Coal Creek | 25.5 | Finney Creek | 0.1 |
| Skagit-Lower | 5.3 | Day Creek | 1.4 | Gravel Creek | 1.6 |
| | | Gilligan Creek | 1.0 | Illabot Creek | 0.1 |
| | | Jones Creek | 4.2 | Jackman Creek | 0.4 |
| | | Loretta Creek | 1.4 | Olson Creek | 1.5 |
| | | Mansser Creek | 16.4 | Prairie Creek | 1.5 |
| | | Morgan Creek | 13.1 | Rocky Creek | 0.3 |
| | | Muddy Creek | 14.2 | Hobbit Creek | 0.9 |
| | | O'Toole Creek | 0.0 | Everett Creek | 11.9 |
| | | Red Cabin Creek | 4.5 | Skagit-Upper unassigned | 0.6 |
| | | Salmon/Stevens Creeks | 9.5 | | |
| | | Wiseman Creek | 11.5 | | |
| | | Skagit-Middle | 12.9 | | |

[6] A "centroid" is the geometric center of a surface area. If a straight line were to slice the area into two equal portions, it would always pass through this point, no matter the angle.

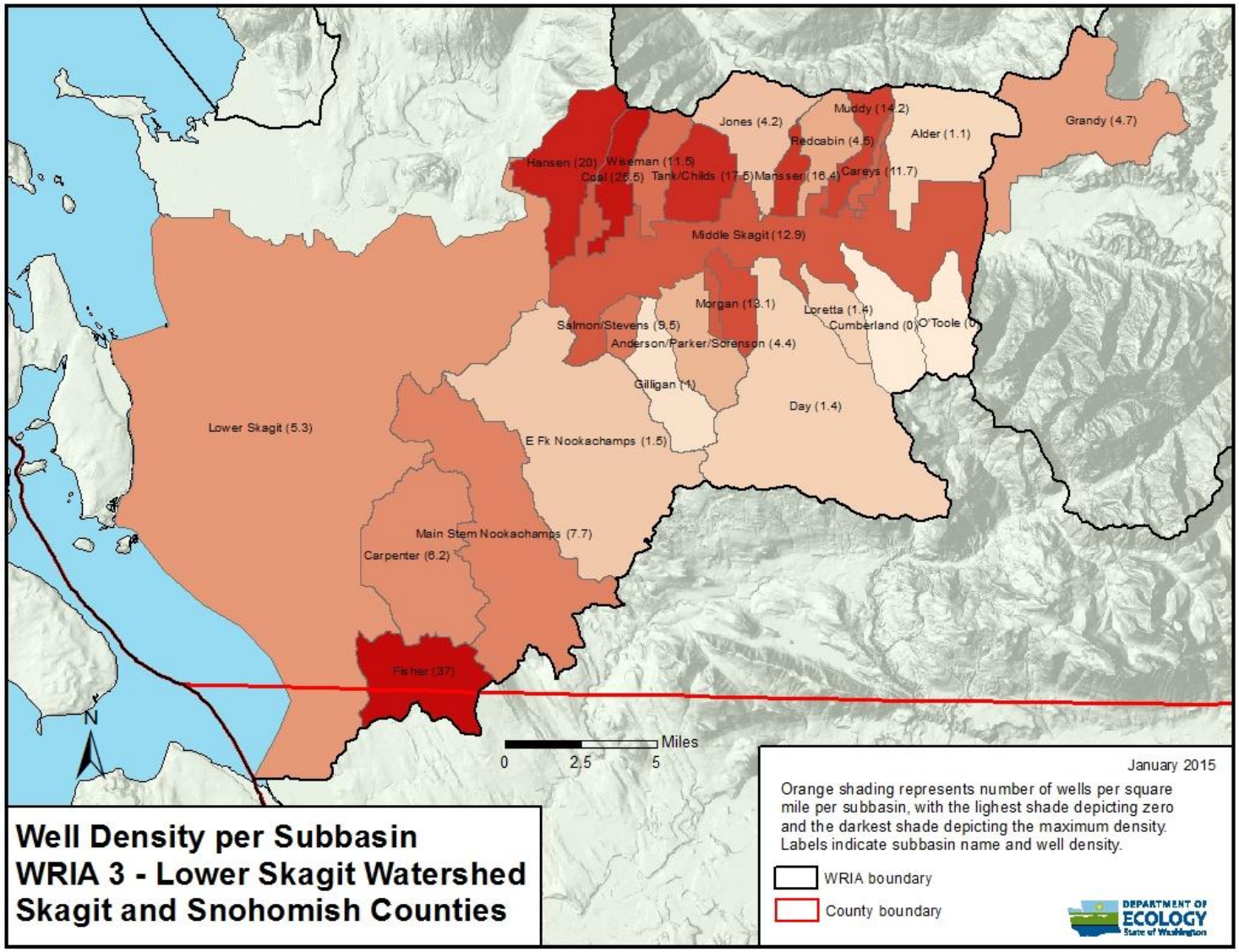


**Figure 9. Range of permit-exempt well density in WRIA 3 – the Lower Skagit Watershed.**

# Other Washington Studies

Beyond statewide estimates of Washington water use produced by the USGS every five years, there have been several localized water use studies.

## Skagit Basin Investigation

Golder Associates studied permit-exempt well water use in the Skagit Basin (WRIA 3). This work was initially conducted under contract to the Skagit County Public Works Department during a project jointly funded by Skagit County, Ecology, and the City of Anacortes (Golder Associates, 2013). The project was then extended a second year under an additional contract with Ecology (Golder Associates, 2014). The primary objectives of that study were to:

- Identify a network of volunteer permit-exempt well users to install meters and collect monitoring data on water use over a period of at least one year.

- Create a database for managing information collected from the metering program.

- Statistically analyze attributes of the metered properties in comparison to other parcels in the Fisher-Carpenter and Upper Nookachamps (also referred to as the Main Stem Nookachamps) sub-basins.

- Estimate indoor versus outdoor use, where feasible, based on the metering records.

During this study, 18 properties served by permit-exempt wells in the Carpenter-Fisher and Upper Nookachamps sub-basins were supplied flow meters and monitored for groundwater use. Estimates of indoor versus outdoor use were developed, where feasible, based on the metering records. A statistical analysis of the data was conducted to determine if the data from the monitored properties was representative of unmonitored parcels. Some conclusions from this study include:

- For combined 2012-2013 data, total average annual daily use ranged from 68 to 723 gpd, with an average for all of the properties of 188 gpd.

- The estimated average annual indoor daily use ranged from 41 to 289 gpd, with an average of 131 gpd for the 17 properties where it was estimated. Average annual outdoor daily use ranged from 6 to 112 gpd with an average of 56 gpd for the 10 properties where it was estimated.

- Precipitation at the WSU Mount Vernon station during the expected outdoor watering season (May through October) was evaluated and compared to other years.

- Comparing the available data for 1994 through 2012, low amounts of precipitation during the 2012 irrigation season resulted in a relatively high level of total water use compared to a typical year.

- Comparing the available data for 1994 through 2013, low amounts of precipitation data during the 2013 irrigation season again resulted in significantly more outdoor water use compared to a typical year.

- Based on the study results, total water use during the irrigation season (May through September) was 265 gpd (131 gpd indoor plus 134 gpd outdoor), and consumptive water use during the irrigation season was 134.1 gpd (13.1 gpd indoor plus 121 gpd outdoor).

Figure 10 below presents mean daily groundwater use (weekly average) for all metered properties during this Golder study.

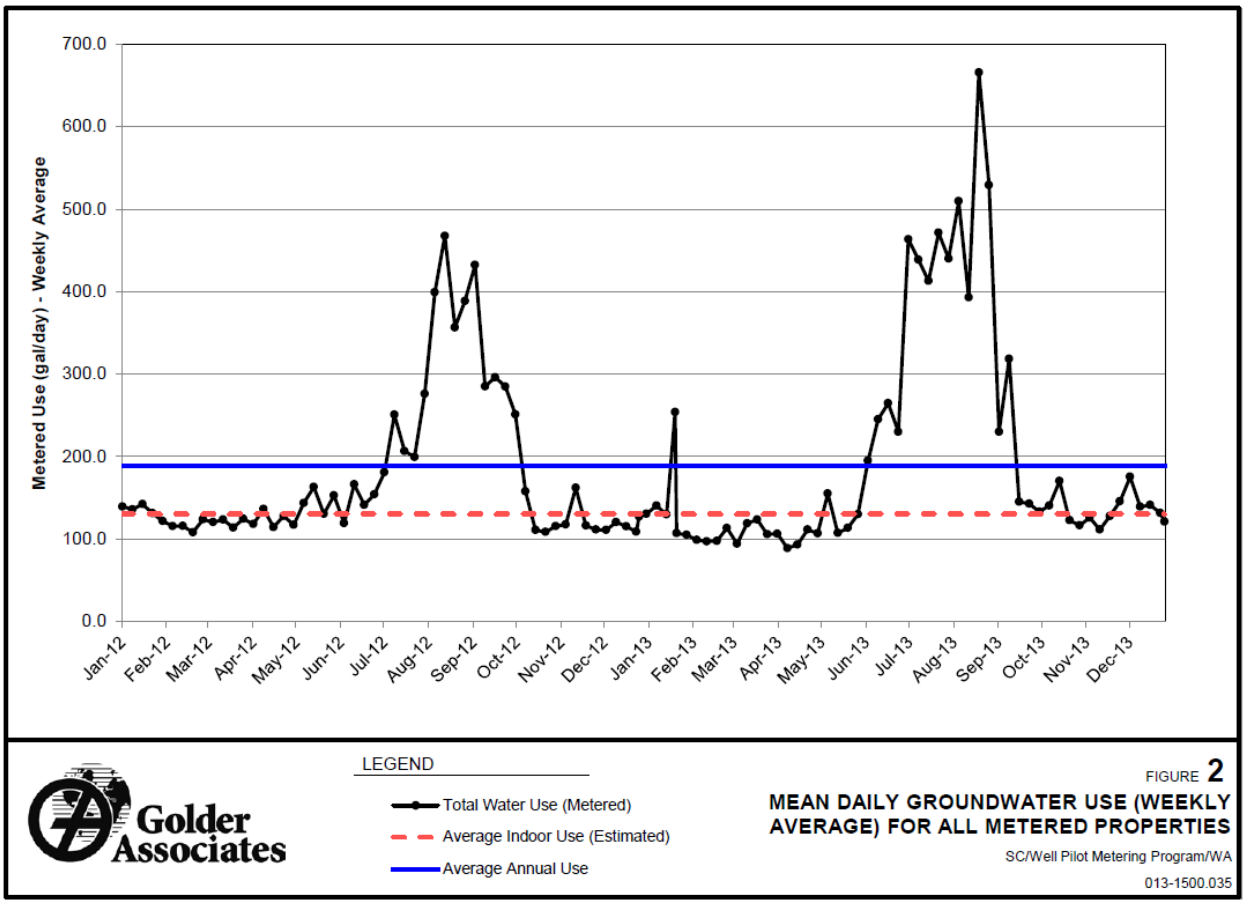


**Figure 10. Skagit County permit-exempt well metering program mean daily groundwater use (weekly average) for all metered properties (Figure 2 in Golder Associates, 2014).**

# Spokane County Water Resources Investigation

In 2010, Spokane County Water Resources, in conjunction with Tetra Tech and Camp Dresser & McKee Inc., developed a county-wide water demand forecast model (Spokane County Water Resources, 2011 and 2013). The model is capable of forecasting demand for numerous water use sectors, at various spatial scales and time horizons. In order to extend the more-detailed public supply water use data to rural residential water use, the county also conducted a Spokane County Residential Water Use Survey. Survey results suggest that single family self- supplied residential water use is similar to public water systems. Therefore, the single family public supply (SFPS) model was used for the rural residential water sector with some modifications to account for differences.

One important finding of Spokane County's investigation was that while the self-supplied residential sector represents only approximately 7 to8 percent of total water demand, the associated water use can be significant at the sub-basin level. This is because several streams within Spokane County have summer low flows near 1 cfs. For example, in the California – Lower Rock Creek sub-basin, the forecasted increase in summer withdrawal was between 57 and 255 percent of stream flow. Although, the report notes the specific hydrogeology needed to evaluate the impacts of withdrawals on streams is not fully understood, Table 16 in the report (Table 5 below) presents stream flow and projected increases for average and July rates of withdrawal for selected sub-basins. Based on the information presented, it can be inferred that increased withdrawal could cause significant impacts to these streams.

**Table 5. Stream flow and withdrawal increases for selected Spokane County sub-basins (Table 16 in Spokane County Water Resources, 2011).**

| Subbasin | Minimum Summer Low Flow (CFS) | Maximum Summer Low Flow (CFS) | Average Withdrawal (CFS) | | | | July Withdrawal (CFS) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2010 | 2040 | Change | % Increase | 2010 | 2040 | Change | % Increase |
| California – Lower Rock Creek | 0.42 | 1.87 | 0.94 | 1.40 | 0.46 | 49% | 2.17 | 3.25 | 1.07 | 49% |
| Latah Creek | 5.10 | 14.0 | 1.28 | 2.29 | 1.01 | 79% | 3.04 | 5.44 | 2.40 | 79% |
| Marshall Creek | 1.60 | | 0.62 | 1.28 | 0.66 | 106% | 1.38 | 2.85 | 1.47 | 106% |
| Deep Creek | 1.5 – 0.6 | | 1.23 | 2.03 | 0.79 | 64% | 2.76 | 4.54 | 1.78 | 64% |

Notes: California-Lower Rock Creek values are a combination of flow measurements taken at the outlet of each creek. The California-Lower Rock Creek and Latah Creek minimum and maximum values measured by the Spokane County Conservation District (SCCD) between 2001-2010. The Marshall Creek value was measured by SCCD on September 8, 2010. Deep Creek values taken from the *Draft Technical Memorandum Field Data Collection and Phosphorus Loading Summary, Deep Creek Field Data Collection Area, HDR and GeoEngineers, 2010.*

The results of the Spokane County investigation can also be used to evaluate the validity of estimates in our report. Ecology contacted Spokane County and obtained 2010 water use estimates that were developed as part of the study, but not included in the county's reports. Specifically, the following estimates were obtained for single-family, self-supplied residences, average use per connection, consumptive use:

| | |
|---|---|
| May | 815 gpd |
| June | 830 gpd |
| July | 1,204 gpd |
| August | 1,128 gpd |

This results in an average consumptive use of 995 gpd for that time period.

# Washougal River Watershed

Pacific Groundwater Group (PGG) estimated the effect of permit-exempt wells on baseflow[7] in the Washougal River watershed on behalf of the WRIA 27/28 watershed planning unit (PGG, 2003). The number of permit-exempt wells in each sub-watershed was estimated by counting well logs in Ecology's well log database (Figure 11 below). The groundwater withdrawal for each permit-exempt well was assumed to average 290 gallons per day (gpd), and return flow to the uppermost aquifer through septic systems and excess irrigation was assumed to be 70 percent of 290 gpd. Therefore, water consumption was estimated to be 87 gpd per well.

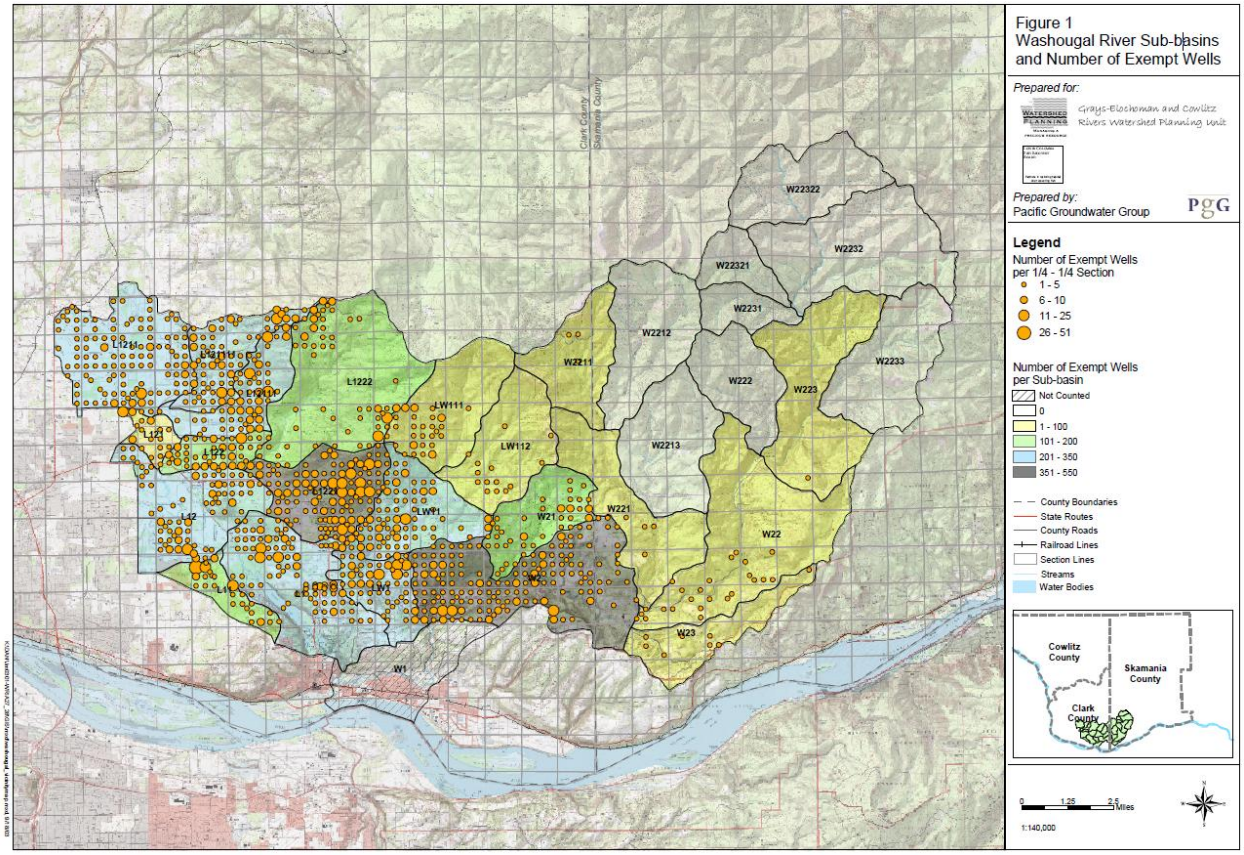


**Figure 11. Washougal River watershed permit-exempt wells (Figure 1 in PGG, 2003).**

A critical assumption during PGG's study stemmed from the relative hydrogeologic homogeneity and elevation consistency within the bedrock and Upper Troutdale aquifers. The sub-basin from which a given well captured all its consumed surface water was identified by comparing well bottom elevations to the streambed elevation at the mouth. If a well did not penetrate below the elevation of the sub-basin outlet, it was assumed that it captured most of its water from the sub-basin in which it was located. Otherwise, it was assumed that it most likely captured its water from the first downstream sub-basin to have an outlet elevation lower than the well bottom. To estimate the percent of baseflow that would be captured by permit-exempt

[7] "Baseflow" is the stream flow resulting from groundwater discharge to the stream.

wells, the 70 percent return flow from each well was assumed to return to the unconfined aquifer of the sub-basin where the well was located.

Based on this methodology, PGG report concluded that the baseflow capture per sub-basin ranged from gains of up to 0.06 cfs and losses of up to 0.34 cfs. The report concluded that capture losses were as much as 3.3 percent of estimated lowest mean monthly baseflow, and capture gains were as much as 6.8 percent of baseflow. Net baseflow gains were assumed to occur when return flow from deeper wells in a sub-basin exceeded the capture by shallower wells in the sub-basin and any deeper wells in an upstream sub-basin. A key assumption for net gain was that all groundwater pumped by the deeper wells was captured from a downstream sub-basin, whereas 70 percent of the withdrawal returned to the sub-basin where the well was located.

Tallying all of the sub-basin results in PGG's report, produces an estimated net flow loss of 0.453 cfs for the watershed. However, technically this is not equivalent to the net flow change in the Washougal River as a result of permit-exempt well use, since exempt wells in sub-basin W1 were not counted during this study.

# Discussion

Ecology's Well Construction and Licensing System database cannot yield precise numbers regarding the number of new permit-exempt domestic wells. However, making various assumptions we conclude that approximately 17,200 permit-exempt domestic wells were drilled statewide from 2008 through September 4, 2014 - ranging from about 17 wells in Garfield County to 1,238 wells in Okanagan County. There are many reasons for the large increase in Okanagan County, including that it is the largest county in the state and nearly all growth is occurring in rural areas outside of municipal supply areas. Other useful information in Ecology's database is that there was a substantial drop in the development of new permit-exempt domestic wells after the recession of 2009, and these wells far outnumber wells for other types of uses.

During this investigation, WDOH Group A public water systems data was also subtracted from U.S. Census Bureau population data on a county-by-county basis to estimate the populations using permit-exempt domestic wells. Results from this analysis suggest that the population served in 2013 was actually less than the population served in 2005 for 19 of 39 counties. Such trends are inconsistent with results of the analysis based on Ecology's Well Construction and Licensing System database, since the latter indicates an increase in the number of permit-exempt domestic well use for every county from 2008 through January 4, 2014.

As discussed in the "U.S. Geological Survey Total Water Use Estimates" section on page 2, there are reasons to question the accuracy of the WDOH Group A public water systems data, since it is based on data reported by public water systems. Similarly, it is known that in some cases non-residential populations have been included along with residential populations. Based

on these concerns and the fact that Ecology's well database information is more directly linked to actual wells drilled, we conclude that Ecology's well drilling data is likely a better indicator of increasing permit-exempt domestic well use. That said, there is no way of knowing to what extent these new permit-exempt domestic wells are actually in use.

In addition to Ecology's analysis of the increase in the number of permit-exempt domestic wells, this study evaluated consumptive water use for all water uses. One significant limitation with Ecology's method involved an assumption that all outdoor water use occurred within a 4-month irrigation season. Outdoor irrigation actually varies widely across the state and on a month-by-month basis, and there are other types of outdoor water use such as that associated with year-round dairy and feedlot operations. However, from an environmental protection standpoint Ecology is most interested in the effects that self-supplied domestic withdrawals have upon summer-season low flows. Therefore, although this study does not evaluate how consumptive water use by permit-exempt domestic wells actually affects streamflows, concentrating outdoor water use into a narrower 4-month time frame provides a more useful gauge of consumptive water use.

A more significant issue with our consumptive water use analysis is that it was based largely on estimates provided in USGS SIR 2009–5128. That report based much of its self-supplied and public-supplied total water use analyses on WDOH Group A water system data. As discussed above, a comparison of actual well drilling data and results of an analysis based on WDOH Group A water system data suggests the latter is inaccurate. Therefore, as there are significant concerns with the SIR 2009–5128 self-supplied results, there are also concerns with Ecology's analyses based on that report's information. That said, SIR 2009-5128 is the only readily available source of information on total water use for different use categories throughout the state, and differences between self-supplied domestic use and other types of use generally are large. Consequently, Ecology believes results of its consumptive water use analysis are instructive.

Bearing in mind the stated limitations on Ecology's analysis, our results suggest the percent of total water use due to permit-exempt domestic water use on a 4-month irrigation season consumptive use basis (the last column in Table 3) ranged from 0.1 percent in Grant and Franklin counties to nearly 26 percent in San Juan County, for an overall statewide proportion of about 0.9 percent. However, it is critical to recognize that this result is skewed by the large role irrigation plays statewide when it comes to consumptive water use. For example, the second largest water use category, public water supply, also constitutes a relatively small percentage of total consumptive water use, as it comprises only about 4.6 percent.

It is also important to understand the method limitations when interpreting these results. Due to the source data used (Lane, 2009), the most specific consumptive water use estimates provided are on a county-wide basis. However, the effects of well use are not constrained by county boundaries. Although an analysis based on a watershed or a subbasin basis would be much more accurate, the base data for the other use categories makes it very difficult to estimate their consumptive water use on a geographic basis.

As a check of Ecology's methods, our results were compared to results from other studies addressing consumptive use within Washington. Golder Associates studied permit-exempt well water use in the Skagit Basin by monitoring groundwater use at 18 properties with permit-exempt wells in the Carpenter-Fisher and Upper Nookachamps sub-basins. Based on Golder's results, total water use during the irrigation season (May through September) was 265 gpd, and consumptive water use during the irrigation season was 134.1 gpd. These numbers differ from our study's Skagit County permit-exempt domestic, 4-month irrigation season estimates, which were 174 gpd for total water-use and 38 gpd for consumptive water use (numbers from spreadsheet calculations that led to results in Table 3). Therefore our results suggest significantly less total and consumptive water use. In part this difference relates to the fact that Golder's data were drawn from only a subset of Skagit Watershed subbasins. Also, as illustrated in Figure 9, there is considerable well density variation throughout the Skagit River watershed.

During another study conducted by Spokane County Water Resources in 2010, they developed estimates of single-family, permit-exempt residential water use based on relationships with single-family public supply data. Results based on their data lead to an estimate of 995 gpd average consumptive water use, for these wells during May through August. This compares with our permit-exempt domestic, consumptive water-use estimate of 838 gpd for Spokane County (from spreadsheet calculations that led to results in Table 3). This indicates our result is about 16 percent less than the Spokane County Water Resources estimate.

To properly evaluate the impacts of permit-exempt domestic wells on streamflow, specific watershed hydrogeology must be considered. If wells are completed in confined aquifers with restricted connections to surface water, the effects of groundwater pumping on nearby streams may be negligible. Moreover, in situations where water discharges from a watershed via both stream discharge and groundwater discharge, any reductions due to consumptive use by permit-exempt domestic wells is divided between reduced surface water flow and reduced groundwater discharge.

PGG attempted to account for both the stream discharge and groundwater discharge pathways when estimating the effects of permit-exempt wells on baseflow in the Washougal River watershed. During that study, assumptions were made regarding two primary aquifers tapped by domestic wells and what that meant for stream capture at the mouth of each sub-basin. As a result, PGG concluded that baseflow capture per sub-basin in the Washougal River watershed ranged from gains of up to 0.06 cfs and losses of up to 0.34 cfs. Tallying the results for all sub-basins produces a net flow decrease of 0.453 cfs. Theoretically this translates to the net flow change in the Washougal River as a result of permit-exempt well use (minus the effects of exempt wells in the lower-most sub-basin). However, due to numerous assumptions, the results are suspect.

One significant limitation inherent in this Ecology statewide assessment is that it essentially assumes an even distribution of permit-exempt domestic wells across each county. Obviously this is not the case, and if a large number of wells are clustered within a small watershed the effects of those wells can be much more substantial. However, while this sort of scenario may exist in some areas, most permit-exempt domestic well water-use scenarios in Washington are

not so dramatic. In situations where any of the following apply, well development would result in smaller summer low-flow effects:

- Discharge from the watershed is a combination of surface and subsurface flow.
- There are a small number of permit-exempt wells.
- Homes have little to no landscaping/use highly efficient landscape irrigation systems.
- Residences are used as vacation homes only.
- Wells are completed in confined aquifers with restricted connections to streams.
- Each well supplies only one single family residence.
- Stream flows are high during summer months.

# Conclusions

The number of permit-exempt domestic wells throughout Washington has grown significantly. Our analysis suggests that statewide, during the irrigation season, self-supplied wells account for about 0.9 percent of the overall consumptive water use. However, according to our estimates even public water supply systems account for only about 4.6 percent of consumptive water use in Washington, and overall most consumptive water use is due to irrigation.

It is critical to view this study's consumptive use estimates in the context of method limitations. From a water management perspective, scenarios of greatest concern involve: (1) relatively small watersheds where many permit-exempt domestic wells are drilled in aquifers highly connected to small streams, (2) a considerable amount of outdoor watering, and/or (3) surface water use in endangered aquatic species habitat.

Areas with high concentrations of permit-exempt domestic wells were not specifically addressed during this study. However, that does not diminish this study's usefulness. Analyses indicate that permit-exempt domestic wells may have a relatively small impact related to total consumptive use when looked at countywide or statewide. Still, there are areas with high densities of permit-exempt domestic wells where the impacts on streams can be significant. Ecology suggests that the greatest return from a water management perspective will be gained by focussing on areas where the potential impact is greatest. These types of scenarios can only be analyzed with detailed analyses that evaluate factors such as hydrogeology, site-specific outdoor water use, detailed distributions of wells, legal water availability, and so on. Such factors were not considered during this analysis; however, Ecology may explore these variables for representative situations during future focused studies in selected basins.

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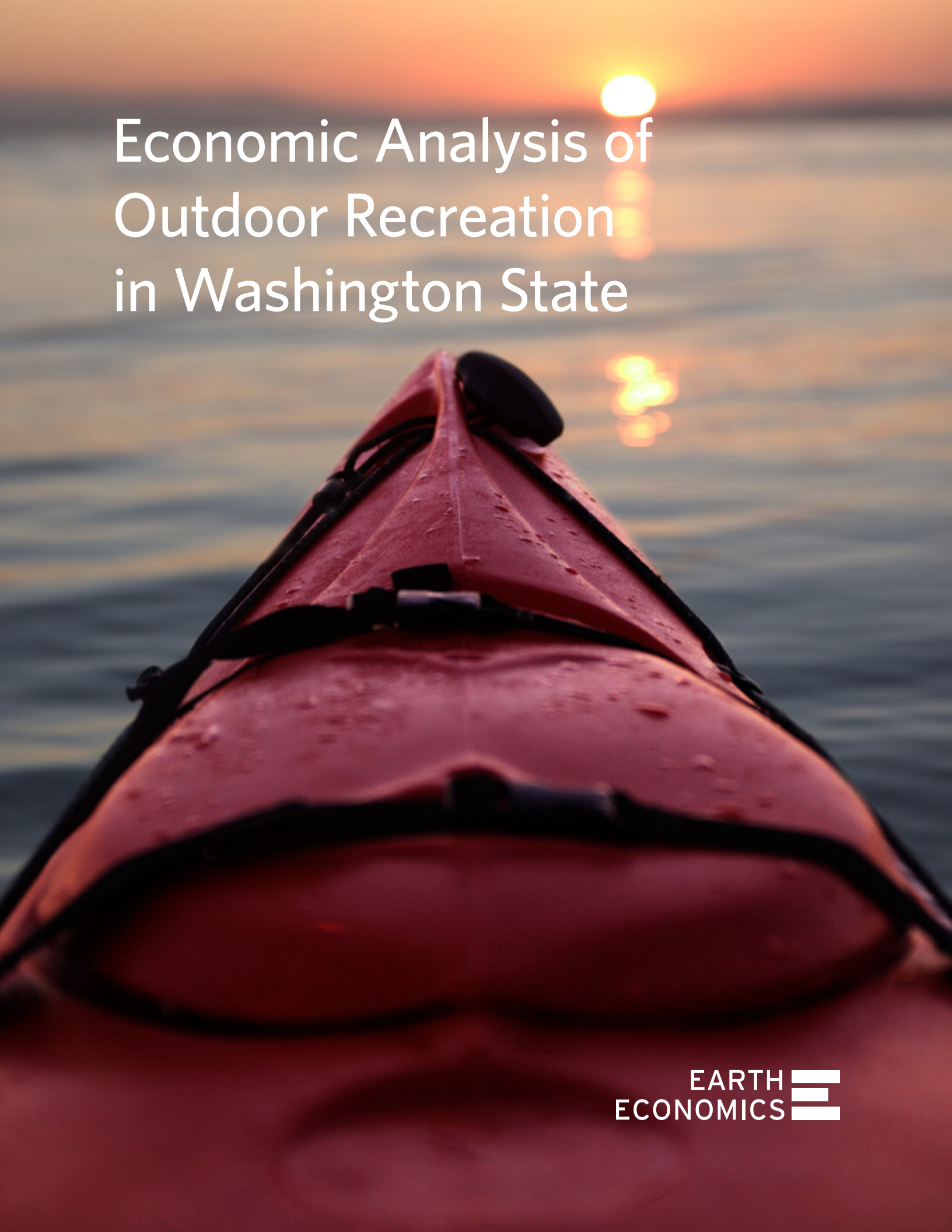
# Economic Analysis of Outdoor Recreation in Washington State



EARTH ECONOMICS

# Economic Analysis of Outdoor Recreation in Washington State

January 2015
Report Version 1.2

**Prepared By:**

Earth Economics
Tacoma, Washington

**Prepared For:**

Washington Recreation and Conservation Office
Olympia, Washington

**Primary Authors:**
Tania Briceno, Ecological Economist, Earth Economics
Greg Schundler, GIS and Research Analyst, Earth Economics

**Suggested Citation:**
Briceno, T., Schundler, G. 2015. Economic Analysis of Outdoor Recreation in Washington State. Earth Economics, Tacoma, WA.

**Production Team:**
Aaron Schwartz, Research Analyst, Earth Economics
Angela Fletcher, Research Analyst and Graphic Designer, Earth Economics
Johnny Mojica, Research Assistant, Earth Economics
Peter Casey, Research Assistant, Earth Economics

**Contributors:**
Wendy Brown, Advisor and Editor, Washington Recreation and Conservation Office
Jim Fox, Advisor and Editor, James Fox Consulting
John Loomis, Advisor and Editor, Colorado State University

**Acknowledgements:**
Leslie Connelly and Kaleen Cottingham from Washington's Recreation and Conservation Office provided valuable feedback as well as Jim Cahill from the Washington State Office of Financial Management. Rebecca Hill from Colorado State University provided feedback on IMPLAN modelling and Randy Rosenberger from Oregon State University helped through his recreation value database. We would also like to thank all the agencies and associations that collaborated with data collection. Thanks to Brenden Mclane, Chelsey Aiton, and Professor Robert Aguirre who provided assistance as part of course work for the University of Washington Professional Master's Program in GIS & Sustainability Management.

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# Glossary of Terms Used in this Study

## Economic Terms

***Recreation-related Expenditures*—**The total amount of money spent on outdoor recreation, including equipment, travel and lodging, entrance fees, and food and beverages, among others. In this study, all expenditures were calculated as estimates of Washington State recreational patterns. Most of these expenditures were made within Washington.

***IMPLAN*—**IMPLAN is an industry-standard economic modeling software package that allows the user to estimate total economic activity generated by expenditures in a regional economy. County and statewide IMPLAN models were used in this report.

***Economic Contribution*—**The portion of an initial expenditure that circulates throug the local economy (in this case the state or county economy). Total economic contribution is the sum of direct contribution, indirect contribution and induced contribution.

***Direct Contribution*—**Direct sales or margins of sales associated with the initial expenditure. Some expenditures are assumed to translate into purchases made outside the state, as determined by the IMPLAN model.

***Indirect Contribution*—**Sales to the businesses where expenditures are made (e.g. intermediary inputs bought in the supply chain). A gas station buying gasoline refined in Washington State or a grocery store buying produce grown in the state creates an indirect contribution to the state's economy.

***Induced Contribution*—**Sales of goods and services purchased by employees of directly and indirectly affected businesses. A Cabela's employee that buys locally-produced milk is creating an induced contribution for the Washington economy.

***Economic Effect*—**Economic effects differ in a fundamental way from economic impacts. Economic effects can be generated by in-state recreation participants as well as out-of-state visitors. However, the in-state participants on public recreation land would likely spend some of their money elsewhere in Washington State if few or no recreational opportunities were available.

***Economic Impact*—**The net changes in new economic activity associated with the sector analyzed (i.e. outdoor recreation economy). In this study, the economic impact is the portion of the total economic contribution that is the result of spending by out-of-state visitors.

***Economic Multiplier*—**In this report the economic multiplier refers to the ratio between initial expenditures and total economic contribution (also called Keynesian multiplier). It shows how initial expenditures generate additional economic activity as the initial money is re-spent by other businesses and workers. An illustration of this follows below:

> A hotel is paid $150 to house a recreation participant for the night. The hotel owner keeps $15 as profit, employees are paid $85 and $50 are spent importing goods from out of state (rent and taxes

are ignored for brevity). The employees spend $85 on food. Most of the food is imported from out of state so only $10 of the expenditure goes to wages and profit for the grocery store. The hotel owner sends his $15 to his daughter in California creating no further economic activity in Washington. Currently there has been $110 ($15 profit + $85 wages + $10 to grocery store) in economic activity from the initial $150. If no further activity occurs then the multiplier will be .73 (110 divided by 150).

*Economic Sector*—The economic sectors in this report come from IMPLAN's 400+ sector database. Each sector produces a unique good or service (gasoline, transportation, food and drink, medical care etc.). Each sector also has unique products, services, wages and profits that businesses in that sector purchase in order to operate. The intricacy of this model allows IMPLAN to output very detailed economic data.

*Economic Activity*—Economic activity refers to different types of economic exchanges as they circulate through a region's economy. In this study, the direct, indirect, and induced contributions represent total economic activity (e.g. sales, production and consumption of goods and services, employment, tax payments, etc.) associated with outdoor recreation. Gross domestic product (GDP) is a common measure of economic activity.

*Economic Leakage*—Money that leaves the regional economy when an expenditure is made by a consumer. Leakages generally result because a portion of the expenditures is made outside the local economy or because producers get their inputs from outside the state. For example, if a recreational boat has to be repaired in Washington, some of the parts needed for the repair may be ordered from California.

*Economic Benefit*—An economic benefit is the wellbeing a consumer derives as a result of her consumption of a specific good or service, expressed in monetary terms. Economic benefits are generally associated with the goods and services people obtain from ecosystems.

*Ecosystem Service Value*—The measurement of economic benefits that people derive from ecosystems, many times expressed as non-market values or market value equivalents.

*Consumer Surplus*—Consumer surplus is the value a person realizes from engaging in an outdoor recreational activity that is above the expenditures incurred.

## Recreational Terms

*Participant Day*—A singular visit to a recreational land or a one-time engagement by one individual in a recreational activity.

*Visitors*—Recreation participants from out-of-state that visit one of Washington State's recreational areas.

*Recreation Participants*—Recreation participants are people that engage in recreation irrespective of the frequency in which they engage in the activity.

*Local Parks*—We assumed that recreation participants at county and city parks have very similar expenditures, therefore county and city parks are aggregated into the "local parks" category.

*Events*—Special events held on public lands such as youth sport tournaments, marathons, bike races, wildlife festivals, and other participatory sporting and recreation events. The majority of events are assumed to happen on local lands.

## Types of Expenditures

*Expenditure Category*—Expenditures made by consumers of recreation, grouped into general categories. Assumptions made in order to appropriately allocate expenditures to IMPLAN sectors are detailed in Appendix E.

*Government Fees*—Any payment from recreation participants to government enterprises, typically access fees. This could be for using public boat launches, paying for a Discover Pass, or registering a snowmobile. Does not include expenditures paid to public agencies for overnight accommodations.

*Fees to Private Recreational Providers*—Payments made to private recreation providers such as downhill ski areas, private timberland owners, private golf courses and horse-riding businesses. A trip that is primarily to publicly owned land may also feature some use of private recreation providers such as a rafting company providing guided trips on public waters.

*Equipment Expenditures*—Equipment expenditures are calculated based on the number of participants and average lifespan of the equipment good. They are classified as retail sales and are based on U.S. Census data yearly sales. These expenditures are attributed to the home state or county of the recreation participant.

*Trip Expenditures*—Trip expenditures occur on nearly every trip that a recreation participant takes to recreational lands. The primary elements of this are transportation, food and beverages, and lodging. They are allocated to the destination site.

## Tax Categories Used for Economic Contribution Analysis

*Employee Compensation*—Taxes that go towards social insurance programs, such as disability and unemployment programs.

*Tax on Production and Imports*—Taxes comprised of non-personal property taxes, licenses, sales, gross receipts, and excise taxes. Gross receipts taxes are levied on the gross income a business receives. Excise taxes are levied on particular goods and services like petroleum products, liquor, and public utilities.

*Household Taxes*—Taxes comprised of fines and fees paid to local and state governments. This includes recreational motor vehicle licenses, property taxes, and fishing and hunting licenses.

*Corporations*—Taxes on corporate dividends.

# Executive Summary

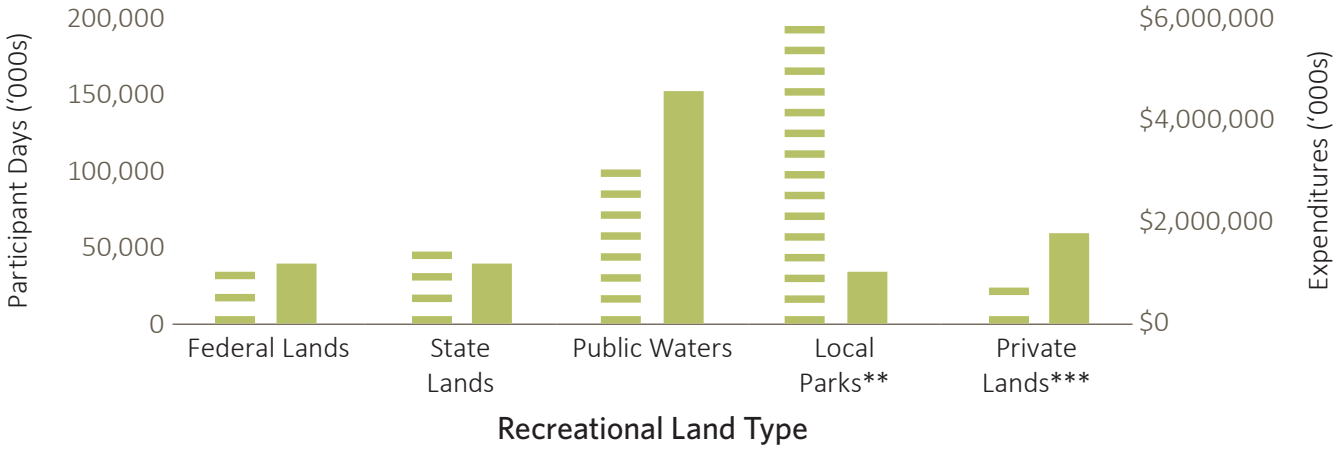
From hikes in the desert to a ski run down a mountain side to clam digging at the ocean, Washington State residents have numerous choices when deciding what to do outside. The state's rich outdoor recreation choices also provide jobs to many families and businesses. This study quantifies the contribution of outdoor recreation to Washington State's economy and way of life. This report was written as required by the 2013-2015 biennial operating budget (Chapter 221, Section 304, Laws of 2014).

The benefits of Washington's outdoor recreation industry go beyond supporting jobs to include creating a way of life. It is estimated that Washingtonians, on average, spend 56 days a year recreating outdoors. According to the recreation surveys and public land records used in this study, there were a total of about 446 million participant days a year spent on outdoor recreation in Washington, resulting in $21.6 billion dollars in annual expenditures.

Expenditures were highest for recreation associated with public waters. Water recreation includes a number of activities with high trip and equipment expenditures, especially motorized boating. Ranking second were special events such as sports tournaments and races, which generally involve fees and attract overnight stays. Ranking third was recreation on private lands, which includes expensive recreation activities such as golf, skiing, and off-highway vehicle riding and hunting, which often occur on private timberland. Local parks are the most common place for people to visit as well as the most accessible and least costly destination.

Figure 1 shows the total expenditures and total participant days for different recreational land types. Note that data was only available for a limited range of private recreation lands (ski areas, golf courses, private timberland, and horse-related businesses).

Figure 1. Participant Days and Expenditures for All Lands




*Excludes equipment expenditures, which total $8,974,243,000

**Excludes events occurring on public lands, which total $1,986,000 in expenditures

***A limited number of private lands were included in this analysis

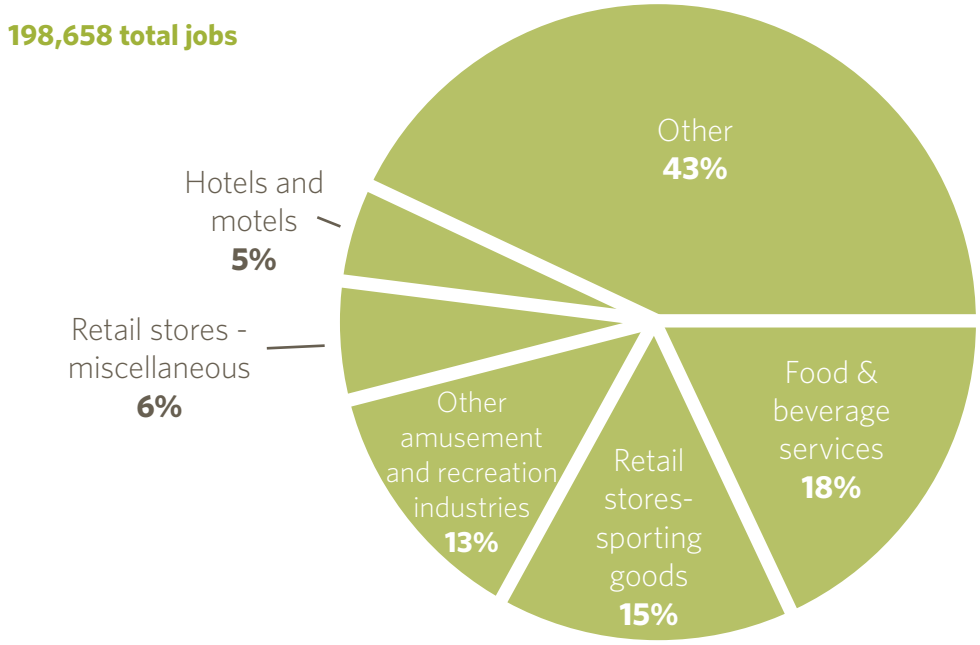
KEY
Participant Days
Expenditures*

An economic contribution analysis, conducted through use of an economic modeling program known as IMPLAN, demonstrates how money spent on outdoor recreation flows through the local and state economies, promoting exchange from one business to another. Of the $21.6 billion of outdoor recreation spending in Washington, about $9.1 billion is transferred to out-of-state producers of related goods and services. This leaves about $12.5 billion in direct sales to circulate through the local economy (direct economic contribution), producing, in turn, $3.3 billion in supply chain activity to create outdoor recreation goods and services (indirect economic contribution) and $4.7 billion in household wages that further stimulate economic activity (induced economic contribution). Thus, in total, economic contributions to the state economy amount to $20.5 billion every year.

Nearly 200,000 jobs are supported in Washington State as a result of outdoor recreation spending. A total of about 122,600 jobs, or about 62 percent, are from expenditures associated with outdoor recreation on public lands. These numbers compare to other major employers in the state such as the information technology (191,000 jobs supported) or the aerospace industry (94,200 jobs supported). Outdoor recreation-related jobs include both full-time and part-time jobs in sectors such as food and beverage services, retail, and general recreational services (Figure 2). In general, these sectors are made up of many businesses ranging from small local shops to large retailers such as REI.

Detailed results for recreation-related expenditures by land type are provided for Washington State as a whole, as well as for counties and legislative districts. These results show that outdoor recreation markets play an important role bridging urban and rural communities. The recreation market is unquestionably one of the largest markets in the state for moving income from urban to rural areas and building sustainable jobs in rural Washington State. Out-of-county visitors create a redistribution of wealth between the place of origin and the destination for recreation. For example, Seattle residents going to Leavenworth for outdoor recreation redistributes income from Seattle to Leavenworth. These dynamics are important to many rural counties.

Figure 2. Employment Supported By Outdoor Recreation by Sector



Out-of-state visitors play an important role in the economics of outdoor recreation. Out-of-state visitors accounted for an estimated 12 percent of all participant days and 27 percent of total outdoor recreation spending. Every dollar spent by an out-of-state traveler in Washington generates $1.36 in economic impacts, resulting in a total of $4.6 billion in new money circulating in the state's economy. A total of 46,430 jobs or 23 percent of total outdoor recreation supported jobs in Washington are a result of expenditures by out-of-state visitors. The results of the out-of-state visitor impact analysis highlights the importance of promoting outdoor recreation in Washington beyond state borders.

In addition to the monetary contribution of outdoor recreation to Washington's economy, there are a number of other benefits not accounted for within traditional economic analysis. These benefits include the satisfaction and increase in general quality of life people get from engaging in outdoor recreation and from the ecosystem services recreational lands provide. Trees, water, and animals provide ecosystem goods and services such as swimmable water, habitat, and aesthetic beauty. Washington’s 23 million acres of public land provide many of these benefits. The combined total estimated value of these non-market benefits is between $134 billion and $248 billion a year.

There is much more to the story of outdoor recreation and its importance to Washington State than is revealed in the economic analyses presented in this report. Outdoor recreation markets help connect urban and rural communities and, as identified by the Governor’s Blue Ribbon Task Force on Outdoor Recreation in its final report (2014), the benefits of outdoor recreation translate into “healthier kids, lowered health care costs, less absenteeism in the work place, and decreases in juvenile crime." The Task Force also recognized that "recreating outside leads to people placing a value on natural places and believing it is important to keep them available for today's and future generations.” For those reasons and all of the others presented in this report, investment in outdoor recreation yields tremendous returns.

Kayaks at the San Juan Islands, image credit: creative commons image by Jeff Clark, Bureau of Land Management

# CHAPTER 1

# Introduction, Methods and Concepts

## The Outdoor Recreation Economy in Washington

The recreation economy of Washington State is vast. Walking, hiking, biking, birding, boating, fishing, hunting, swimming, skiing, 4-wheeling, horse riding, snowboarding, sail boarding, whale watching—Washingtonians head out on weekends and weekdays for healthy fun engaging in hundreds of recreational activities all across Washington State from local parks to wilderness areas and the open ocean. Outdoor recreation brings us together with friends and family, or allows for moments of solitude. Oddly, and perhaps precisely, because it is so closely tied to life enjoyment, the value of the recreation economy, and the land and seascapes that produce it, have often been underestimated in economic analysis.

The purpose of this study is to quantify and qualify the economic characteristics of outdoor recreation in Washington State. We investigate the magnitude and distribution of economic contributions, economic impacts, and ecosystem services based on geography, demography, and recreational behaviors. Expenditures and contributions are calculated for different public and private land types, participant types, and recreational activities. Results are presented at the state level, by county, and by legislative district. The distribution of outdoor recreation economic activity is presented in the context of regional economies, recreational land ownership, and recreational behavior preferences.

It is estimated that the average Washingtonian spends 56 days per year doing some kind of outdoor recreation. According to the recreation surveys and public land records used in this study, there were a total of about 446 million participant days spent on outdoor recreation in Washington State. The total number of days spent on outdoor recreation would be even larger if one counted other spaces where outdoor recreational activities take place such as private rural areas, sidewalks, backyards, school playing fields, and tribal lands. These trends result in money spent on, income derived from, and employment associated with outdoor recreation.

Tolt river angler, image credit: RCO

The results from the economic analyses conducted illustrate how diverse and far-reaching the recreation economy is in Washington State. Every year millions of people spend at least $21.6 billion dollars associated with outdoor recreation in Washington. After accounting for leakages of spending on items not produced in Washington, these expenditures generate about $20.5 billion in economic contributions through Washington State. Of that $20.5 billion contribution, $4.6 billion is flowing into the economy from out-of-state visitors coming to enjoy Washington's outdoor recreational lands. The way in which outdoor-recreation related expenditures trickle down through different types of economic contributions is analyzed in detail in this report.

In addition, the economic benefits, or wellbeing generated by outdoor recreation and by recreational lands, are also calculated. The land and waters that provide recreation also provide other valuable goods and services including clean water, habitat for wildlife, aesthetic attributes, and enhanced recreational experiences. It is estimated that economic benefits amount to at least $134 billion to $248 billion for these four ecosystem services annually. The economic value of nature's goods and services tied to the recreation land and seascape remained uncounted in Washington until this report.

An illustration of the economic activity measured in this report is provided in Box 1.

**Box 1. A Day out at Mount Rainier: An Illustrative Story**

Sarah sets out for a day hike in Mount Rainier National Park and stops to purchase some supplies. On her way out of Seattle, she spends $20 to put enough gas in her car to drive up and back. This money not only supports the gas station and its employees, but all the businesses the gas station buys from and the fees and taxes it has to pay. The transportation and refining may be done by Washington businesses, but the oil will have to be imported from out of state.

As Sarah gets closer to Mount Rainier her stomach rumbles and she realizes she left her lunch at home! Fortunately, she finds a grocery store as she is driving through Graham. She purchases a sandwich, a bag of chips, an apple, and a drink ($13). Again, while a portion of her spending stays within the local economy, much of it goes to out-of-state wholesale suppliers and transport services. Sarah also realizes that the weather is going to be cooler than she anticipated; she stops at a shop and buys a warm hat to wear on her hike ($12).

Now that she is fully prepared, Sarah drives to the park entrance and purchases a park pass for the day ($10). After consulting maps, Sarah hikes nine miles, enjoying the beautiful views, sounds, and smells of alpine meadows and mountain vistas. Sarah is grateful that she can have this kind of experience only a few hours from her home in a bustling city. Only here, can she decompress from all the cares and concerns of her busy life in Seattle.

At the end of the day, Sarah returns to her apartment in Seattle feeling rejuvenated. She has spent $55 on the day trip. However, the enjoyment she experiences on her trip cannot be measured merely by the amount she spent on the trip; connecting with nature and recreating in the mountains is part of the reason she lives in Washington State.

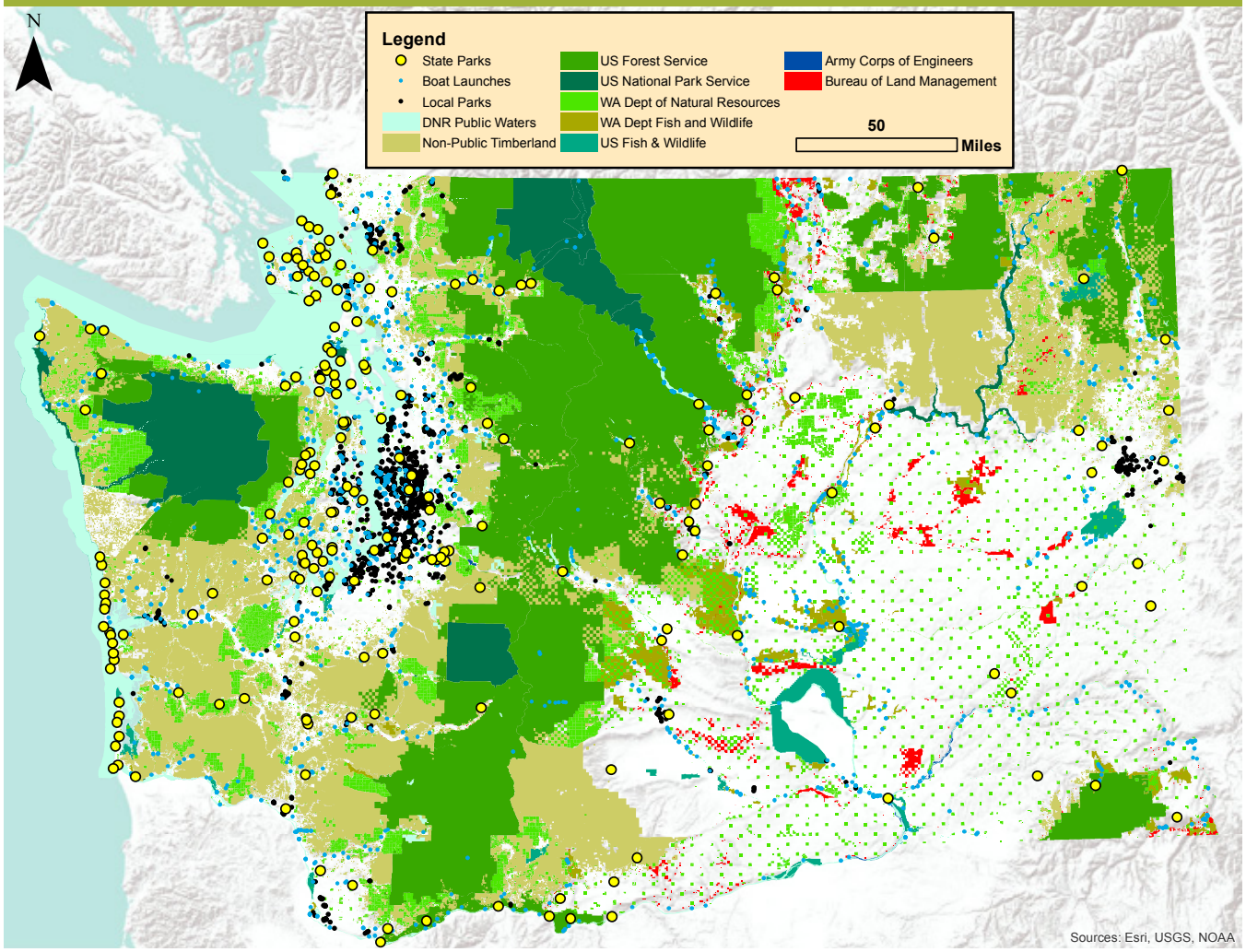
## Recreation Land Types Studied

The recreational lands studied here are federal and state managed lands, public waters, county and city lands (referred to as "local"), public lands used for special events, and a set of private lands and activities for which data was available. The study is not exhaustive of all the spaces available for outdoor recreation. Certain categories of lands had more data limitations than others. Data limitations, assumptions, and estimations are outlined in more detail in each chapter and in Appendix B.

The distribution and relative size of the recreational lands included in this study can be seen in Figure 3. For the purposes of visualization some lands are exhibited as areas and others as points.

Following is a brief overview of the general recreational land types studied. A full list of the recreation lands managed by each agency and their specific characteristics are presented in Appendix A.

Figure 3. Recreational Land Types in Washington State



**Federal lands:** Federal agencies play an important role as managers of recreational lands across the country. In Washington State, the following federal lands were included: National Park Service managed areas, National Forests and Monuments managed by the U.S. Forest Service, National Wildlife Refuges and Monuments managed by U.S. Fish & Wildlife Lands, and recreation projects or areas managed by the U.S. Bureau of Land Management and the U.S. Army Corps of Engineers.

**State lands:** State agencies manage a large number of areas for recreation, resource extraction, and conservation of critical natural spaces. The lands under state jurisdiction included in this analysis are the following: Washington State Parks; Washington Department of Natural Resources' state forest lands and conservation areas; Washington Department of Fish and Wildlife's Game Management Units and State Wildlife Areas, which are located within Game Management Units but host recreational activities other than hunting.

**Public waters:** Water bodies used for recreation were categorized under public lands. Washington's Department of Natural Resources has jurisdiction over most public waters including the Puget Sound, coast, and freshwaters. The Washington Fish and Wildlife Department and Washington State Parks manage boat launches and water access sites. Water access sites are also managed by port districts and other local land managers.

**Local lands**: Local lands include county parks, city parks, parks managed by special districts, and municipal golf courses. Special events held on public lands such as youth sport tournaments are included as a separate category in this study, although most of these happen on local lands.

**Private lands:** A limited number of private lands are included in this analysis. The lands for which data was available are private skiing areas, private golf courses and facilities, private timberlands, and private horse-related businesses. Results for private lands should be interpreted as only a portion of economic activity generated by these lands. Examples of other types of private recreation lands not included in this study are private campgrounds, shooting ranges, vacation cabins, water parks and even backyard exercise and sports.

Obstruction Point Trail in the Olympic National Park, image credit: Angela Fletcher

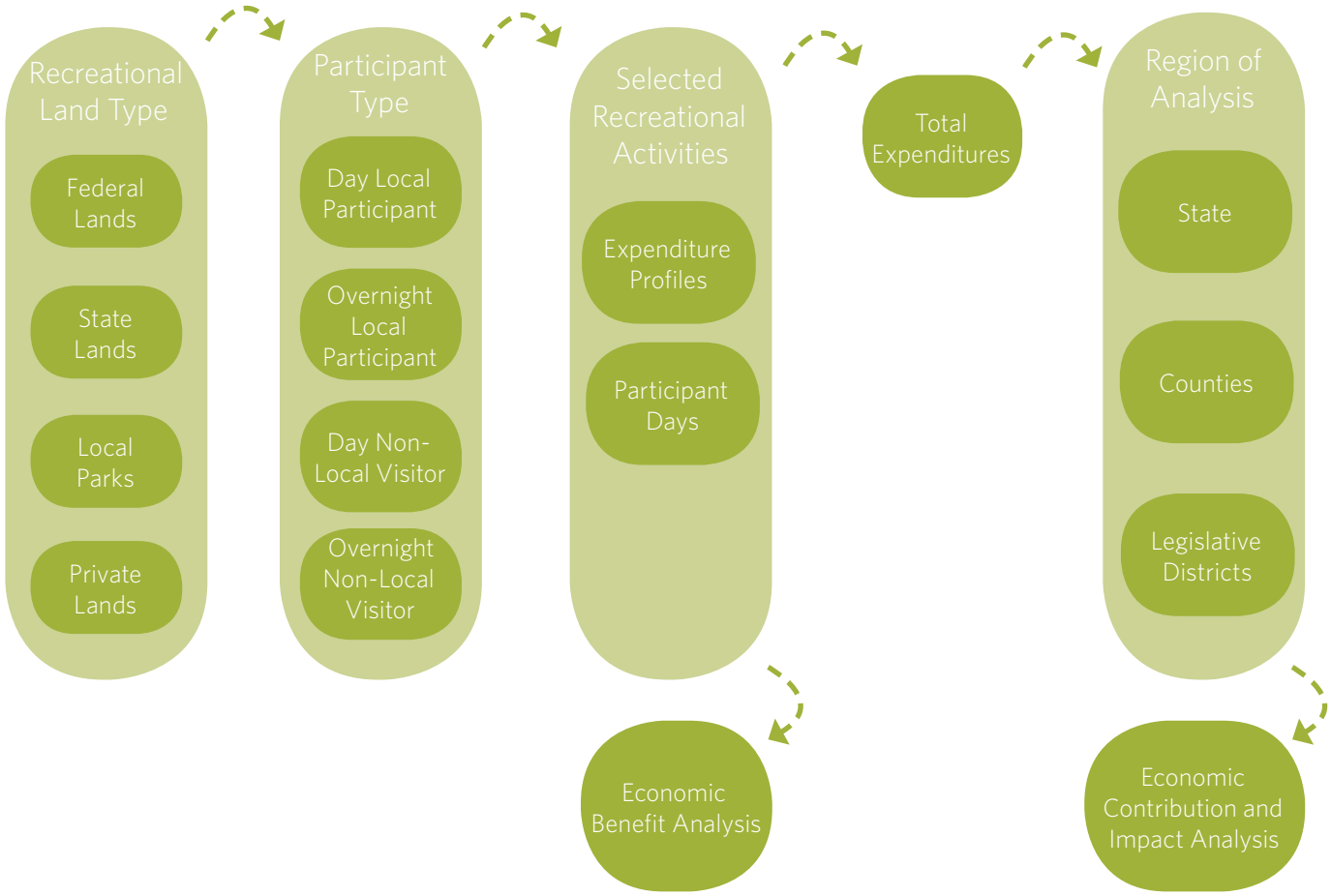
# Methodology Overview

### *Methodology Structure*

The economic analysis was carried out by estimating visits to different recreational destinations and the incurred expenditures. The economic contribution and impact analyses are based on the calculated expenditures. Figure 4 shows a schematic of the data components and general path of the methodology for calculations. The process is outlined beginning with data collection at the land type level, the identification of participant types, the creation of expenditure profiles, the calculation of total participant days and expenditures per destination, and finally the economic analyses at different geographical levels. Data sources include existing studies on recreation, data recorded by destination sites, local surveys on recreation behavior, licenses and permits issued for specific activities, and when necessary, modeling of location-specific trends. Data sources and methodology are outlined in Appendix B. GIS methods assisted in allocating expenditure results to counties and legislative districts. All expenditure estimates are based on data of various vintages and are all converted to 2014 dollars using the Bureau of Labor Statistics' consumer price index. Similarly, yearly participant data was derived from estimates from various years and adjusted to Washington's current population.

Publicly managed recreation destinations typically track their attendance by day and overnight use as well as by participant place of origin. Some destinations and activities involve a higher frequency of overnight stays (e.g. national forests,

**Figure 4. Schematic On Data Components and Methodology**



special public events, and windsurfing) than others (e.g., local park recreation, state park visits, and ball sports). These differences have an impact on expenditure patterns.

Most public land managers also provide GIS polygon or parcel datasets for their jurisdiction. When these were not available, destinations were geocoded from Google Earth search results (e.g. "horseback riding") or expert recommendation (e.g. surfing beaches). In these cases, we utilized a GIS-based allocation model (see Appendix B) that calculated attendance probabilities given the destination's proximity to populated areas. It should be noted that some double counting may exist with public water accessed through public land types, as water recreation was estimated as a separate category and could not always be differentiated from certain land types (e.g. county parks).

Each participant day involves different types of expenditures depending on where it happens and what activities it involves. Expenditure profiles were created for an average recreational outing spent in each land type. Expenditure profiles were also derived for a set of 42 recreational activities (See Appendix B). Expenditures on equipment were calculated based on U.S. Census consumer data and data available from previous research as outlined in Appendix B and E. Adjustments were made for activities that have a different participation rate in Washington than the U.S. (e.g. snowmobiling). Equipment expenditures were only included in the analysis for all recreational lands and assigned to the assumed place of residence of the participant.

### *Economic Analysis Structure*

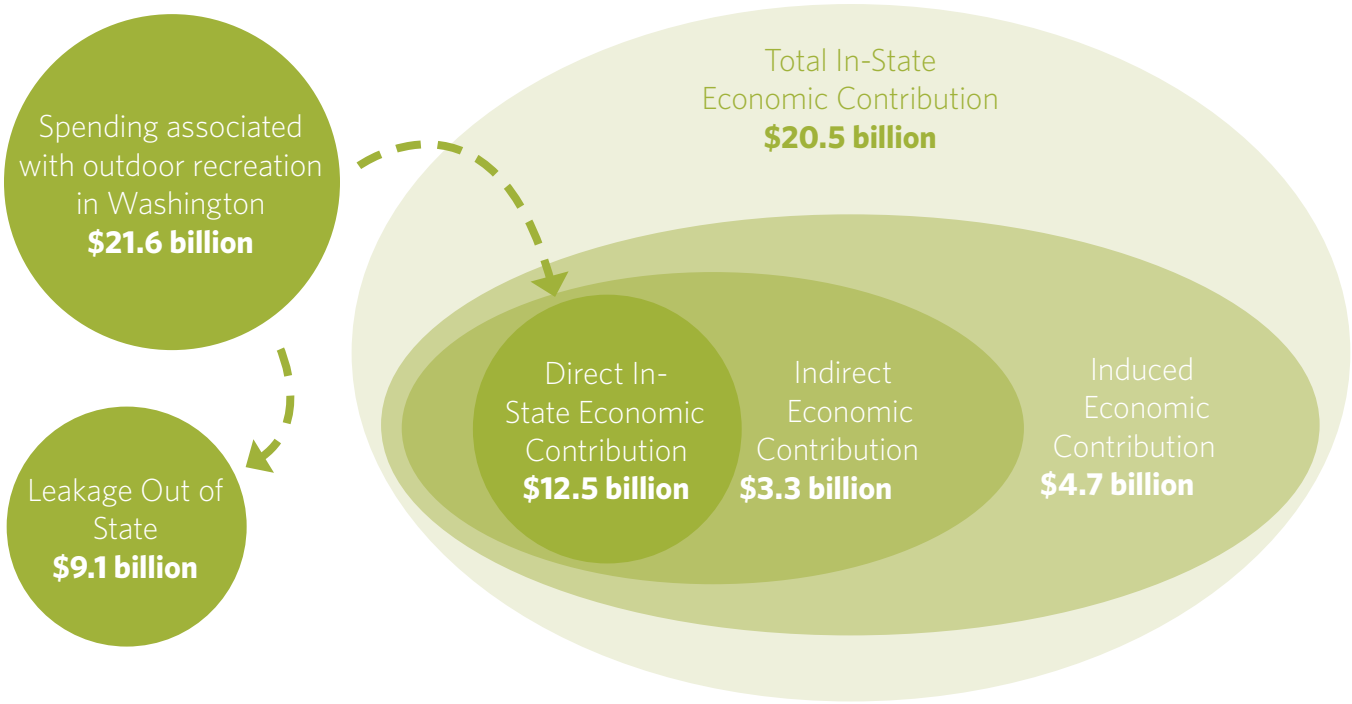
The first part of the analysis identifies the type of expenditures associated with outdoor recreation. These expenditures are the purchases you make to enable a recreation experience and can include gasoline, food, lodging and equipment, among others. Most expenditures are made within Washington State. The amount of money spent on purchases will vary based on location and the activity chosen. The data collected in this study yielded a range of expenditures for each visit type. These were organized into general expenditure categories in order to calculate economic contributions.

The economic contribution analysis identifies the portion of the expenditures that stays in Washington State and that trickles through the economy to supply goods and services, provide jobs and income, stimulate producers, and generate tax revenue. All of these economic activities are different types of contributions. Contributions are also calculated by the economic sector in which they happen (e.g. hotels, food and beverage places, etc.). Figure 5 illustrates the relationship between expenditures and economic contribution.

The analysis for calculating economic contribution and economic impact is done through IMPLAN, which is widely used in recreational economic analyses (see Box 2 for details). This tool uses local data on economic and industry relationships to predict revenue flows to existing businesses (direct contributions), effects on related industries from which purchases are made (indirect contributions), and effects from expenditures made through the affected household incomes and salaries (induced contributions). Local economic models are derived using data from the U.S. Bureau of Labor Statistics (BLS), U.S. Bureau of Economic Analysis (BEA), U.S. Census Bureau and other sources.

Economic benefits beyond expenditures are also calculated (see Chapter 6). These reflect the value placed on recreational opportunities beyond direct market expenditures. They include the total wellbeing provided to recreationalists as well as ecosystem services provided to other beneficiaries. Ecosystem services include water quality improvements, aesthetic values, and habitat maintenance. The data for these modules was obtained from the National Land Cover Dataset (NLCD) and Earth Economics' proprietary database of primary ecological economics sources called the Ecosystem Valuation Toolkit (EVT).

Figure 5. The Relationship Between Expenditures and Economic Contribution




## Box 2. IMPLAN: A Brief Primer

This study utilizes IMPLAN (IMpact Analysis for PLANning) which was developed by MIG, Inc. The IMPLAN modeling system has been in use since 1979 and was originally developed by the U.S. Forest Service. The modeling system is primarily based on the U.S. Bureau of Economic Analysis' Input-Output Benchmarks, which are based on industry survey data. Using this data, IMPLAN constructs regional tradeflow models to capture how spending in one industry impacts all other industries. This data captures regional relationships between the economic output of industries, jobs, income, and taxes. Based on these models, IMPLAN can calculate how an economic activity such as consumer spending on a specific industry will impact jobs and income for an entire region's economy.

This study used IMPLAN models for the entire state of Washington and for each of the 39 counties. Each of these models can capture the response of that regional economy to a change in demand or production in a given industry or group of industries. When a consumer expenditure is entered, IMPLAN models how it will translate into jobs and incomes for the region. The model estimates how the expenditure will "ripple" through the economy. The industry experiencing the change in sales will need to purchase additional inputs from its suppliers (indirect contributions). Household spending also changes due to wage impact and job creation (induced contributions).

The economic contribution models factor in geographic and demographic nuances including consumer spending patterns, local production capacity, and general trade flows to yield an estimate of in-state sales from the total expenditures made. In-state sales subtract the portion of purchases that ultimately flows out of the state (called economic leakage). In turn, the in-state sales are used to model tax revenues, ripple effects for local industries, and labor market effects. The sum of these ripple effects (also known as multipliers) yields the total economic contribution of an activity. In a separate calculation, the economic impact analysis identifies the influx of new money into the local economy as a result of outdoor recreation opportunities by out-of-state visitors.

# CHAPTER 2

# Expenditures and Contributions of All Outdoor Recreational Land Types

**Chapter 2 Highlights**

- $21.6 billion is spent every year on outdoor recreational trips and equipment across all recreational land types in Washington.
- These expenditures generate about $20.5 billion in state economic contributions after deducting out-of-state leakages and including multiplier effects.
- Washington residents average 27 visits per year to local parks, making local parks the most visited land type for outdoor recreation.
- Recreation associated with public waters generates the highest expenditures.

## Participation and Expenditure Analysis of All Recreational Lands

We estimate that residents and visitors to Washington State spend about $21.6 billion per year on outdoor recreation trips and equipment. This estimate is based on spending across all the recreational lands included in this report (more detail in Appendix A). In total there were 446 million participant days per year in outdoor recreation.

Total expenditures for each recreation land type were obtained by multiplying participant days by appropriate expenditure rates. Total expenditures were highest for recreation in or on public waters, which included motorized and non-motorized boating, fishing, swimming, surfing/windsurfing, inner tubing/floating, and scuba diving in most marine and freshwaters. Water recreation includes a number of activities with high trip and equipment expenditures, especially motorized boating.

Ranking second in total expenditures were events like youth sports tournaments and races, which attract high spending rates and overnight stays. Ranking third was recreation on private lands, which includes expensive recreation activities like golf, skiing, off-highway vehicles, and hunting.

In terms of participant days, local public lands have the highest number of participant days with 189 million participant days per year[i]. Federal lands have 32.8 million participant days per year and state lands had a slightly higher number with 49 million participant days per year. Private lands had the lowest number of participant days with 27.9 million days per year (see Table 1, Figure 6 and Figure 7). As explained later, there was limited data available for private lands.

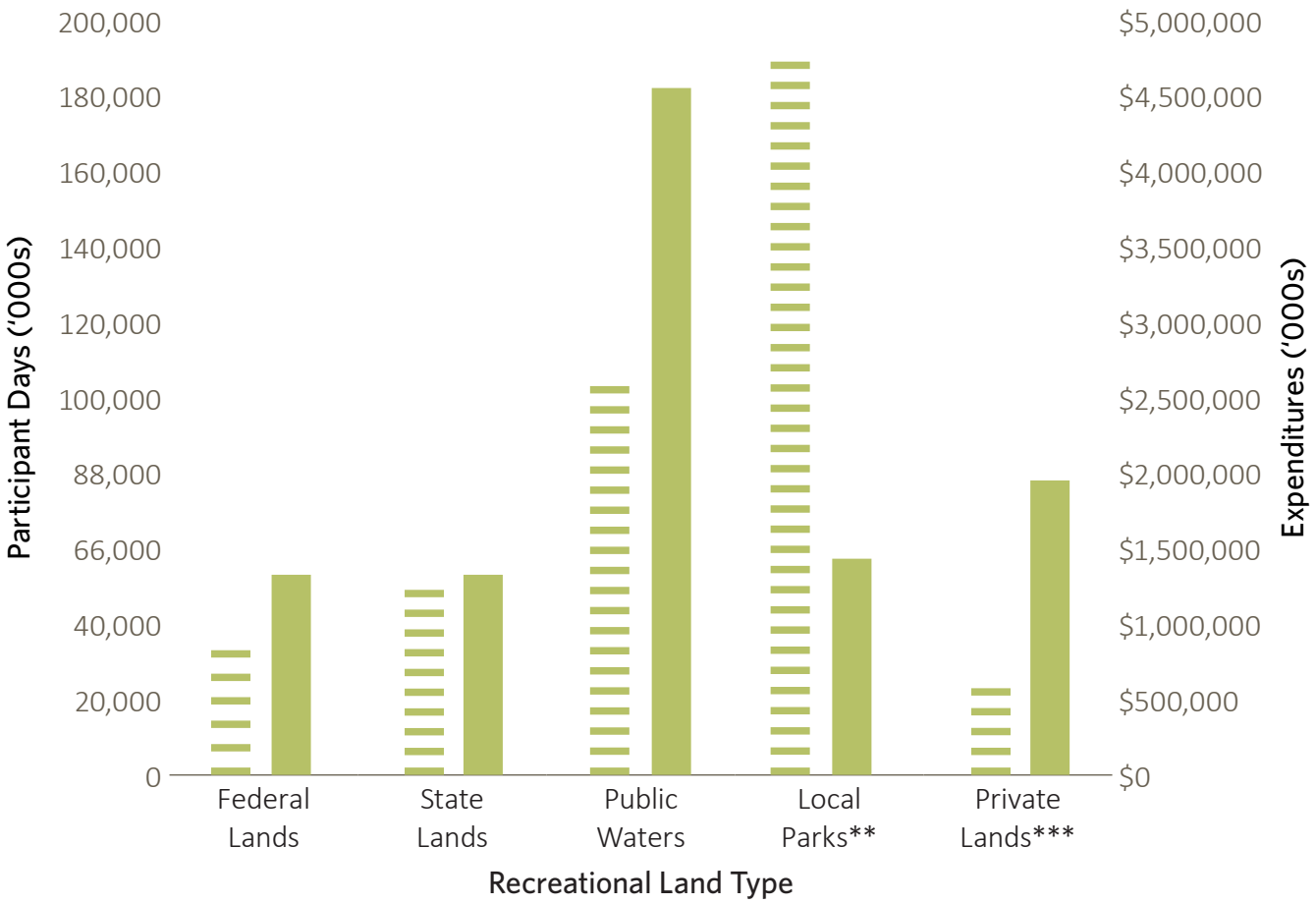
i Although an effort was made to use current data as much as possible, some participation estimates are based on studies from previous years adjusted to Washington's current population.

**Table 1. Participant Days and Expenditures on All Recreational Land Types**

| Land Type | Participant Days ('000s) | Expenditures*** ('000s, 2014 USD) | Per-Person Per-Day Expenditures (2014 USD) |
|---|---|---|---|
| Federal Lands | 32,853 | $1,323,545 | $40 |
| Washington State Lands | 49,095 | $1,347,192 | $27 |
| Public Waters | 101,701 | $4,630,986 | $46 |
| Local Parks | 189,915 | $1,439,096 | $8 |
| Events* | 44,516 | $1,986,312 | $45 |
| Private Lands** | 27,946 | $1,933,961 | $69 |
| ***Total*** | ***446,027*** | ***$12,661,092*** | |

*Events occurring on public lands
**A limited number of private lands were included in this analysis
***Excludes equipment expenditures

**Figure 6. Participant Days and Expenditures for All Lands**




*Excludes equipment expenditures, which total $8,974,243,000

**Excludes events occurring on public lands, which total $1,986,000 in expenditures

***A limited number of private lands were included in this analysis

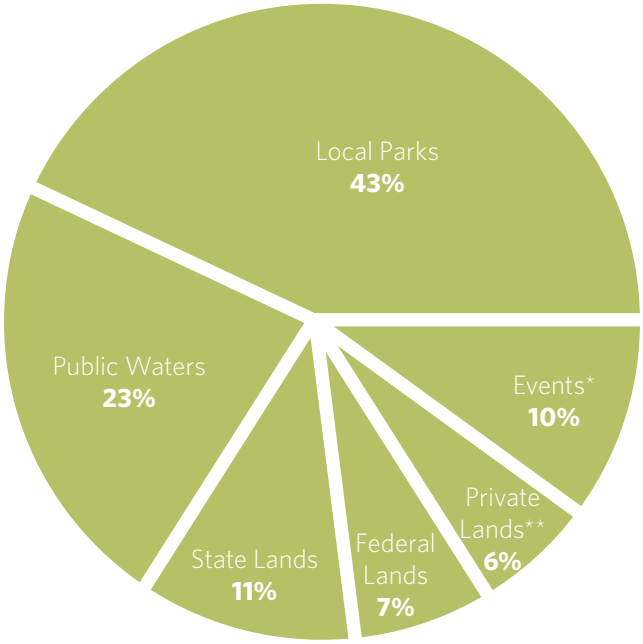
KEY
Participant Days
Expenditures*

Outdoor recreation is characterized by many different types of expenditures across many businesses, depending on the activity and destination involved. These are grouped into general expenditure categories as outlined in Figure 8. Most of these expenditures are assumed to be made within Washington State.

Total equipment purchases make up 42% of all recreation expenditures. These include the purchase of sporting equipment (19%) and motor vehicles and boats for recreation (15%). Participant day expenditures are largely made up of gasoline (13%), food and beverage services (10%), and groceries bought at retail stores (9%).

Figure 7. Participant Days on all Recreational Land Types, Including Events on Public Lands

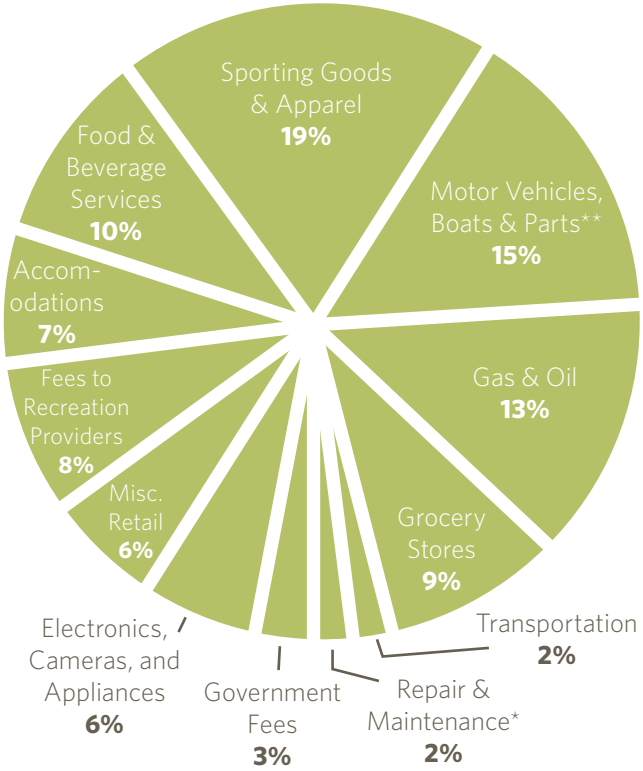
**446,027,000 total participant days**




*Events occurring on all public land types
**A limited number of private lands were included in this analysis

Figure 8. Expenditure Categories for All Recreational Land Types

**$21,635,335,000 recreation related expenditures across all land types**




*Repair & Maintenance on OHV, boats, and other recreational vehicles
**Represents OHVs, boats, and other recreational vehicles

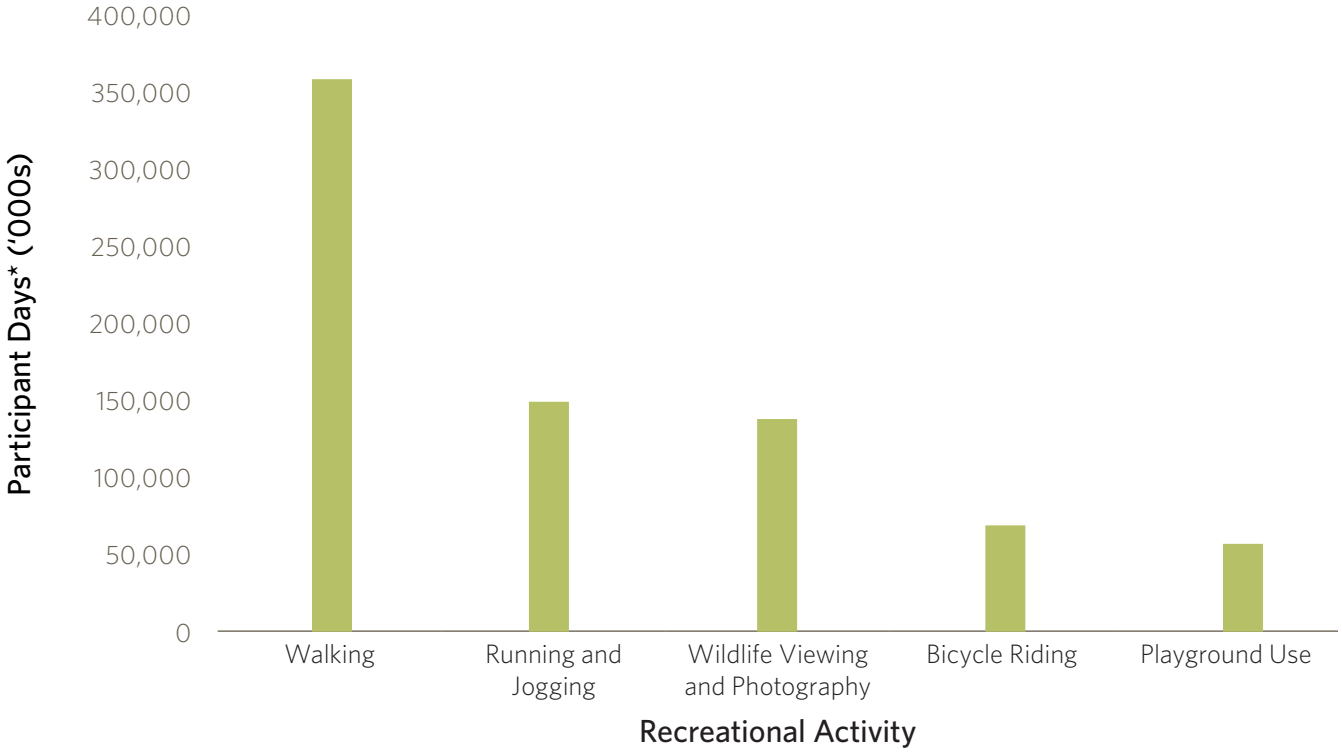
## Activity-based expenditure analysis

A separate methodology was used to estimate participation and expenditures attributable to popular outdoor recreational activities in Washington. These expenditures were calculated based on participant days derived from the survey conducted for Washington's Statewide Comprehensive Outdoor Recreation Plan (SCORP, 2013). The survey has data on participation rates (i.e. percent of residents participating in a recreational activity) as well as participation frequency (i.e. average numbers of days per year a resident participates in a given activity), which were used to calculate the total number of participant days for any activity. Out of a total of 300 activities studied in SCORP, 42 activities and activity groupings were chosen for this analysis.

Expenditure profiles were created for each activity based on literature searches, U.S. Census data, and communication with activity associations. The activities were chosen based on their popularity among adults in Washington, their existence within at least one of the recreational lands studied, and their potential economic contribution. Results by activity and the methodology used for this analysis can be found in Appendix D.

Overall, the analysis shows that certain activities are highly popular (by the number of participant days per year). Figure 9 illustrates the activities with the highest number of participant days. For example, there are 357 million participant days attributed to walking for outdoor recreation (most popular activity) and 151 million to jogging or running in outdoor settings (second most popular activity). These activities have relatively

Figure 9. Top Five Recreational Activities by Participant Days

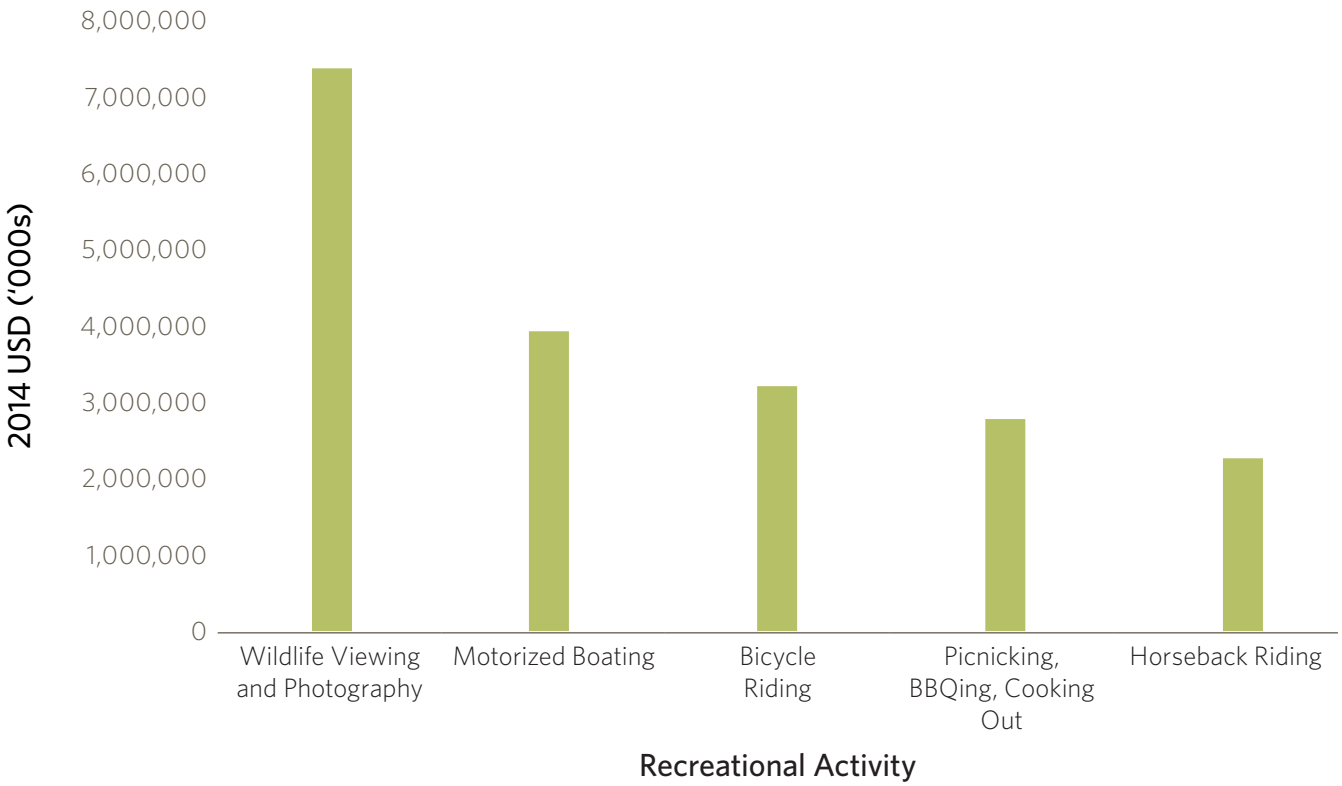



*Derived from SCORP participation rates

low expenditures (about $5 per trip and about $35 per person per year in equipment) but given their high frequency, they result in high total expenditures (a combined amount of $2.7 billion per year). In contrast, windsurfing involves about 740,000 participant days per year but with trip expenditures of about $90 per trip and about $2,000 per person in yearly equipment expenditures, this activity results in about $170 million in expenditures per year. Off-highway vehicle (OHV) recreation and boating are other activity types with high equipment and trip expenditures. See Appendix D for an analysis of relative trip and equipment expenditures as well as total expenditures by activity. Figure 10 illustrates the activities with the highest expenditures.

Hiking and wildlife viewing in the Mt. St. Helens National Volcanic Monument, image credit: © Cece Watkins

Figure 10. Top Five Recreational Activities by Total Expenditures




*Total expenditures include trip and equipment expenditures

# Economic Contribution Analysis for All Recreational Lands

The $21.6 billion spent in outdoor recreation across all land types in Washington cascades through different types of economic activities linked to these purchases. The economic contribution analysis estimates the portion of expenditures that register as sales retained in the state (direct contributions), as well as intermediate sales made from industry to industry purchases within the supply chain (indirect contribution). In addition, the contribution analysis includes the purchases made with the salaries and wages of those employed in the supply chain (induced contribution). All economic activity triggered by the initial expenditures is captured by region-specific economic IMPLAN models (See Appendix E for IMPLAN model details), the results of which are divided by county.

According to the model, after leakages are accounted for, total outdoor recreation-related expenditures generate $12.5 billion in direct in-state sales (i.e. direct contribution), $3.3 billion in supply chain activity to create outdoor recreation goods and services (i.e. indirect contribution) and $4.7 billion in household wages which stimulate further economic activity (induced contribution). Thus, in total, economic contributions through the state amount to $20.5 billion (See Table 2).

Table 2. Economic Contributions, All Recreational Lands

| Contribution | Total (000's, 2014 USD) |
|---|---|
| Direct | $12,520,000 |
| Indirect | $3,300,000 |
| Induced | $4,701,000 |
| **Total** | **$20,521,000** |

More than 400 IMPLAN-defined economic sectors are affected by outdoor recreation-related expenditures (See Appendix E for more detail on sectors). The top eight economic sectors receiving contributions resulting from outdoor recreation in Washington State are shown on Table 3. Together they receive half the total contributions generated by the outdoor recreation economy. Food and beverage places are the largest beneficiary of all outdoor recreation expenditures. Retail sales follow, largely due to the fact that equipment expenditures are taken into account here. Wholesale trade businesses include sales to other businesses and institutions. Sales within the category of "Other amusement and recreation industries" include access and entrance fees by private agencies, equipment rentals, or guided tours.

Table 4 shows some general categories of state and local taxes receiving revenue from the estimated expenditures. Taxes on production and imports represent the largest source of tax revenue. These taxes are comprised of business property taxes, sales and other excise taxes. Goods such as gasoline have especially high excise taxes. Household taxes are comprised of fees and fines paid to local and state governments for

Table 3. Economic Contributions by Economic Sector, All Recreational Lands

| Sector | Total ('000s, 2014 USD) |
|---|---|
| Food and beverage places | $2,473,498 |
| Retail Stores-Sporting goods, hobby, and books | $1,606,277 |
| Wholesale trade businesses | $1,443,031 |
| Other amusement and recreation industries | $1,397,971 |
| Hotels and motels | $1,325,500 |
| Petroleum refineries | $1,103,919 |
| Retail Stores-Motor vehicle and parts | $666,613 |
| Retail Stores-Miscellaneous | $650,047 |

Table 4. Local and State Tax Contributions, All Recreational Lands

| Tax | Total ('000s, 2014 USD) |
|---|---|
| Tax on Production and Imports | $1,966,982 |
| Households | $30,980 |
| Employee Compensation | $11,712 |
| Corporations | $1,317 |
| **Total** | **$2,010,992** |

Table 5. Employment Associated with Outdoor Recreation, by Sector

| Sector | Employment |
|---|---|
| Food and beverage places | 36,047 |
| Retail Stores - Sporting goods, etc. | 30,190 |
| Other amusement and recreation industries | 25,170 |
| Retail Stores – Miscellaneous | 12,000 |
| Hotels and motels | 10,046 |

motor vehicle licenses, property taxes, and fishing and hunting licenses. Employee compensation refers to taxes paid by employers and employees into Washington State's benefit trust fund and workers compensation system. Corporation taxes refer to taxes on net dividends. Total tax contributions are estimated at about $2 billion.

Approximately 200,000 jobs are supported in Washington State as a result of expenditures related to outdoor recreation. This estimate includes both full-time and part-time jobs and does not distinguish between them or identify the number of hours worked within each job.[ii] Table 5 identifies the sectors where most of this employment occurs.

The economic contribution analysis demonstrates how money flows through the local economy, promoting monetary exchanges from one business to another. Direct contributions, or in-state sales, are lower than total expenditures because they exclude revenue that flows outside the region of study. Therefore out of the $21.6 billion dollars spent in Washington for outdoor recreation, about $9.1 billion is transferred to out-of-state producers of outdoor-recreation related goods and services. This leaves about $12.5 billion in direct sales to circulate through the local economy and generate a total of $20.5 billion in total contributions.

Every industry and economic sector has a unique supply chain and economic network. However, some sectors tend to source more from outside the state, while others are more local. A significant proportion of retail sales are sourced from outside the state. For example, a substantial amount of expenditures on off-highway vehicles goes to purchase them where they are manufactured, resulting in lower economic contributions for the state. On the other hand, expenditures made in restaurants, for example, tend to trickle down more locally to pay for local staff and produce.

### *County Expenditures and Contributions*

The participation and expenditures attributed to outdoor recreational lands were allocated to counties and legislative districts. These calculations made use of local primary data available (e.g. fishing licenses or hunting permits issued by each county) and/or GIS modeling (see Appendix B for a detailed methodology description). The number of participant days for each county or legislative district differed substantially, depending on what types of recreational land were located within the county or legislative district. Total expenditures made within each county can be seen in Figure 11. The highest expenditures were made in King County (about $5.4 billion). Those counties in lighter shades had lower total expenditures.

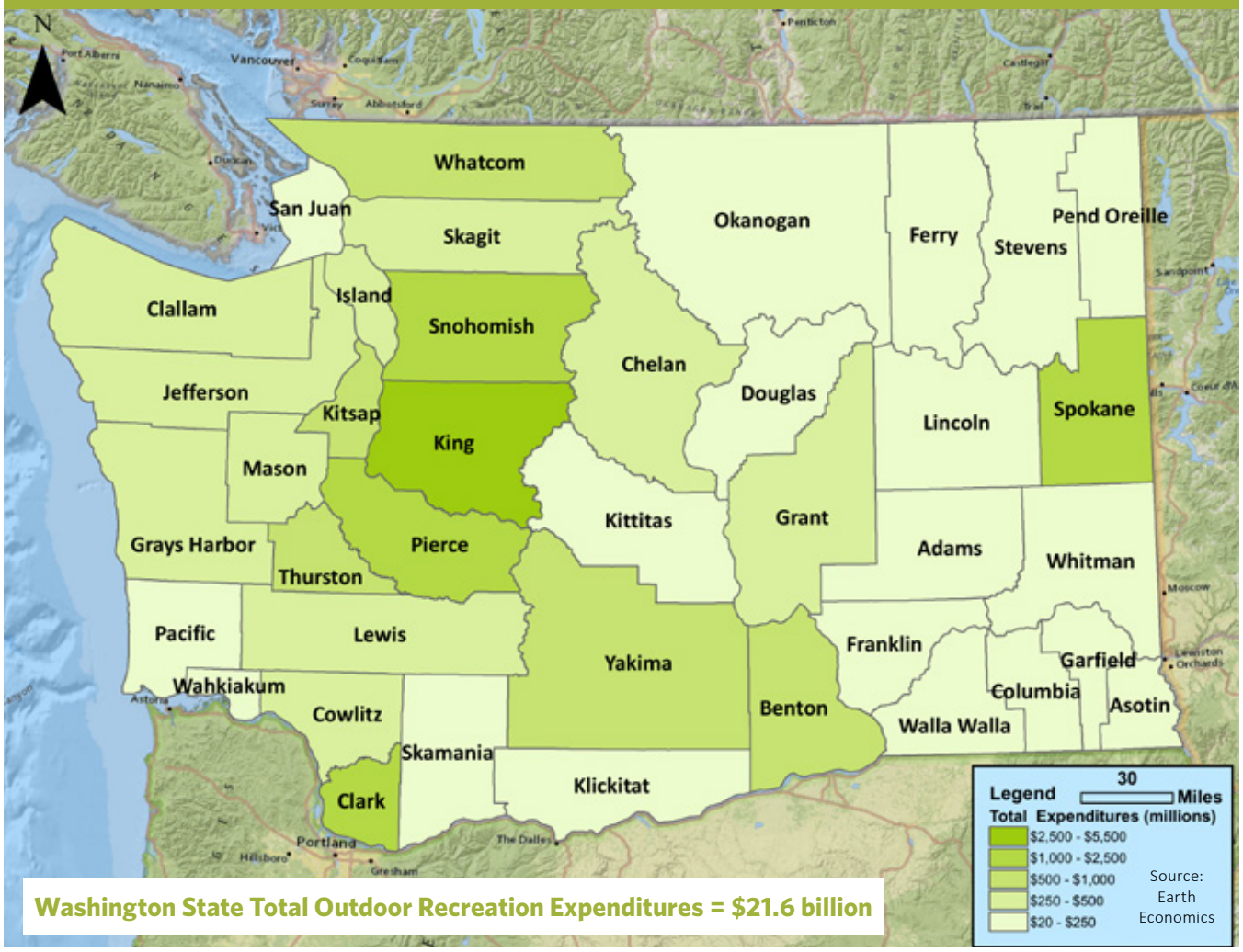
ii It is expected that a high proportion of total outdoor recreation jobs are part-time jobs. For example, the U.S. Forest Service and National Parks Service hire many seasonal workers in the summer who are students the rest of the year.

The contributions of these expenditures to the counties' economies are estimated based on county-specific IMPLAN data. Indirect and induced contributions as well as local jobs supported reflect the industrial make-up, expenditure patterns, and trade flows of each county. The results for each county are presented in Appendix F. The multiplier effects—expenditures recirculating within a counties economy—are smaller than for the state as a whole due to a higher number of supply industries being located outside county borders. Multipliers, defined as the ratio of total contributions to expenditures, range between a low of 0.29 in Pend Oreille County and a high of 0.9 in Spokane County. Job generation resulting from outdoor recreation expenditures ranges between a low of 100 jobs in Wahkiakum County and a high of 50,000 jobs in King County. Note that the sum of all of the counties' recreation-related economic contributions and employment does not equal the total for the state of Washington since county models do not take into consideration inter-county interactions.

### *Out-of-County Expenditure Patterns*

The recreation market is unquestionably one of the largest markets in the state for moving income from urban to rural areas and building jobs in rural Washington State. Out-of-county

Figure 11. Total Outdoor Recreation Expenditures by County

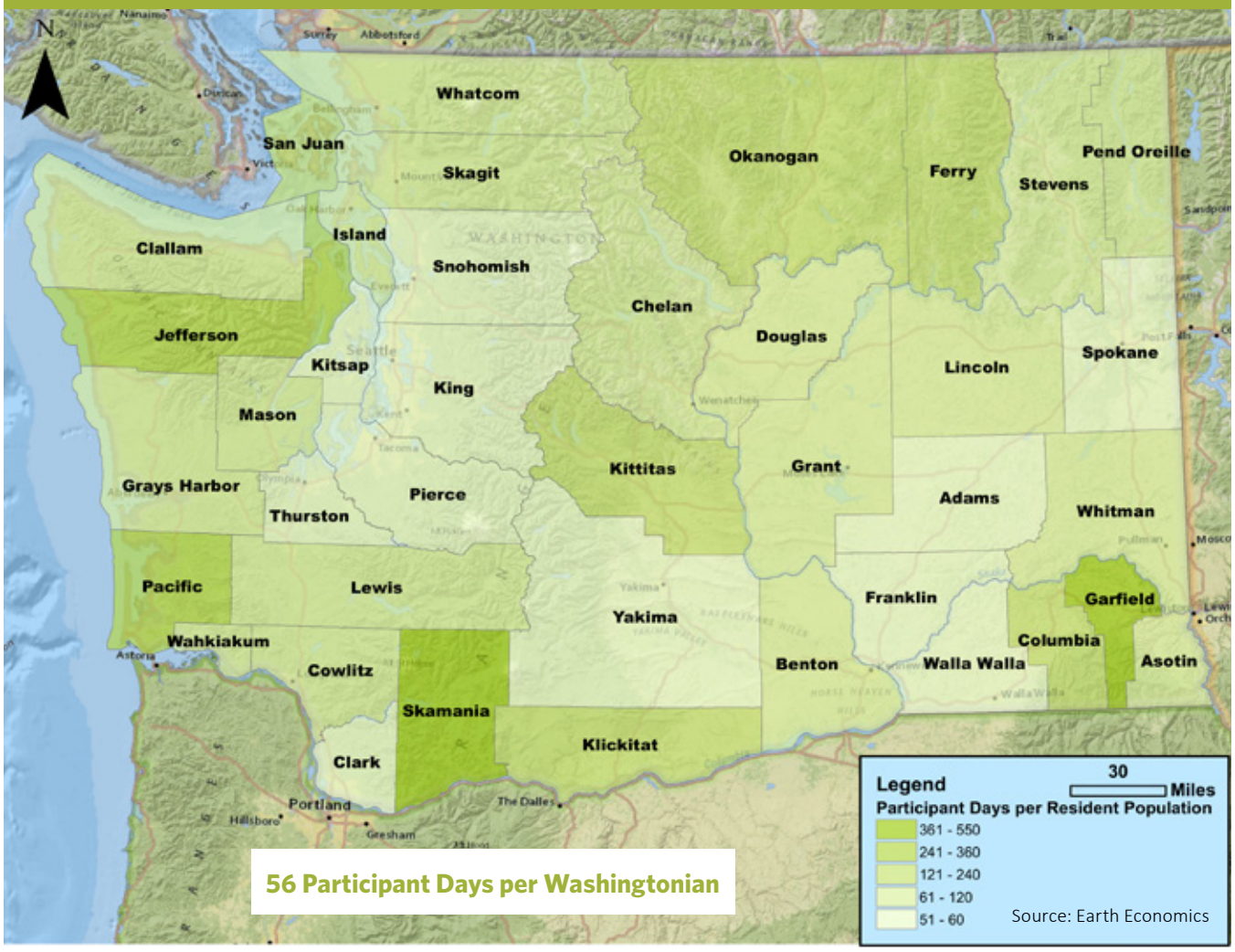


visitors create a redistribution of wealth between the place of origin and the destination for recreation. For example, Seattle residents going to Leavenworth for outdoor recreation redistribute income from higher income Seattle to Leavenworth. These dynamics are important to many rural counties.

Although out-of-county visitors were not accounted for in this study, an inference of their magnitude can be made by comparing total participant days in each county relative to the population of the county. We see that Washington State has a number of recreation hot spots (see Figure 12) where participant days surpass by far the average that would be expected from county residents (56 days per year) and hence it is assumed that this is due to people traveling from outside the county. Figure 12 illustrates the ratio between participant days in the county and county population.

Many counties benefit from expenditures made by out-of-county visitors. For example, Skamania County hosts a number of state and local parks as well as national protected areas; with the Gifford Pinchot National Forest, Columbia River Gorge National Scenic Area, and Mt. St. Helens National Volcanic Monument. With a population of just 11,066, it hosts 5 million outdoor participant days per year. Total expenditures amount to almost $200 million per year.

Figure 12. Participant Days in Counties Compared to County Population



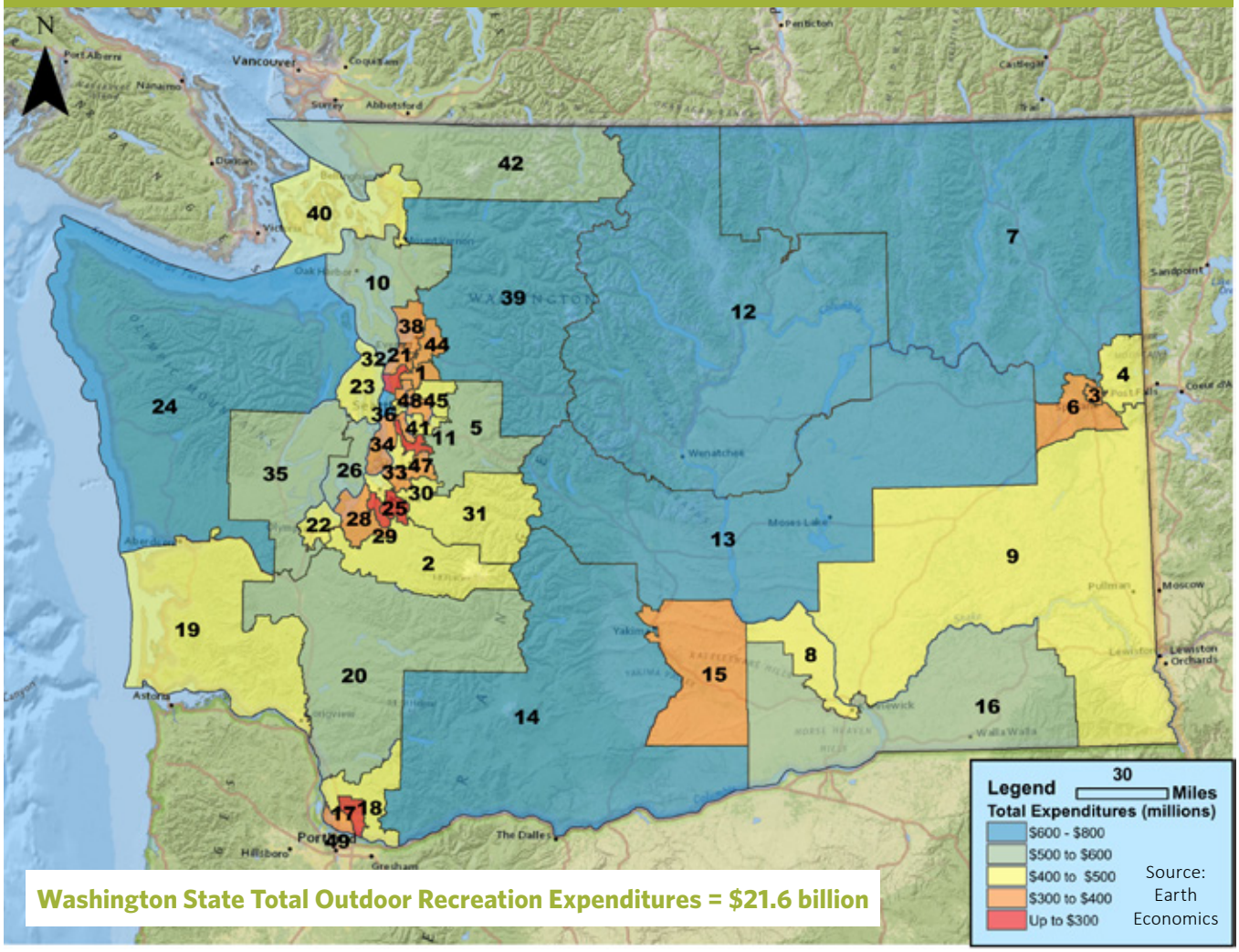
### *Legislative District Expenditures*

Expenditures at the legislative district level were derived through a GIS overlay of recreational land areas and legislative district boundaries, controlling for landscape characteristics, existing facilities, and access points. The distribution of expenditures by legislative district can be seen in Figure 13. Many legislative districts located far from urban areas have high expenditure rates.

Expenditures at the legislative district level ranged from $264 million in Legislative District 32 to $775 million in Legislative District 7. Average expenditures per legislative district level were about $441 million across all legislative districts.

There is not much variation in population sizes between legislative districts. However, some legislative districts benefited greatly from outdoor recreation because of out-of-region visitors. The total number of expenditures and participant days by recreational land type at the legislative district level can be seen in Appendix G. Because the legislative district does not exist as a unit of analysis in IMPLAN, a contribution analysis to estimate multipliers and employment was not possible.

Figure 13. Total Outdoor Recreation Expenditures by Legislative District

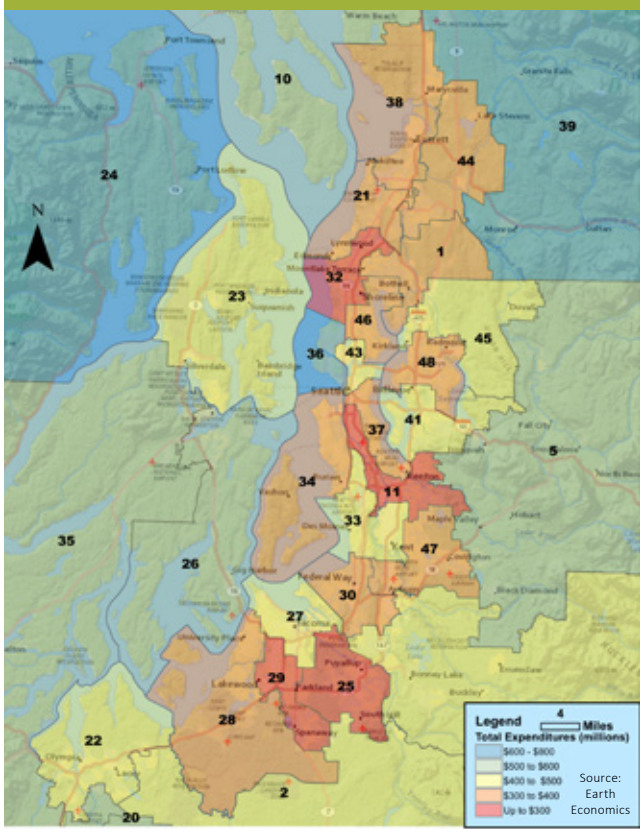


### *Out-of-Legislative-District Expenditure Patterns*

Population of legislative districts does not vary much from one district to another. Therefore, the ratio of total participant days to population is already reflected in the map showing total expenditures by legislative district (Figure 13). This pattern suggests similar dynamics of travel from urban to more rural areas to experience outdoor recreation. More data is needed in order to understand out-of-legislative district participant days and trends.

Because the legislative district does not exist as a unit of analysis in IMPLAN, a contribution analysis to estimate multipliers and employment was not possible.

Figure 14. Total Outdoor Recreation Expenditures by Legislative District, Puget Sound Inset



Sailboats on Budd Inlet, image credit: © Kim Merriman

# CHAPTER 3

## Expenditures and Contributions of Outdoor Recreation on Public Lands

### Chapter 3 Highlights

- The greatest amount of land available for outdoor recreation by acre is under federal jurisdiction.
- Visits to local parks and public waters are most common in terms of participant days.
- Trip-related expenditures (not including equipment) associated with recreation on federal, state and local public lands amount to $10.7 billion per year. These expenditures generate $13.6 billion in economic contribution.
- State lands account for $1.3 billion of trip-related expenditures related to outdoor recreation (not including equipment).

Public lands and public waters available for outdoor recreation cover about 23 million acres. Federally-owned lands make up 58% of total public lands for outdoor recreation, state lands make up 29%, public waters make up 12%, and the remaining 1% of recreational land is made up by counties, cities, or other local jurisdictions (Table 6).[iii] Within federal, state, and local jurisdictions there are different agencies managing specific land types. State lands include State Parks, lands managed by the Department of Natural Resources, and Washington Department of Fish and Wildlife. Public waters include marine areas, rivers, lakes and streams, which are all categorized as public, although a portion of these may be private.[iv] Local lands include county, city, and special district parks as well as publicly managed golf courses. Special events on public lands are not assigned any acreage since their location varies. In our solicitation for local outdoor recreation data, many counties cited the importance of local events, such as youth sports tournaments.

ATV riders, image credit: Philip Wolff

iii Acreages were calculated by Earth Economics using Geographic Information Systems (GIS) and the National Land Cover Dataset (NLCD) in reference to lands used for outdoor recreation. They differ from RCO's Public Lands Inventory as these refer uniquely to areas for outdoor recreation and the measurement methods differ.

iv Lakes, rivers, and streams are considered public if they are deemed "navigable." See The Revised Code of Washington (RCW), available on-line at http://apps.leg.wa.gov/rcw/.

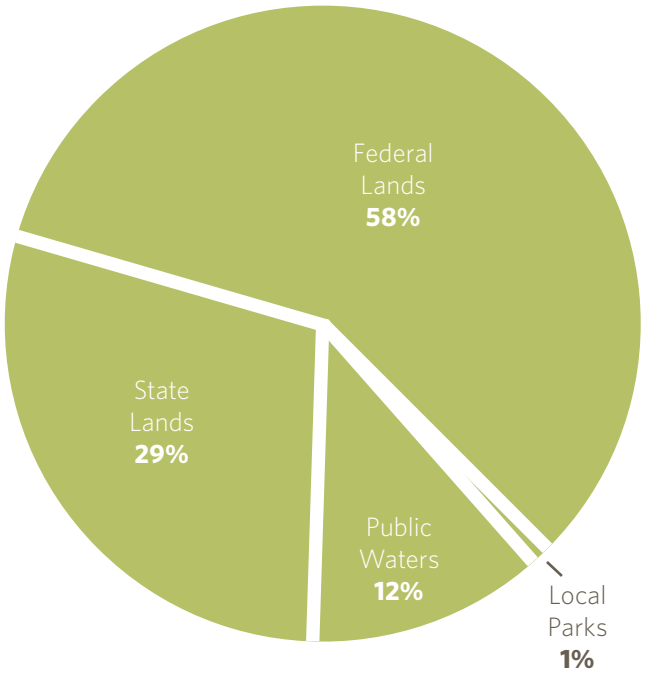
Table 6. Acreage of Public Recreational Lands

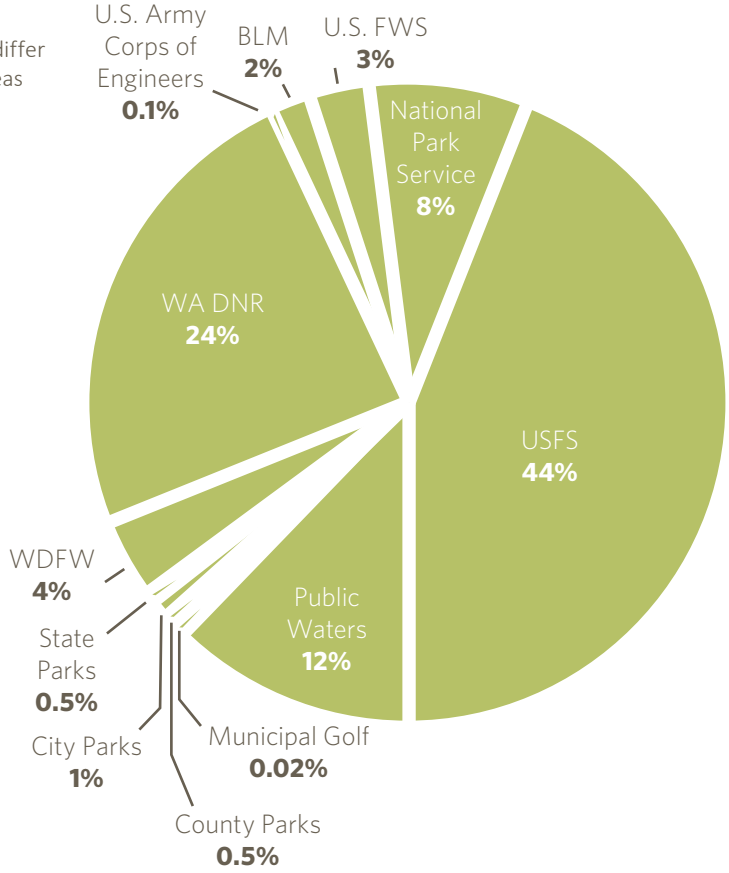
| Sub-Category | Acres** |
|---|---|
| ***Total Federal Lands*** | ***13,627,359*** |
| National Park Service | 1,958,406 |
| United States Forest Service | 10,437,470 |
| United States Fish and Wildlife Service | 761,275 |
| Bureau of Land Management | 438,126 |
| United States Corps of Army Engineers | 32,081 |
| ***Total State Lands*** | ***6,802,286*** |
| Department of Natural Resources | 5,737,633 |
| State Parks | 111,540 |
| Washington Fish and Wildlife Service | 953,113 |
| ***Total Local Parks*** | ***326,452*** |
| County Parks | 115,714 |
| City Parks* | 206,513 |
| Municipal Golf | 4,226 |
| ***Public Waters*** | ***2,726,092*** |
| **Grand Total** | **23,482,189** |

*Special district parks under city parks
** Acreages were calculated by Earth Economics using Geographic Information Systems (GIS) and the National Land Cover Dataset (NLCD) in reference to lands used for outdoor recreation. They differ from RCO's Public Lands Inventory as these refer uniquely to areas for outdoor recreation and the measurement methods differ.

Figure 15. Acreage of Public Recreational Lands, by Percentage

**23,482,189 acres of recreational land total**



## Participation and Expenditures Associated with Public Lands

Overall, it is estimated that outdoor recreation trip-related expenditures associated with recreation on public lands in Washington amount to about $10.7 billion per year (excluding equipment). Expenditures on equipment were not included in this analysis as it is difficult to separate equipment purchases made for exclusive use on public lands. Expenditures by public institutions for construction and maintenance were also not included.

The estimates of participant days and expenditures associated with public lands are shown in Table 7. Recreation associated with public waters has the

Table 7. Participant Days and Expenditures by Public Land Type

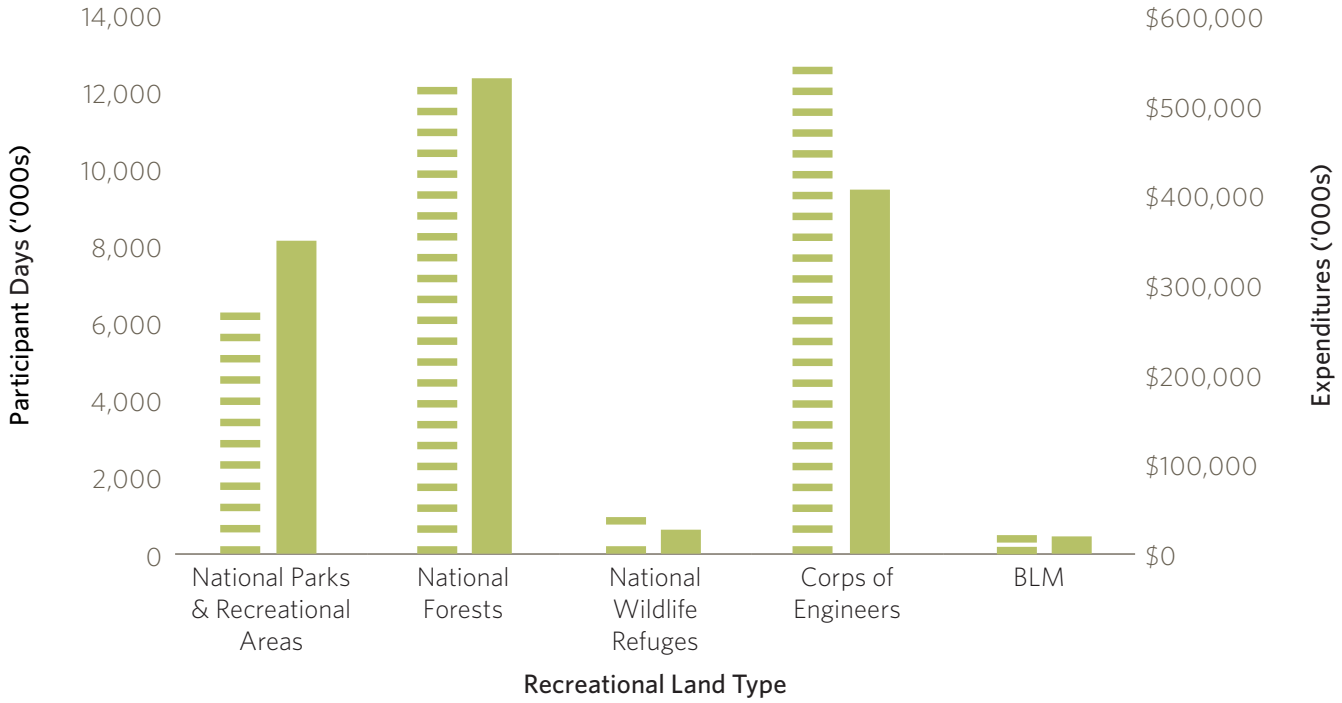
| Land Type | Participant Days ('000s) | Expenditures** ('000s, 2014 USD) | Per-Person Per-Day Expenditures (2014 USD) |
|---|---|---|---|
| ***Total Federal Lands*** | ***32,853*** | ***$1,323,545*** | ***$40*** |
| National Parks & National Recreational Areas | 6,466 | $344,057 | $53 |
| National Forests | 12,279 | $535,494 | $44 |
| National Wildlife Refuges | 898 | $18,090 | $20 |
| U.S. Army Corps of Engineers | 12,748 | $405,772 | $32 |
| BLM | 462 | $20,133 | $44 |
| ***Total State Lands*** | ***49,095*** | ***$1,347,192*** | ***$27*** |
| State Parks | 33,059 | $699,289 | $21 |
| State DNR Lands | 10,281 | $448,359 | $44 |
| WDFW Game Management Units | 1,755 | $118,945 | $68 |
| WDFW Wildlife Areas | 4,000 | $80,600 | $20 |
| ***Public Waters*** | ***101,701*** | ***$4,630,986*** | ***$46*** |
| Fishing | 19,494 | $805,288 | $41 |
| Motorized Boating & Sailing | 19,171 | $1,641,007 | $86 |
| Non-Motorized Paddle Sports | 7,669 | $578,669 | $75 |
| Inner tubing or floating | 12,753 | $560,219 | $44 |
| Non-Motorized Windsurfing/Surfing | 1,399 | $123,153 | $88 |
| Swimming in natural waters | 26,624 | $525,818 | $20 |
| Swimming (outdoor pools) | 13,498 | $266,591 | $20 |
| Scuba diving | 1,094 | $130,242 | $119 |
| ***Total Local Parks*** | ***189,915*** | ***$1,439,096*** | ***$8*** |
| County Parks | 34,857 | $243,999 | $7 |
| City and Special district Parks | 153,371 | $1,073,597 | $7 |
| Municipal Golf | 1,687 | $121,500 | $72 |
| ***Events**** | ***44,516*** | ***$1,439,096*** | ***$45*** |
| **Total** | **418,081** | **$10,727,131** | |

* Events occurring on public lands
** Excludes equipment expenditures

highest expenditures. This category was studied by combining data from a set of activities taking place in Washington's water bodies[v]. In general, recreation in or on public water involves activities high expenditures. Visits to federal lands also involve high per day expenditures. Places like national parks and national forests are high profile destinations attracting visitors from far away and for longer overnight stays. Although state lands attract a large number of recreational participants, visits to these areas tend to be shorter with lower expenditures per day. Visits to local parks involved very low trip expenditures but a high frequency of visitation. Special events have a high per day expenditure rate due to a large number of overnight stays and access fees. Figure 16 through Figure 18 summarize the data for each public land type by subcategory.

v Some adjustments were made to avoid double counting within the category. The number of fishing days was reduced by 25% in order to avoid double counting fishing days done from a boat. The actual number of fishing days in Washington is estimated at 26.3 million days per year. However, there may be some overlap with other categories (e.g. a lake may be located in a state park and hence swimming in natural waters may be double counted with state park visitor counts.

Figure 16. Participant Days and Expenditures for Federal Lands




*Excludes equipment expenditures

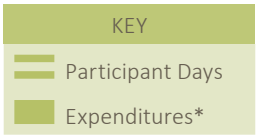
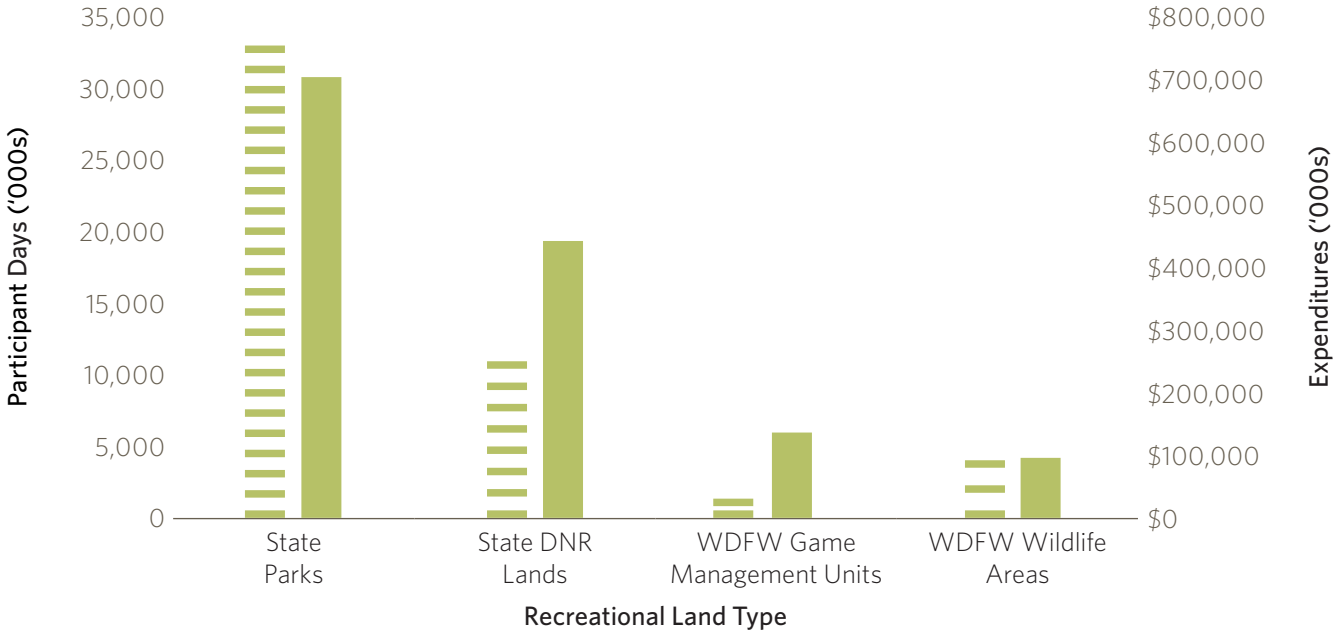


Figure 17. Participant Days and Expenditures for State Lands




*Excludes equipment expenditures

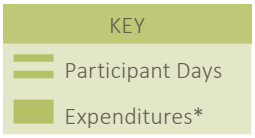
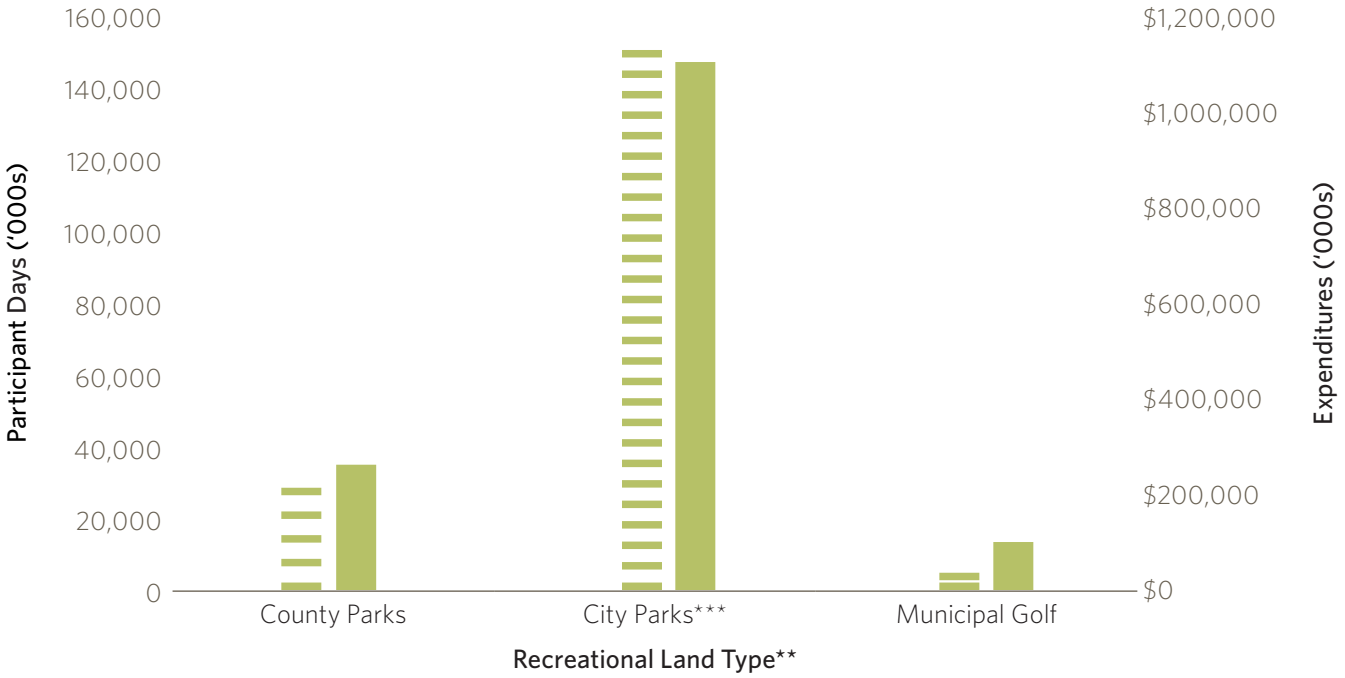


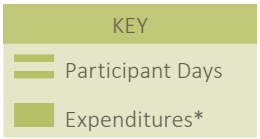

Figure 18. Participant Days and Expenditures for Local Lands




*Excludes equipment expenditures

**Excludes events occurring on public lands, which total $1,986,000 in expenditures

*** Includes special district parks

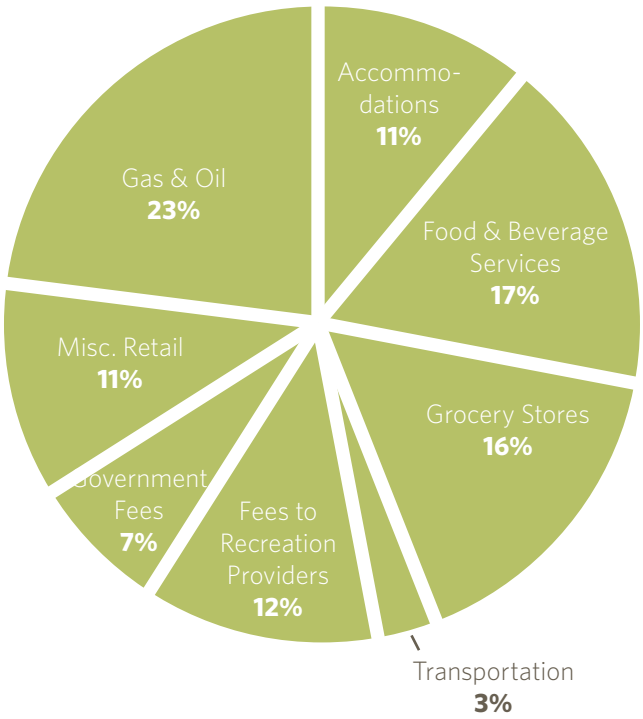


Federal and state agencies often record data on recreational use and its economic effects. For example, the U.S. Forest Service has published numerous studies on the economic characteristics of outdoor recreation in national forests. Most state parks in Washington also record numbers of visitors to each park as well as length of stay.[vi] The number of visits to local parks and the associated expenditures were more difficult to quantify as there is often no formal attendance counts for these lands. Participant days for this land type were estimated using an average number of days that adult Washingtonians visit these types of facilities as well as primary data collected from a handful of counties and cities. Expenditure profiles were extrapolated from existing studies on specific park systems or recreational activities (for a description of the full methodology see Appendix B).

Expenditures associated with recreation on public lands can be seen in Figure 19. Expenditures on equipment were not included in this analysis as it is difficult to separate equipment purchases made for exclusive use on public lands. Expenditures by public institutions for construction and maintenance were also not included since estimates were derived from a consumer perspective. Food and beverage expenditures (both at service places and at grocery stores) totaled about a third of expenditures. Another third was spent on accommodations, fees, and recreation services. A quarter of expenditures were in oil and gasoline mostly for private vehicle use. Public transportation expenditures made up a small percentage (3%) by contrast. The remaining 11% was made up of miscellaneous retail, which is above and beyond total state equipment expenditures.

Figure 19. Expenditures Associated With Recreation on Public Lands

**$10,727,131,000 recreation related expenditures on public lands***




*Excludes equipment expenditures

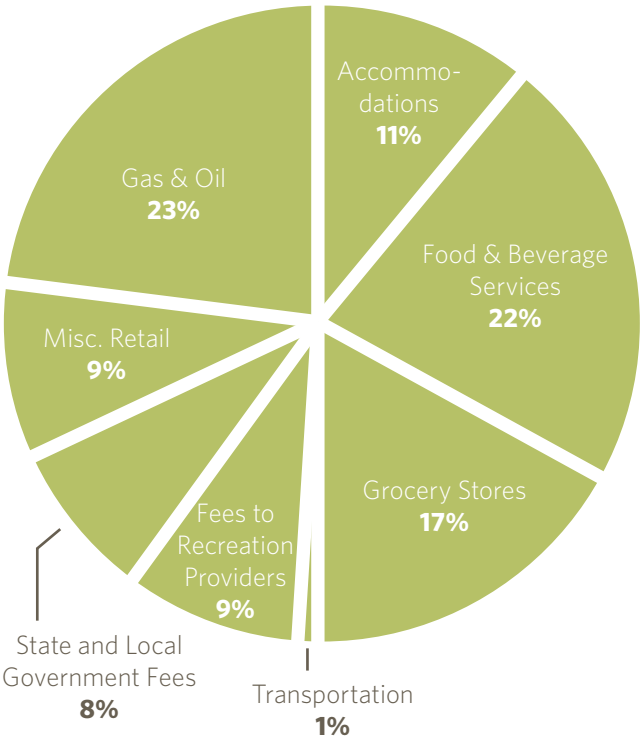
vi Although visitation is reported, methods for estimating visitation vary. For some parks, visitation is estimated from a road counter, and for island state parks, it is estimated from the amount of trash picked up monthly.

### *A Closer Look at State Lands*

Trip-related expenditures on state lands account for $1.35 billion, about 13% of non-equipment recreation related expenditures on all public lands and 10% of non-equipment recreation related expenditures for all recreational lands. The analysis of state lands is similar to the analysis done for all public lands. Figure 20 illustrates recreation related spending on state lands. Some differences to be noted are the expenditures at food and beverage places (these are less than total public lands) and the fees to recreation providers (also less than public lands total).

Figure 20. Expenditures Associated With Recreation on State Lands

**$1,347,191,809 recreation related expenditures on state lands***




*Excludes equipment expenditures

## Economic Contribution Analysis for Public Lands

The $10.7 billion spent as a result of outdoor recreation on public lands (excluding equipment) generate substantial economic activity throughout the state. Equipment expenditures could not be included as they could not be solely attributed to recreation on public lands. According to the economic model used, trip-related expenditures on public lands in Washington State generate $8.3 billion in direct contributions from in-state sales. This spending, in turn, results in other in-state sales of $2.3 billion to support the production of the purchased goods and services (indirect contributions). The associated household wages result in additional sales of $3 billion (induced contributions). In total, economic contributions resulting from outdoor recreation on public lands throughout the state amount to $13.6 billion (Table 8). Multiplier effects are greater than that for all lands due in part to the exclusion of retail sales (equipment) characterized by significant leakages.

Table 8. Economic Contribution from Public Recreational Lands

| Contribution | Total ('000s, 2014 USD)* |
|---|---|
| Direct | $8,297,740 |
| Indirect | $2,294,417 |
| Induced | $3,013,100 |
| **Total** | **$13,605,257** |

*Excludes equipment expenditures

The top eight economic sectors benefiting from these expenditures, once margins and outflows of goods and services are taken into account, are shown in Table 9. These sectors make up more than half of the total in-state sales linked to the public land recreation economy of Washington State. Food and beverage places are the largest beneficiary of outdoor recreation expenditures, followed by wholesale trade, and by hotels and motels. The expenditures analyzed in this section do not include equipment expenditures.

Table 10 shows some general categories of state and local taxes receiving revenue from the estimated expenditures. Taxes on production and imports represent the largest area of tax revenue. These taxes emerge largely from the sale of goods and services. Total tax contributions to state and local governments amount to $1.2 billion.

A total of 122,562 jobs, or about 62% of all outdoor recreation jobs, are associated with expenditures for outdoor recreation on public lands. This estimate includes both full-time and part-time jobs. Table 11 shows the sectors where most employment occurs.

**Table 9. Economic Contribution by Economic Sector, Public Lands**

| Sector | Total* ('000s, 2014 USD) |
|---|---|
| Food and beverage places | $2,018,404 |
| Wholesale trade businesses | $1,164,232 |
| Hotels and motels | $1,045,563 |
| Other amusement and recreation industries | $967,009 |
| Petroleum refineries | $910,951 |
| Retail Stores – Miscellaneous | $552,772 |
| Retail Stores - Gasoline stations | $547,002 |
| Retail Stores - Food and beverage | $534,936 |

*Excludes equipment expenditures

**Table 10. Local and State Tax Contributions, Public Lands**

| Category | Total ('000s, 2014 USD) |
|---|---|
| Tax on Production and Imports | $1,187,661 |
| Households | $19,856 |
| Employee Compensation | $7,496 |
| Corporations | $883 |
| **Total** | **$1,215,897** |

**Table 11. Employment Associated with Public Land Recreation, By Sector**

| Sector | Employment |
|---|---|
| Food and beverage places | 29,415 |
| Other amusement and recreation industries | 17,411 |
| Retail Stores - Miscellaneous | 10,205 |
| Hotels and motels | 7,924 |
| Retail Stores - Food and beverage | 6,951 |

# Expenditures and Economic Contributions in Counties Resulting From Recreation on Public Lands

Outdoor recreational activity on all public lands and their associated expenditures were calculated at the county level. The methodology for calculating these estimates was the same as that used for all the recreational lands, with an exclusive focus on public lands and the exclusion of equipment. Total expenditures for all public lands by county can be seen in Figure 21. Expenditures for total recreation followed a nearly identical pattern.

The contributions of these expenditures to the counties' economies were estimated based on county-specific models. Indirect and induced contributions as well as local job creation were estimated using IMPLAN data on industrial make-up, expenditure patterns, and trade flows of each county. The results for the counties are presented in Appendix H. Multipliers at the county level are lower because of the smaller size of counties' economies, resulting in many of the goods and services purchased within a county being sourced from out of the county. Multipliers for the ratio of expenditures to total contributions range between a low of 0.36 in Ferry County and a high of 1.24 in Spokane County. Job generation ranges between a low of 78 jobs in Wahkiakum County

Figure 21. Total Expenditures by County Resulting From Recreation on Public Lands

**Total Washington State Expenditures* for Outdoor Recreation on Public Lands & Waters = $10.7 billion**

*Excludes equipment expenditures

and a high of 27,000 jobs in King County. The sum of all of the counties' contributions resulting from recreation on public lands is less than contributions for the public lands state-wide since county models do not capture inter-county and state level interactions.

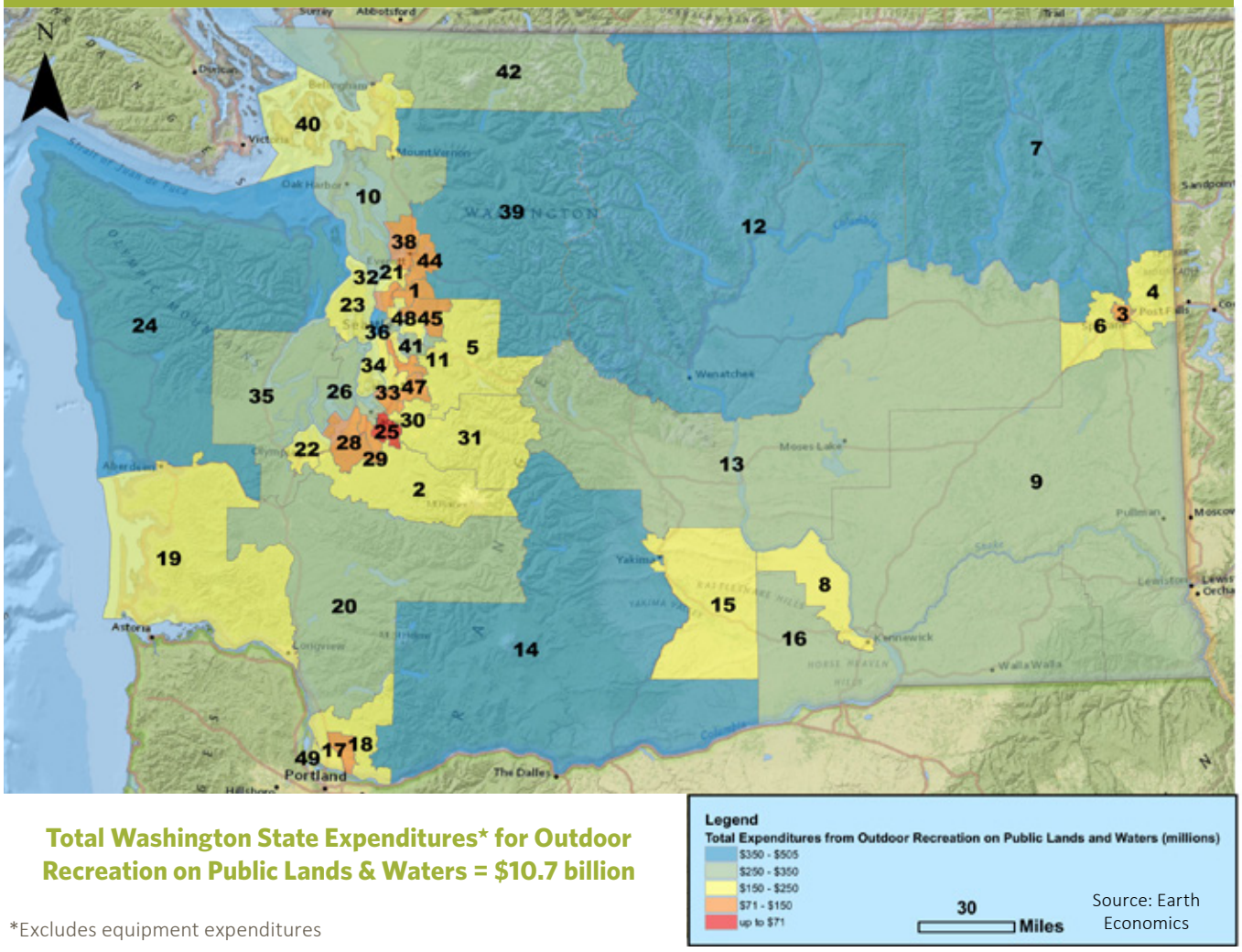
### *Legislative District expenditures in Public Recreational Lands*

Recreational trip expenditures were also calculated at the legislative district level. Expenditures at the legislative district level were derived through a GIS overlay of legislative district boundaries on recreation jurisdictions. The distribution of expenditures by legislative district can be seen in Figure 22. Equipment expenditures are not included.

Expenditures by the legislative district level ranged from $70 million in Legislative District 25 to $503 million in Legislative District 36. Average expenditures at the legislative district level were $219 million. There is not much variation in population between legislative districts, however, some legislative districts benefited greatly from outdoor recreation because of out-of-region visitors. The total number of expenditures by recreational land type at the legislative district level can be seen in Appendix G.

Because the legislative district does not exist as a unit of analysis in IMPLAN, a contribution analysis to estimate multipliers and employment was not possible.

Figure 22. Total Expenditures by Legislative District Resulting From Recreation on Public Lands




**Total Washington State Expenditures* for Outdoor Recreation on Public Lands & Waters = $10.7 billion**

*Excludes equipment expenditures

# CHAPTER 4

# Expenditures and Contributions of Private Outdoor Recreation Lands

**Chapter 4 Highlights**

- Only a limited number of private lands had data complete enough for this analysis: timberlands, private businesses for horse-riding, private golf sites, and ski areas.
- Outdoor recreation occurring on private campgrounds, private rural lands, private vacation properties, backyards, and other private property were not included in this analysis.
- A conservative estimate of $1.9 billion is spent every year as a result of recreational trips to private lands (excluding equipment), which generates $2.6 billion in total economic contribution throughout the state.

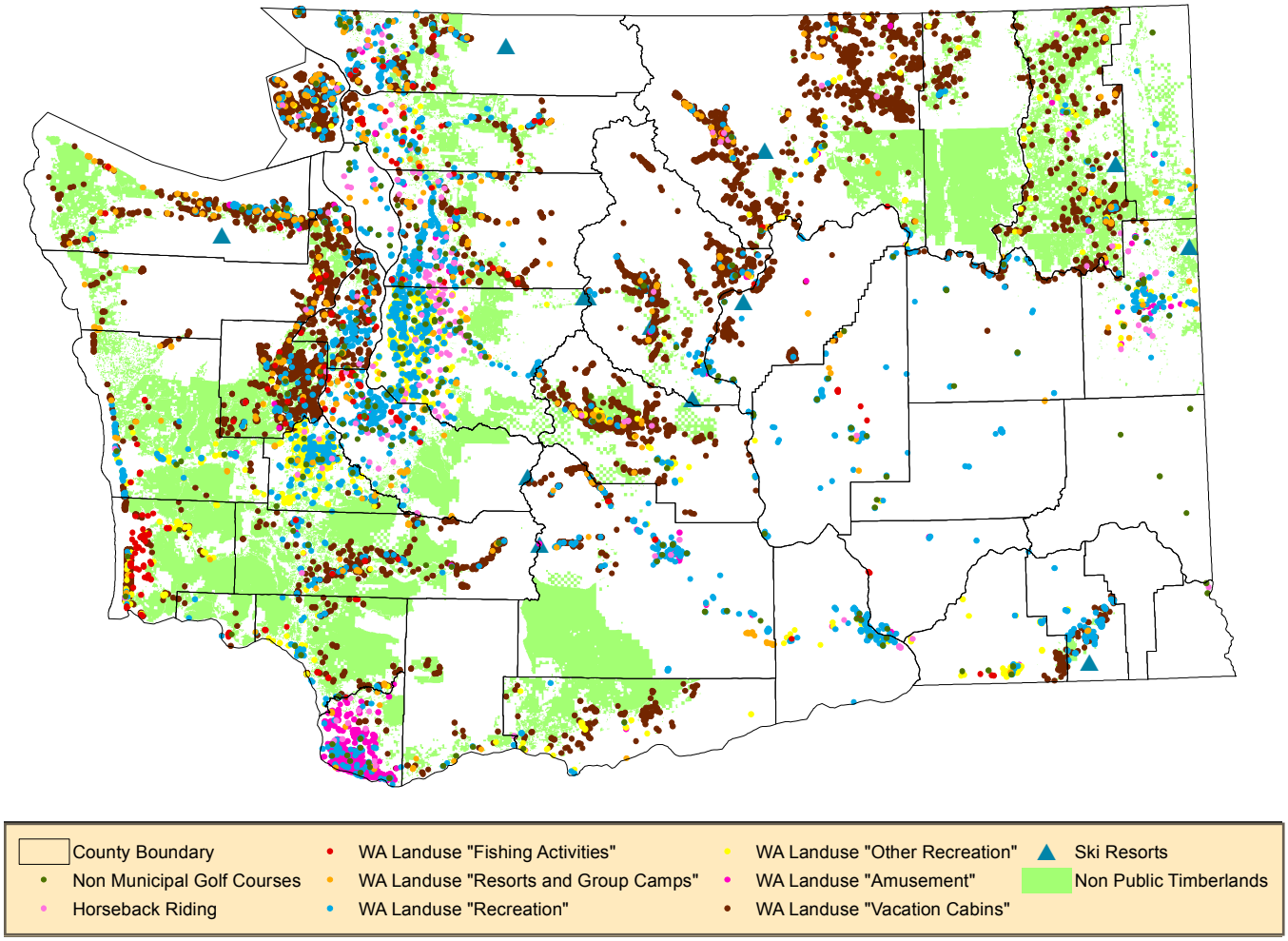
## Participation and Expenditures in Private Recreational Lands

Figure 23 illustrates the breadth and ubiquity of private recreation providers in Washington State.[1] These and other privately held lands available for outdoor recreation total about 18 million acres.[2] About 70% of the marine shoreline is privately owned.[3] Washington's Fish and Wildlife Department permits hunting access to 1 million acres of private land through land owner agreements.[4] Other significant private recreation sectors are privately managed camping sites, water parks, private vacation properties, race tracks, gardening and landscaping, and the growing sector of agro-tourism. Unfortunately, data describing behavior and expenditures related to recreation on private lands is not easily available for public research. As a result, only a limited number of private lands were included in this study: private timber companies, ski resorts managed by private entities,[vii] horseback riding-related businesses, and non-municipal golf courses. Therefore the expenditure estimations and associated effects of private recreation in this study should be considered underestimations and interpreted with caution.

vii Ski areas are generally lands leased from national forests and managed by private entities.

Hiking in the snow, image credit: RCO

Figure 23. Private Lands Available for Outdoor Recreation in Washington




*Derived 2010 Washington State Landuse[5] and Google Earth 2014

Table 12. Expenditures and Participation in Outdoor Recreation on Private Lands

| Land Type | Participant Days ('000s) | Expenditures** ('000s, 2014 USD) | Average Per-Person Per-Day Expenditures (2014 USD) |
|---|---|---|---|
| Horseback Riding | 12,633 | $757,992 | $60 |
| Private Golf | 8,357 | $601,714 | $72 |
| Private Timberland Recreation | 4,859 | $257,028 | $53 |
| Skiing | 2,097 | $317,226 | $151 |
| **Private Lands Total*** | **27,946** | **$1,933,961** | |

*A limited number of private lands were included in this analysis
**Excludes equipment expenditures

This analysis estimates that this sample of private lands hosts about 27.9 million participant days per year. Expenditures on these private lands total about $1.9 billion every year. Equipment expenditures are not included as they could not be assigned exclusively to private land use. The relative frequency and specific contribution of the different categories under private land recreation can be seen in Table 12.

Horseback riding, though allowed on some public lands, requires businesses and facilities managed by private agents. Golfing sites, regardless of public access or private membership, include only those that are managed by private entities (municipal courses were counted under "public lands"). Average expenditures for golfing were conservatively estimated at $72 per day.

There are about 9.4 million acres of privately held timberland in Washington, which we estimate to host over 4.8 million participant days every year.[6] These lands, which are often managed by large timber companies, offer a wide array of recreational activities. Some of the most popular activities include hiking, hunting, fishing, camping, and off highway vehicle (OHV) use. Expenditure calculations for private timberlands were based on expenditure profiles for national forests, leading to an estimate that, on average, each participant day on private timberlands generates $53 in expenditures.

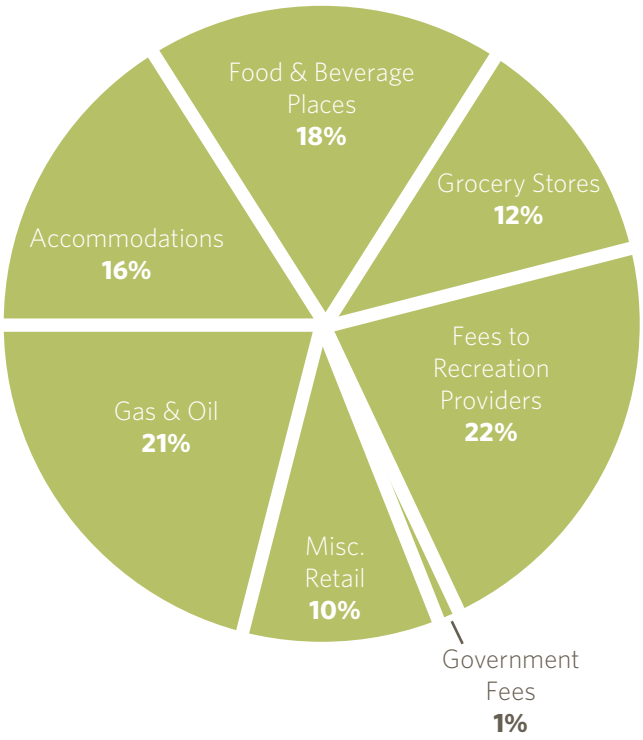
Downhill skiing generally happens on land leased from national forests managed by private entities. On average, a day of skiing attracted $151 in expenditures. Skiing outside the thirteen major resorts is not included therefore the numbers estimated here are conservative.

Figure 24 shows the average type of expenditures incurred within private lands. Overall, recreation on private lands had the highest amount of recreational fees incurred. Skiing, golfing, and recreation in timberlands[viii] tend to involve high access or entrance fees. Expenditures on gasoline were close behind, followed by food services and drinking places. These expenditures are aggregated in general categories here but in reality they involve a number of diverse actors and businesses.

viii Not all private timberland owners charge access fees

Figure 24. Expenditure Categories Resulting From Recreation Occurring on Private Lands

**$1,933,961,000 recreation related expenditures* on private lands****




*Excludes equipment expenditures
**A limited number of private lands were included in this analysis

# The Economic Contribution of Recreation on Private Lands

The $1.9 billion trip-related expenditures resulting from outdoor recreation on private lands in Washington State generates substantial local economic activity, as demonstrated by the economic contribution analysis. This analysis was carried out using region-specific IMPLAN models, depicting the industrial make-up of a region, trade flows, and spending patterns. According to these parameters, expenditures resulting from recreation on private recreational lands generate about $1.6 billion in direct contributions from in-state sales. These resulted in $444 million in indirect contributions. Indirect contributions include supply chain activities like the purchase of materials by manufacturers to produce final goods and services. Purchases made through household wages related to the affected industries totaled $568 million (induced contributions). In total, economic contributions to the state totaled $2.6 billion for the private lands included in the analysis (Table 13). Multiplier effects were larger for private lands (in comparison to all lands or public lands) as a result of higher expenditures on fees and accommodation services, which trickle more directly to the local economy.

The top eight economic sectors benefiting from expenditures associated with recreation on private recreation lands in Washington State are shown in Table 14. These are the sectors where purchases are flowing to once they enter the local economy. The sectors outlined make up more than half of the total in-state sales linked to the private land outdoor recreation economy. As illustrated below, recreational industries managing these activities were the largest beneficiaries, followed by food and beverage places, followed by hotels and motels. The expenditures analyzed in this section do not include equipment expenditures.

Table 15 shows some general categories of state and local tax revenues resulting from the estimated expenditures associated with recreation

**Table 13. Economic Contributions from Private Recreational Lands**

| Contribution | Total* ('000s, 2014 USD)* |
|---|---|
| Direct | $1,595,086 |
| Indirect | $444,009 |
| Induced | $568,815 |
| **Total** | **$2,607,911** |

*A limited number of private lands were included in this analysis. Excludes equipment expenditures.

**Table 14. Economic Contributions by Economic Sector, Private Lands**

| Sector | Total* ('000s, 2014 USD) |
|---|---|
| Other amusement and recreation industries | $427,863 |
| Food and beverage services | $384,513 |
| Hotels and motels | $278,540 |
| Wholesale trade businesses | $193,638 |
| Petroleum refineries | $149,448 |
| Retail Stores - Miscellaneous | $89,561 |
| Retail Stores - Gasoline stations | $88,504 |
| Retail Stores - Food and beverage | $77,051 |

*A limited number of private lands were included in this analysis. Excludes equipment expenditures.

**Table 15. Local and State Tax Contributions, Private Lands**

| Category | Total ('000s, 2014 USD)* |
|---|---|
| Tax on Production and Imports | $254,723 |
| Households | $3,737 |
| Employee Compensation | $1,456 |
| Corporations | $167 |
| **Total** | **$260,083** |

on private lands. Taxes on production and imports represent the largest area of tax revenue. These taxes emerge largely from the sale of goods and services at retail places. Total tax contributions are estimated to be approximately $260 million.

A total of 25,817 jobs were supported as a result of expenditures associated with recreation on private lands managed for outdoor recreation in Washington State. This is 13% of the total number of outdoor recreation supported jobs estimated in this study. This estimate includes both full-time and part-time jobs. Table 16 shows the sectors where the most employment occurs. The category of "other amusement and recreation industries" refers to employment in private golf courses, ski resorts, timberlands, or private horse riding businesses.

The results presented here are reflective of the selected activities and types of lands included under this category and should be considered an underestimate. Behavioral surveys, real estate trends, and usage data concerning outdoor recreation on private lands would all be required for a more complete assessment.

**Table 16. Employment Associated with Outdoor Recreation, Private Lands***

| Sector | Employment |
|---|---|
| Other amusement and recreation industries | 7,704 |
| Food services and Beverage places | 5,604 |
| Hotels and motels | 2,111 |
| Retail Stores - Miscellaneous | 1,653 |
| Retail Stores - Food and beverage | 1,001 |

*A limited number of private lands were included in this analysis. Excludes equipment expenditures.

Horseback riders, image credit RCO

# CHAPTER 5

# Economic Impact from Out-of-State Visitors to Washington's Outdoor Recreational Lands

## Chapter 5 Highlights

- Out-of-state visitors accounted for an estimated 12% of participant days and 27% of total outdoor recreation spending, not including equipment purchases.
- Every dollar spent by an out-of-state traveler in Washington generates $1.36 in economic impacts.
- Visitors to National Park Service lands accounted for 48% of out-of-state participant days and 77% of total National Park Service related expenditures.
- Impact analysis highlights the importance of promoting outdoor recreation in Washington beyond state borders.

The economic impact analysis differs from the economic contribution analysis in that it estimates the net change to Washington's economy attributed to the new money flowing into the state as a result of recreation related spending from out-of-state visitors. The impact represents the economic activity that would be lost if the recreational lands were not there.[7] If the current outdoor recreational lands did not exist, it is assumed that these visitors would go somewhere else and the revenue flows from their visit would go with them. Spending by local residents is not included in the economic impact analysis since it is assumed that the money spent by residents would stay in Washington's local economy through direct substitutions to other types of local expenditures. The analysis does not include Washingtonians that would travel out-of-state in the absence of outdoor recreation opportunities.

River rafting, image credit: Mike Ramsey

# Participant Days and Expenditures by Outdoor Recreation Visitors

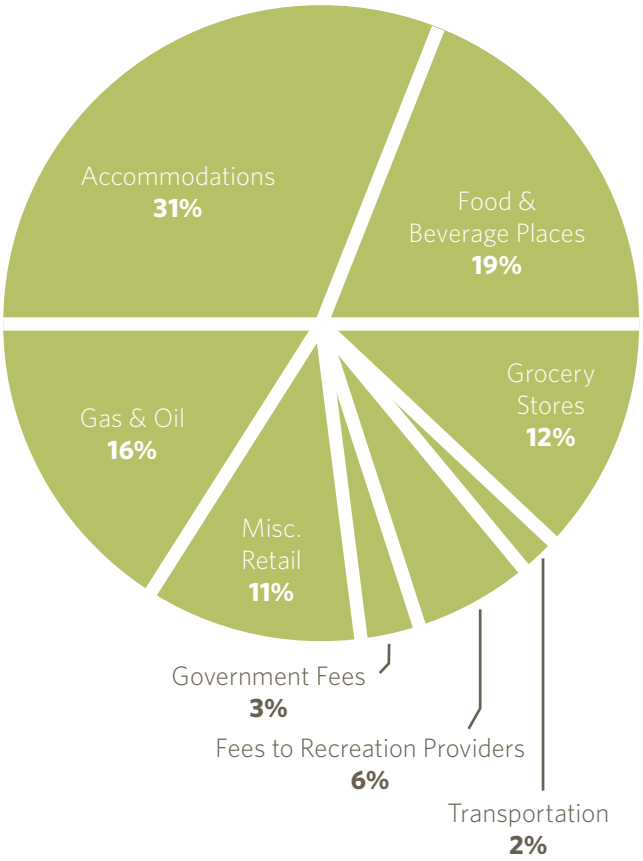
Out-of-state visitors spend an estimated $3.4 billion per year in Washington State. These expenditures are made during an estimated 55.7 million participant days. Equipment expenditures are assumed to be made in the participant's home state. Out-of-state visitors account for about 12% of all participant days and about 27% of all trip-related expenditures.

Participant days and expenditures were estimated for each recreational land category studied (see Table 17). In some cases, land managers keep records of the origin of their visitors (most federal land and some state land managers). In other cases, the number of out of state visitors had to be extrapolated from studies or estimates provided by recreation activity associations (see Appendix G for full methodology). Expenditures often assumed overnight expenditure rates.

The types of expenditures these visitors make can be seen in Figure 25. It is not surprising that two thirds of total expenditures are for accommodations, food and beverage places, and gas and oil since out-of-state visitors are often away from home and on multi-day visits.

Figure 25. Expenditures by Out-of-State Visitors

**$3,441,158,000 recreation related expenditures by out-of-state visitors***




*Equipment expenditures are not included in the out-of-state calculations

Table 17. Out-of-State Visitors and Associated Recreation-Related Expenditures* by Land Type

| Land Type | Total Participant Days ('000s) | Expenditures* ('000s, 2014 USD) | Per-Person Per-Day Expenditures (2014 USD) |
|---|---|---|---|
| ***Federal Lands Total*** | ***9,207*** | ***$621,147*** | ***$67*** |
| National Parks & National Recreational Areas | 3,091 | $263,827 | $85 |
| National Forests | 2,487 | $208,730 | $84 |
| National Wildlife Refuges | 307 | $13,264 | $43 |
| Corps of Engineers | 3,276 | $130,854 | $40 |
| BLM | 46 | $4,473 | $97 |
| ***Washington State Lands Total*** | ***6,227*** | ***$369,775*** | ***$59*** |
| State Parks | 3,769 | $216,007 | $57 |
| State DNR Lands | 1,028 | $86,303 | $84 |
| WDFW Game Management Units | 70 | $8,713 | $124 |
| WDFW Wildlife Areas | 1,360 | $58,752 | $43 |
| ***Public Waters Total*** | ***9,303*** | ***$692,440*** | ***$74*** |
| Fishing | 1,657 | $244,193 | $147 |
| Motorized Boating & Sailing | 1,342 | $154,466 | $115 |
| Non-Motorized Paddle Sports | 767 | $77,814 | $101 |
| Inner tubing or floating | 1,275 | $75,329 | $59 |
| Non-Motorized Windsurfing/Surfing | 140 | $16,560 | $118 |
| Swimming in natural waters | 2,662 | $70,713 | $27 |
| Swimming (outdoor pools) | 1,350 | $35,851 | $27 |
| Scuba diving | 109 | $17,514 | $160 |
| ***Local Parks Total*** | ***18,992*** | ***$157,028*** | ***$8*** |
| County Parks | 3,486 | $24,400 | $7 |
| City and Special District Parks | 15,337 | $107,360 | $7 |
| Municipal Golf | 169 | $25,269 | $150 |
| ***Events**** | ***8,903*** | ***$1,173,180*** | ***$132*** |
| ***Private Lands Total***** | ***3,102*** | ***$427,589*** | ***$138*** |
| Private Timberland Recreation | 827 | $84,228 | $102 |
| Skiing | 176 | $72,457 | $411 |
| Private Golf | 836 | $125,136 | $150 |
| Horseback Riding | 1,263 | $145,768 | $115 |
| **Grand Total** | **55,734** | **$3,441,158** | |

*Excludes equipment expenditures
**Events occurring on public lands
***A limited number of private lands were included in this analysis

# Economic Impact from Outdoor Recreation Associated with Out-of-State Visitors

The $3.4 billion spent in outdoor recreation in Washington by out-of-state visitors generates substantial economic activity that would otherwise not have occurred. The economic impact analysis illustrates the total increase of monetary flows in the state as a result of these expenditures. This analysis was carried out using region-specific IMPLAN models, depicting the industrial make-up of a region, trade flows, and spending patterns. According to these parameters, expenditures by outdoor recreation visitors to Washington State generate $2.7 billion in revenue from in-state sales (direct impacts). These give way to other in-state sales of $874 million to support the production of the purchased goods and services (indirect impacts). The associated household wages resulted in additional sales of about $1 billion (induced impacts). In total, the economic impact to the state amounted to $4.6 billion (Table 18). The total economic activity generated surpasses the expenditures made through its multiplier effects.

The top eight economic sectors benefiting from expenditures by out-of-state visitors in Washington State are shown in Table 19. These are the sectors where purchases are flowing to once they enter the local economy. The sectors outlined in Table 19 make up more than half of the total in-state sales linked to visitors. Hotels and motels were the largest beneficiaries, followed by food and drinking places. The expenditures analyzed in this section do not include equipment expenditures and represent expenditures across all land types.

Table 18. Economic Impact from Out-of-State Visitors

| Impact | Total* ('000s, 2014 USD) |
|---|---|
| Direct | $2,745,118 |
| Indirect | $874,705 |
| Induced | $1,048,627 |
| **Total** | **$4,668,450** |

*Excludes equipment expenditures

Table 19. Economic Impact of Out of State Visitors by Economic Sector

| Sector | Total* ('000s, 2014 USD) |
|---|---|
| Hotels and motels | $932,101 |
| Food and beverage places | $670,431 |
| Wholesale trade businesses | $306,531 |
| Petroleum refineries | $235,289 |
| Retail Stores – Miscellaneous | $177,422 |
| Other amusement and recreation industries | $142,509 |
| Retail Stores - Food and beverage | $139,802 |
| Real estate establishments | $134,220 |

*Excludes equipment expenditures

Table 20 shows some general categories of state and local taxes receiving revenue from the observed expenditures. Taxes on production and imports represent the largest area of tax revenue. These taxes emerge largely from the sale of goods and services at retail places. Total state and local tax impacts currently stand at $317 million.

A total of 46,430 jobs or 23% of total outdoor recreation jobs are supported in Washington State as a result of expenditures by out-of-state visitors. This estimate includes both full-time and part-time jobs and does not distinguish between them or identify the number of hours worked within each job. Table 21 shows the sectors where the most employment occurs. Food and beverage places generate the most jobs.

The economic impact analysis identifies new revenue brought into Washington State as a result of existing outdoor recreational lands. In this case, the total economic impact is greater than the gross expenditures made by out-of-state visitors (see Table 22). Expenditures in accommodation and service industries tend to trickle down to the local economy more than expenditures on other sectors such as retail stores (more common on the other contribution analyses). The impact analysis highlights the importance of promoting outdoor recreation in Washington beyond state borders.

**Table 20. Local and State Tax Impact from Out-of-State Visitors**

| Tax | Total ('000s, 2014 USD) |
|---|---|
| Tax on Production and Imports | $307,483 |
| Households | $6,933 |
| Employee Compensation | $2,641 |
| Corporations | $273 |
| **Total** | **$317,330** |

**Table 21. Employment Associated with Out-of-State Visitors**

| Sector | Employment |
|---|---|
| Food and beverage places | 10,555 |
| Hotels and motels | 8,288 |
| Retail Stores – Miscellaneous | 3,890 |
| Other amusement and recreation industries | 2,766 |
| Other Federal Government enterprises | 2,396 |

**Table 22. Economic Impact Resulting From Recreation by Out-Of-State Visitors**

| | Total |
|---|---|
| Expenditures by out-of-state visitors | $3,441,157,000 |
| Total Economic Impact | $4,668,450,000 |
| Multiplier | 1.36 |

# CHAPTER 6

# Ecosystem Services on Outdoor Recreational Lands in Washington

**Chapter 6 Highlights**

- Over 19 million acres of public land for outdoor recreation were included in an analysis of ecosystem services.
- The value of outdoor recreation as a singular ecosystem service in Washington State is estimated as a consumer surplus of about $19.6 billion to $31.2 billion per year beyond recreation expenditures.
- Three additional ecosystem services were valued, including water quality, habitat, and aesthetic beauty into this non-market analysis. These services are estimated to be between $115 billion and $217 billion per year.
- The combined total of these non-market benefits is between $134 billion and $248 billion per year.

## Introduction to Ecosystem Services

In addition to the monetary flows associated with outdoor recreation in Washington's economy, there are a number of other benefits provided that are not accounted for within traditional economic indicators. These benefits are important to people's wellbeing and to their economic and behavioral decisions. For example, people value recreation above and beyond what they actually pay for it. This situation is generally referred to as consumer surplus in economics. Outdoor recreation also keeps us healthy and in some cases happy, aspects of wellbeing that go beyond economic accounting. These benefits are made possible by Washington's natural spaces where outdoor recreation happens.

View from a hike, image credit: Lola Flores

Ecosystem services are defined as the benefits people derive from nature, free of charge. Trees, water, and animals provide goods and services such as breathable air, drinkable water, nourishing food, flood risk reduction, waste treatment, and stable atmospheric conditions. These are all examples of ecosystem services.

In this chapter, the additional benefits that outdoor recreation provides are examined. These benefits include the satisfaction and increase in general quality of life people get from engaging in these activities. There are ways to translate their value into market value approximations, which are separate from the economic expenditures.

Earth Economics uses a framework of 21 ecosystem services across 4 broad categories adapted from the taxonomy laid out in de Groot et al.[8] The four general categories include provisioning services, regulating services, supporting services, and information services (see Figure 26). See Appendix J for comprehensive definitions of all 21 ecosystem services.

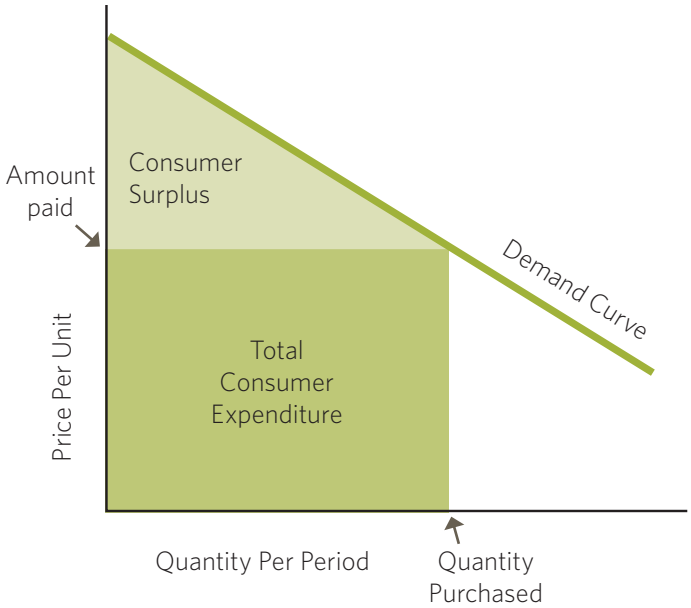
## Recreation as an Ecosystem Service

Though it is difficult to value non-market benefits, economists have developed many methods to estimate them. The value held by the consumer of recreation above what they may have to pay for it is what economists refer to as "consumer surplus," which is the difference between the maximum price consumers would be willing to pay and what they actually pay for it (see Figure 27). This difference is a gain for the consumer since they are paying less than the value they place on that benefit. For example, a Washingtonian may be willing to pay $50 to go hiking for one day on the Olympic Peninsula. If the actual cost of the hiking trip is only $20, then the hiker gains a net economic benefit (consumer surplus) of $30 per day. Even though they are obtained free of charge, the existence of extra benefits is strategic in their decision to visit an attraction or engage in an activity.

**Figure 26. The Four General Categories of Ecosystem Services**

| | |
|---|---|
| PROVISIONING SERVICES | Provide basic goods including food, water and materials. |
| REGULATING SERVICES | Benefits obtained from the natural control of ecosystem processes. |
| SUPPORTING SERVICES | Provide refuge and reproduction habitat to wild plants and animals. |
| INFORMATION SERVICES | Provide humans meaningful interaction with nature. |

**Figure 27. Consumer Surplus Versus Consumer Expenditures**



## Other Ecosystem Services

This analysis includes the valuation of three additional ecosystem services closely related to the recreational experience on public lands: aesthetic information, wildlife habitat, and water quality.

### *Aesthetic Information*

Aesthetic Information is defined as enjoying the sights, sounds, smells, and presence of nature. This ecosystem service is often valued through property sales and hence reflects the added value to those who live close to outdoor recreational areas. Properties located on the edge of a pristine lake are often more expensive than non-lakeside properties in the same area. One half of the respondents to a National Association of Realtors survey reported they would pay 10% more for a house located near a park or open space, while the actual premium paid for homes directly adjacent to parks is 16% higher.[9]

### *Wildlife Habitat*

Recreational activities like wildlife viewing or hunting would not exist without the ecosystem service of habitat and nursery. Ecosystems provide safe havens for species essential to the maintenance and appeal of recreation areas. Degraded habitats can negatively affect recreation experiences and park attendance. Habitat can be thought of as providing production value, which can be similarly valued to factors of production for a business or industry.

### *Water Quality*

Water quality enhances recreation by providing clean water. No one wants to swim in coliform bacteria or red tides. Beach closures prohibit some recreational activities completely and can negatively affect an area's reputation in the long term. Some ecosystems and species, like shellfish, are able to provide clean water by removing pollutants and sediment from water or in the case of forests keeping sediment out of water in the first place. Natural lands filter and control the flow of water in lieu of built infrastructure like water purification facilities, levies, and storm water systems. The cost of replacing these functions with built infrastructure, or replacement value, is one way to value water quality.

## Methodology

### *The Benefit Transfer Method*

We used benefit transfer methodology (BTM) to estimate the ecosystem service values for Washington State. BTM estimates the economic benefit of ecosystem services by applying derived values from previously published valuation studies to a new, sufficiently similar, study area. These published studies utilize a variety of primary valuation techniques. Some methods like Contingent Valuation or Travel Cost measure the benefits consumers derive above and beyond what they would normally pay (i.e. consumer surplus), while other methods value ecosystem services through market data. See Table 23 for a full list of primary valuation methods that were used in the transfer.

Additionally, the primary studies used in BTM are conducted in a number of different socioeconomic, biophysical, temporal, and geographic contexts. Because of these variables, care was taken to ensure transferred values accurately reflect the study area. Any study determined not to be a good fit with our study area was omitted from analysis.

### *Benefit Transfer Methodology for Recreational Values*

Consumer surplus estimates for recreational activities were derived from a recreation value database developed by Dr. Randall Rosenberger, Professor of Environmental Economics at the Oregon State University.[10] Primary valuation methods included stated preference and revealed preference methods, specifically travel cost and contingent valuation methods.

Table 23. Primary Valuation Methods

| Valuation Method | Description | Example | Value |
|---|---|---|---|
| **Market Approaches** | | | |
| Market Price | Valuations are directly obtained from the amounts people pay for the service or good on a private market. | Timber is often sold on a private market. | Total revenue |
| Replacement Cost | Cost of replacing ecosystem services with man-made systems. | The cost of replacing a watershed's natural filtration services with a man-made water filtration plant. | Value larger than the current cost of supply |
| Avoided Cost | Value of costs avoided or mitigated by ecosystem services that would have been incurred in the absence of those services. | Wetlands buffer the storm surge of a hurricane, reducing damage along the coast. | Value larger than the current cost of supply |
| Production Approaches | Service values are assigned from the impacts of those services on economic outputs. | Improvement in watershed health leads to an increase in commercial and recreational salmon catch. | Consumer surplus, producer surplus |
| **Revealed Preference Approaches** | | | |
| Travel Cost | Uses variations in travel cost to trace out the recreation demand curve, from which the consumer surplus is calculated. | Recreation areas attract tourists whose value placed on that area must be at least what they were willing to pay to travel to it. | Consumer surplus |
| Hedonic Pricing | The value of a service is implied by what people will be willing to pay for the service through purchases in related markets. | Housing prices along the coastline tend to exceed the prices of inland homes. | Consumer surplus |
| **Stated Preference Approaches** | | | |
| Contingent Valuation | Value for service demand elicited by posing hypothetical scenarios that involve some valuation of land use alternatives. | People are willing to pay for preservation of wilderness for aesthetic and other reasons. | Consumer surplus |

The annual economic benefit of recreation as an ecosystem service was calculated in two steps. First, values per participant day were determined for a set of activities happening in natural landscapes (see appendix D for the full analysis). Secondly, values by land type were calculated based on the number of participant days in each land type under public jurisdiction. As we did not have data supporting activity participation per land type, we used the average value for all participant days per land type, applying it to the total number of participant days.

### *Economic Value of Other Ecosystem Services*

The values of other ecosystem services which support recreation were estimated using Earth Economics' Ecosystem Valuation Toolkit (EVT). EVT is maintained by Earth Economics and is a comprehensive database of published, peer-reviewed primary ecosystem valuation studies. The unit of valuation used in this database is U.S. dollar per acre per year for ecosystem services which occur on specific land cover types.

Geographic Information Systems (GIS) was used to determine the number of acres of different ecosystems on each public recreational land type studied (federal, state, and local lands) (Table 24). These ecosystems, or land covers, were categorized using the National Land Cover Dataset (NLCD).[11] Public waters and beaches were also calculated separately (Table 25). Private lands were not included in this analysis due to limited data availability within this category.

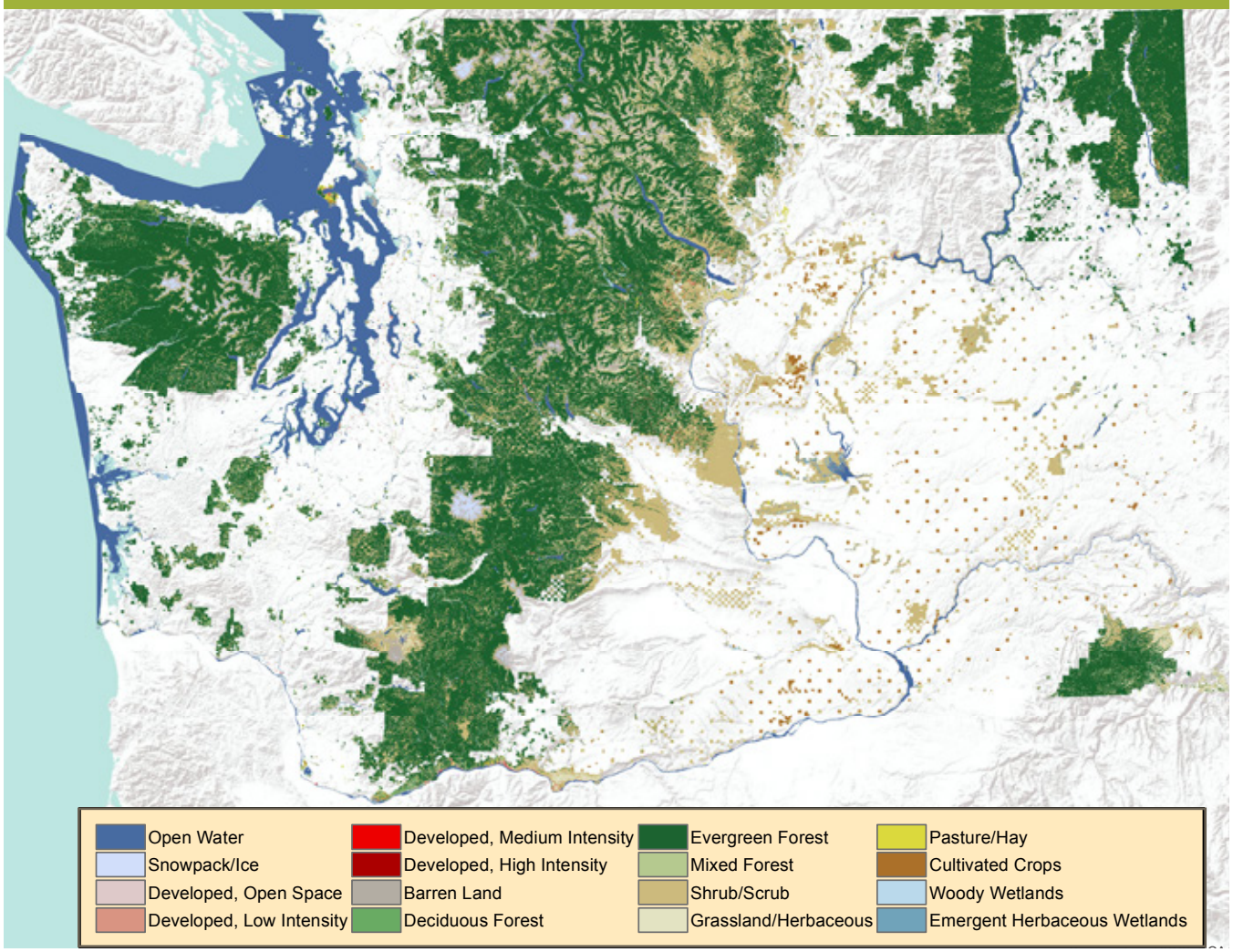
Table 24. Area of Land Cover Types Divided Among Federal, State, and Local Jurisdictions in Washington State

| Ecosystem | NLCD Code(s) | Federal (Acres) | State (Acres) | Local (Acres) |
|---|---|---|---|---|
| Forest | 41,42,43 | 9,021,096 | 2,019,224 | 194,260 |
| Grassland | 71 | 3,059,334 | 1,767,590 | 45,668 |
| Cultivated Land | 81, 82 | 49,339 | 207,366 | 7,253 |
| Wetlands | 90, 95 | 136,759 | 124,489 | 14,732 |
| **Total** | | **12,266,528** | **4,118,669** | **261,913** |

Table 25. Freshwater, Marine, and Beach Areas in Washington State

| Ecosystem | NLCD Code(s) | Public Water Acres |
|---|---|---|
| Open Freshwater | 11 | 2,378,537 |
| Marine | 11 | 238,676 |
| Beach | 31 | 108,878 |
| **Total** | | **2,726,091** |

Figure 28. Map of Land Cover on Public Recreational Lands in Washington State



The greatest limitation to this analysis is a lack of primary valuation studies for Washington State representing the ecosystem services identified. Some land cover-ecosystem service combinations do not have any published data, therefore some services were omitted. Of course these ecosystem functions still produce value. See Appendix J for a full list of gaps in this analysis.

## Ecosystem Service Value Results

The total value of recreation consumer surplus as an ecosystem service in Washington State is about $19.6 billion per year, if estimated through land jurisdiction type (see Table 27). The results estimated by activity provide a high estimate of $31.2 billion per year (see Appendix D). Ecosystem services that support recreation are valued between $115 billion and $217 billion per year. Together, recreation and the three related ecosystem services total approximately $134 billion to $248 billion annually in non-market benefits (Table 26). Note that these are non-market economic benefits, separate from the expenditures and contributions calculated earlier in the report.

Table 26. Summary of Non-Market Benefits on Recreational Lands in Washington State

| | Low Annual Total ('000s, 2014 USD) | High Annual Total ('000s, 2014 USD) |
|---|---|---|
| Total Ecosystem Service Value | $114,640,027 | $216,908,783 |
| Total Recreation Consumer Surplus Value | $19,573,370 | $31,192,437 |
| **Combined Total** | **$134,213,397** | **$248,101,220** |

### *Ecosystem Service Value of Recreation*

Table 27[ix] shows the average per day consumer surplus, participant days, and total consumer surplus per year for visits to public outdoor recreational lands in Washington State. As described previously, consumer surplus indicates the benefit consumers receive beyond what they pay.

The annual total economic benefit of recreation as an ecosystem service with this methodology is about $19.6 billion dollars. Our results show that the consumer surplus of most activities and/or land participant days is almost the same as the economic expenditures. In other words, Washingtonians seem to value recreational activities almost twice as much as what they actually pay to participate in those activities. This result is consistent with findings from another study of national wildlife refuges in Washington.[12]

### *Other Ecosystem Services*

As mentioned previously, we include the valuation of three additional ecosystem services which support recreation. These include aesthetic, habitat and nursery, and water quality. Together with recreation, these services are closely linked and dramatically affect the recreational experience.

Table 28 through Table 31 show the total economic value of the three additional services included on each public land cover type per land class. The economic value of ecosystem services supporting recreation total between $115 billion and $216 billion per year across all public lands in Washington State.

ix Note that some categories have no associated consumer surplus per day values. Because this chapter focuses on ecosystem services, swimming in outdoor pools and golfing were not given consumer surplus values as this activity did not take place in a natural ecosystem. As described previously, private lands were excluded from this analysis due to lack of data. Consumer surplus for events could not be calculated using the methods described.

Table 27. Consumer Surplus of Outdoor Recreation on Public Recreational Land Types in Washington State

| | Participant Days* ('000s) | Consumer Surplus per day (2014 USD) | Consumer Surplus per year ('000s, 2014 USD) |
|---|---|---|---|
| ***Federal Lands Total*** | ***32,853*** | | ***$1,809,691*** |
| National Parks & National Recreation Areas | 6,466 | $44 | $287,444 |
| National Forests | 12,279 | $53 | $645,631 |
| National Wildlife Refuges | 898 | $43 | $38,890 |
| Corps of Engineers | 12,748 | $64 | $813,452 |
| Bureau of Land Management | 462 | $53 | $24,274 |
| ***Washington State Lands Total*** | ***49,095*** | | ***$1,872,298*** |
| State Parks | 33,059 | $38 | $1,243,189 |
| State DNR Lands | 10,281 | $26 | $266,740 |
| WDFW Game Management Units | 1,755 | $61 | $107,131 |
| WDFW Wildlife Areas | 4,000 | $64 | $255,239 |
| ***Public Waters*** | ***88,203*** | | ***$3,880,613*** |
| Fishing | 19,494 | $66 | $1,293,072 |
| Motorized Boating & Sailing | 19,171 | $26 | $498,135 |
| Non-Motorized Paddle Sports | 7,669 | $38 | $292,731 |
| Inner tubing or floating | 12,753 | $50 | $641,694 |
| Non-Motorized Windsurfing/Surfing | 1,399 | $50 | $70,419 |
| Swimming in natural waters | 26,624 | $38 | $1,008,316 |
| Scuba diving | 1,094 | $70 | $76,246 |
| ***Local Lands*** | ***188,228*** | | ***$12,010,768*** |
| County Parks | 34,857 | $64 | $2,224,216 |
| City Parks and Special Districts | 153,371 | $64 | $9,786,552 |
| **Grand Total** | **358,379** | | **$19,573,370** |

* Note that events and private lands were not included in this analysis, so the total number of participant days in this table differs from previous tables.

Table 28. Combined Ecosystem Service Value of NLCD Classes on Federal Lands

| Land Cover | Acres | Low Annual Total ('000s, 2014 USD) | High Annual Total ('000s, 2014 USD) |
|---|---|---|---|
| Urban Greenspace | 123,410 | $59,216 | $369,685 |
| Forest | 9,021,096 | $56,874,090 | $111,340,214 |
| Grassland | 3,059,334 | $24,376,014 | $38,739,361 |
| Cultivated Land | 49,339 | $217,455 | $446,484 |
| Wetlands | 136,759 | $86,854 | $4,085,538 |
| **Total** | **12,389,937** | **$81,613,630** | **$154,981,283** |

Table 29. Combined Ecosystem Service Value of NLCD Classes on State Lands

| Land Cover | Acres | Low Annual Total ('000s, 2014 USD) | High Annual Total ('000s, 2014 USD) |
|---|---|---|---|
| Urban Greenspace | 67,397 | $32,339 | $201,893 |
| Forest | 2,019,224 | $12,619,075 | $24,809,412 |
| Grassland | 1,767,590 | $14,083,716 | $22,382,418 |
| Cultivated Land | 207,366 | $1,797,612 | $3,690,035 |
| Wetlands | 124,489 | $90,659 | $3,371,107 |
| **Total** | **4,186,066** | **$28,623,401** | **$54,454,866** |

Table 30. Combined Ecosystem Service Value of NLCD Classes on Local Lands

| Land Cover | Acres | Low Annual Total ('000s, 2014 USD) | High Annual Total ('000s, 2014 USD) |
|---|---|---|---|
| Urban Greenspace | 21,203 | $10,174 | $63,514 |
| Forest | 194,260 | $1,196,215 | $2,368,828 |
| Grassland | 45,668 | $363,868 | $578,274 |
| Cultivated Land | 7,253 | $17,841 | $36,646 |
| Wetlands | 14,732 | $9,473 | $436,619 |
| **Total** | **283,116** | **$1,597,571** | **$3,483,881** |

Table 31. Combined Ecosystem Service Value of NLCD Classes in Public Waters

| Land Cover | Acres | Low Annual Total ('000s, 2014 USD) | High Annual Total ('000s, 2014 USD) |
|---|---|---|---|
| Rivers and Lakes | 2,378,537 | $609,431 | $1,366,002 |
| Marine and Estuary | 238,676 | $2,195,994 | $2,622,752 |
| Beaches | 108,878 | $27,280 | $72,042 |
| **Total** | **2,726,092** | **$2,805,425** | **$3,988,753** |

# Other Benefits from Outdoor Recreation

It is worth noting that just as ecosystem service values extend the benefits of recreation beyond conventional economic indicators, there are also other important benefits that are not captured by the analysis conducted here. This section describes a few of these additional benefits provided by outdoor recreation.

### *Health Benefits*

Recreation benefits human well-being by improving health, providing social experiences, and increasing happiness. Many health benefits, including physical and mental health, have been attributed to outdoor recreation.

Activities such as hiking, organized sports, biking, diving, surfing, and kayaking provide exercise that keeps us physically healthy. Research has found that children who participate in outdoor recreation have high activity levels and lower levels of obesity.[13] Even walking keeps us healthy by providing weight loss and lowers the risks for heart disease, stroke, type 2 diabetes, depression, and some types of cancers.[14] Using recreation to stay active reduces public and private health care expenses. The average difference in annual medical care costs between active and inactive people is $250 for adults under 65 years of age and $500 for those over 65 years of age.[15] One study estimated about $64 million in total medical care cost savings being attributable to the Seattle Park system.[16]

Experiencing nature, enjoying local foods, and watching wildlife can reduce stress and keep us mentally healthy. Access to green spaces reduces stress and anxiety across all demographics.[17] Studies have shown that outdoor activities in parks or open spaces can benefit children with ADHD by improving concentration. Outdoor use is also linked to reduced aggression[18] and better social and life skills in children and adolescents.[19]

In 1912, the president of the Juvenile Protection Association stated, "Recreation is the antitoxin of delinquency and the sooner it is administered the milder will be the disease and the better it will be for all the children."[20] The same holds true today.

### *Social Benefits*

A 2010 survey of Washington residents found that 84% of respondents listed spending time with family and friends as a very important reason for their participation in recreational activities.[21] The outdoors provides a venue for community events, family reunions, and retreats. Because of this, outdoor recreation is a catalyst for building interconnected communities.[22]

Washington State retains and attracts human capital. Indeed, Washington retains more of its college graduates than any other state in part because of quality of life.[23] Moreover, according to a recent Puget Sound business survey, almost half of the businesses interviewed had decided to locate in Washington State because of its "the environmental surroundings and quality of life."[24]

Countless hours of volunteer work are invested in maintaining public recreation lands. State Parks found that over 275,000 volunteer hours are clocked by individuals every year a value of time estimated between 2 and 25 million dollars.[25] Other researchers have shown that exposure to nature can influence priorities and our perception of values to be more community and connection focused.

### *Ecosystem Services and Ecosystem Health*

Ecosystem health and the recreational experience are directly related. Beach closures due to high levels of toxin or bacteria in the water completely inhibit some recreation activities. Oil, chemical, and other pollution spills severely impact activities such as swimming, fishing, and boating. Although major spills are rare, even small to moderate incidents can disrupt coastal activities for several months. Incidents like this result in

fewer days of outdoor recreation, discourage out-of-state visitors, and can negatively affect human health or a recreation area's reputation in the long term.

Suppose a beach is closed for swimming due to a chemical spill. If 1,000 people use the beach to swim each day, a one-week closure results in 7,000 participant days lost. Our analysis showed that the consumer surplus for swimming in natural waters was $38/day. This hypothetical one-week closure would then result in a loss of $266,000 for users. Other activities like scuba diving, surfing and other water-related activities would also be banned, making the losses even higher. Meanwhile, habitat and the natural beauty of the beach are severely impaired, decreasing the value of other ecosystem services.

Shi Shi beach trail, image credit: creative commons no derivatives image by Brian Holsclaw

# CHAPTER 7

# Conclusions and Further Research

This study conducted an extensive review of existing literature and data on outdoor recreation in Washington State. Through primary and secondary data collection, GIS analysis, evidence-based extrapolation, and transparent assumptions we included nearly all major outdoor recreation activities and destinations. While this report quantifies significant and diverse consumer expenditures for outdoor recreation, it shows that people derive value from recreational experiences and areas far beyond what they pay for. Beyond recreation itself, we show that recreational land and waters also provide other outstandingly valuable goods and services including aesthetic beauty, clean water, and wildlife habitat.

Many of the graphs, maps, figures and results contained in this report have never been published before. This is a comprehensive study of both the market and non-market benefits of the recreation economy in Washington State. Previous studies have examined only part of the full outdoor recreation picture. For example the study conducted by the Outdoor Industry Association[26] estimated a similar economic contribution amount (total of $22.5 billion for 2013) using models that extrapolate from U.S. national data. Our study gathered data specific for Washington State and used models specific to the state. We also analyzed different measures of economic activity beyond economic contributions.

However, results should be interpreted in light of data and scope limitations. The types of activities occurring in each recreational land type are not generally tracked by management agencies; therefore the association of activities to land types was based on informed assumptions when it was necessary. As noted throughout, the analysis of recreation on private lands was most limited in terms of data availability. Expenditures by public management agencies, including capital expenditures, were also not included in this contribution analysis. All of these aspects call for more data tracking and further recreational research.

Other common concerns with visitation data are the double counting of park visitors, double counting of people who engage in multiple types of recreation on a given day, the ability to estimate visitation at facilities with little or no access control, and differences in methods for estimation used by various facilities and management agencies. Some double counting may also be present with public water accessed through public land types. Since data for use of public waters was limited, it had to be inferred

Biking in the Wenatchee Foothills, image credit: RCO

through modeling and approximations. The primary limitation of expenditure data is often the lack of specific data for particular facilities or facility types. The values presented here can be interpreted as best approximations given the data available.

Expenditures at the county and legislative district were estimated through primary data collection and through best approximations derived from GIS modeling tools. Economic contributions associated with these expenditures were made at the county level through county-specific models. However, economic contributions at the legislative district level could not be estimated given that there are no existing economic models specific to each legislative district and the overlap with counties is imperfect. The construction of these economic models would be recommended in order to understand local economic dynamics at the legislative district level better.

There is much more to the story of outdoor recreation and its importance to the Washington State economy than is revealed in this report. Outdoor recreation markets bridge urban and rural communities. Outdoor recreation provides opportunities for physical exercise, which keeps us healthy. Indeed, the recreation market is unquestionably one of the largest markets in the state for moving income from urban to rural areas and building sustainable jobs in rural Washington State. Most outdoor recreation related expenditures trickle down to local economic sectors. Overall, investment in outdoor recreation infrastructure yields high returns throughout the entire state.

# Endnotes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# APPENDIX A

# List of Recreational Lands Included in this Study

## Federal Lands

### *National Park Service*

3 National Parks; Olympic National Park, Mount Rainier National Park, North Cascades National Park; 3 Recreation Areas; Lake Roosevelt National Recreation Area, Lake Chelan National Recreation Area, Ross Lake National Recreation Area; National Historic Reserves and Parks (e.g. Ebey's Land National Historic Reserve, San Juan Island National Historical Park, Lewis and Clark National Historical Park, with some sites in Oregon).

### *National Forests*

5 In-State forests; Colville National Forests, Gifford Pinchot National Forest, Mt. Baker-Snoqualmie National Forest, Okanogan-Wenatchee National Forest, Olympic National Forest; 2 Interstate Forests Umatilla National Forest, Idaho Panhandle National Forests; 1 Interstate Scenic Area; Columbia River Gorge National Scenic Area.

### *National Wildlife Refuges*

28 Wildlife Refuges and Management Areas; Columbia National Wildlife Refuge, Conboy Lake National Wildlife Refuge, Copalis National Wildlife Refuge, Dungeness National Wildlife Refuge, Flattery National Wildlife Refuge, Franz Lake National Wildlife Refuge, Grays Harbor National Wildlife Refuge, Julia Butler Hansen Refuge for the Columbian White-tailed Deer, Lewis and Clark National Wildlife Refuge, Little Pend Oreille National Wildlife Refuge, McNary National Wildlife Refuge , Nisqually National Wildlife Refuge, Pierce National Wildlife Refuge, Protection Island National Wildlife Refuge, Quillayute Needles National Wildlife Refuge , Ridgefield National Wildlife Refuge , Saddle Mountain National Wildlife Refuge , San Juan National Wildlife Refuge , Sinlahekin Deer Winter Range and Wildlife Refuge, Steigerwald Lake National Wildlife Refuge, Toppenish National Wildlife Refuge, Turnball National Wildlife Refuge,Umatilla National Wildlife Refuge, Willapa National Wildlife Refuge, Marrowstone Wildlife Management Area, Colockum Game Range, Lenore Game Range, Sherman Creek Game Range, Sunnyside Waterfowl Management Area. Not included: National Fish Hatcheries, Public Fishing Areas.

### *Army Corps of Engineers Lakes*

11 Lakes; Chief Joseph Dam, Ice Harbor Lock and Dam, Lake Crockett (Keystone Harbor), Lake Washington Ship Canal and Ballard Locks, Little Goose Lock and Dam, Lower Granite Lock and Dam, Lower Monumental Lock and Dam, Mill Creek, Mud Mountain Dam, The Dalles Lock and Dam-Lake Ceillo, Lake Wallula (counted from Oregon).

### *Bureau of Land Management Recreation Lands*

44 Areas and Sites; Boundary Dam Recreation Area, Coffeepot Lake Recreation Site, Crab Creek Recreation Area, "Dispersed-Border", Fishtrap Lake Recreation Area, Govan Recreation Site, Hog Canyon Lake Recreation Site, Odessa Craters, Pacific Lake Recreation Site, Rock Creek Recreation Site, Rocky Ford Management Area, Tellford Management Area, Twin Lakes Recreation Site, Juniper Dunes Recreation Area, Juniper Dunes Wilderness, "Dispersed Juniper Forest", Saddle Mountains, "Dispersed Saddle Mountains", Blind Island, Cattle Point, Chadwick Hill ACEC, Chopaka Lake, "Disperesed-Wentachee", Douglas Creek, Duffy Creek, Iceberg Point ACEC, Indian Island, Kellet Bluff, Liberty, Palmer Mountain, Patos Islands, Point Colville ACEC, Posey Island, SJI Outer Islands & Headlands, Similkameen, Split Rock, Turn Point, Watmough Bay ACEC, Big Pines, Cowiche Canyon, "Dispersed Yakima River Canyon", Lmuma Creek, Ringer Road, Roza, Umtanum.

## State Lands

### *Washington State Parks*

Alta Lake, Anderson Lake, Banks Lake, Battle Ground Lake, Bay View, Beacon Rock, Belfair, Big Eddy, Birch Bay, Blake Island, Blind Island, Bogachiel, Bottle Beach Natural Area, Bridgeport, Bridle Trails, Brooks Memorial, Burrows Island, Cama Beach, Camano Island, Cape Disappointment, Cape Disappointment, Centennial Trail, Clark Island, Columbia Hills, Columbia Plateau Trail, Conconully, Crawford, Crown Point, Curlew Lake, Daroga, Dash Point, Deception Pass, Doe Island, Dosewallips, Doug's Beach, Ebey's Landing, Federation Forest, Fields Spring, Flaming Geyser, Fort Casey, Fort Columbia, Fort Ebey, Fort Flagler, Fort Simcoe, Fort Worden, Ginkgo, Goldendale Observatory, Grayland Beach, Griffith-Priday, Harstine Island, Hope Island, Ike Kinswa, Illahee, Iron Horse Easton, Iron Horse Kittitas, Jackson House, James Island, Jarrell Cove, Joemma Beach, Jones Island, Joseph Whidbey, Kanaskat-Palmer, Kitsap Memorial, Kopachuck, Lake Chelan, Lake Easton, Lake Sammamish, Lake Sylvia, Lake Wenatchee, Lakeside Cottage, Larrabee, Leadbetter Point, Lewis & Clark Trail, Limekiln Lighthouse, Lincoln Rock, Long Beach, Loomis Lake Manchester, Maryhill, Matia Island, Matilda Jackson, McMicken Island, Millersylvania, Moran, Mount Spokane, Mystery Bay, Nolte, North Beach, North Jetty, Obstruction Pass, Ocean City, Olallile, Old Fort Townsend, Olmstead Place, Pacific Beach, Pacific Pines, Palouse Falls, Paradise Point, Patos Island, Peace Arch, Pearrygin Lake, Penrose Point, Peshastin Pinnacles, Pleasant Harbor, Point Doughty, Posey Island, Potholes, Potlatch, Rainbow Falls, Rasar, Reed Island, Riverside, Rockport, Rothschild House, Sacajawea, Saddlebag Island, Saint Edward, Saltwater, Scenic Beach, Schafer, Seaquest, Sequim Bay, Shine Tidelands, South Beach, South Whidbey, Spencer Spit, Spring Creek Hatchery, Squak Mountain, Square Lake, Squilchuck, St Helens Visitor Center, Steamboat Rock, Steptoe Butte, Steptoe Memorial, Stretch Point, Stuart Island, Sucia Island, Sun Lakes, Sun Lakes Resort, Tolmie, Triton Cove, Turn Island Twanoh, Twenty-Five Mile Creek, Twin Harbors, Upright Channel, Wallace Falls, Wanapum, Wenatchee Confluence, Westhaven, Westport Light, Willapa Hills Trail, Wolfe Property, Yakima Sportsmen.

### *State Department of Natural Resources (DNR) Lands*

Major DNR sites include Ahtanum State Forest, Blanchard Forest, Capitol State Forest, Cypress Island Natural Conservation Resources Area, Elbe Hills and Tahoma State Forest, Green Mountain State Forest, Les Hilde Trail & Trailheads, Little Pend Oreille, Loomis State Forest, Loup Loup State Forest, Morningstar Natural Resources Conservation Area, Tahuya State Forest, Tiger Mountain, Yacolt Burn State Forest, and the Walker Valley ORV Riding Area.

### *State Game Management Units*

152 Game Management Units managed by the Washington Department of Fish and Wildlife (WDFW) divide the whole state into hunting opportunities for Deer, Elk, Black Bear, Cougar, Wild Turkey, Bobcat, Coyote, Fox, Raccoon, Cotton Tail & Snowshoe hare, Red Fox, Upland Birds (Pheasant, Quail, Chukar Partridge, Gray Partridge, Forest Grouse); Waterfowl (Puddle Ducks, Diving Ducks, Sea Ducks, Geese), and Other Game Birds. Game Management Units divide the State into different hunting designations.

### *State Wildlife Areas*

34 specific Wildlife Areas managed by WDFW are also included. These are contained within Game Management Units but are special plots of land not oriented for hunting. Participation and expenditure rates differed from WDFW Game Management Units and include the following: Asotin Creek, Beebe Springs, Chehalis, Chelan, Chief Joseph, Colockum, Columbia Basin, Cowlitz, Johns River, Klickitat, LT Murray, Le Clerc, Methow, Mount Saint Helens, North Olympic, Oak Creek, Olympic, Revere, Sagebrush Flat, Scatter Creek, Scotch Creek, Sherman Creek, Shillapoo, Sinlahekin, Skagit, Snoqualmie, South Puget Sound, Sunnyside-Snake River, Swanson Lakes, Teanaway, WT Wooten, Wells, Wenas, Whatcom.

## Local Lands

### *Local Parks*

Includes county parks, city parks, parks managed by special districts, and municipal golf courses. GIS data was obtained for county and city parks from the United States Geological Survey Gap Analysis Program Protected Area Database (“USGS PAD database”), which for Washington State, has 1,662 data points for city and special district parks and 874 county parks; the municipal golf course data included 49 municipal golf courses.

### *Events on Public Lands*

Events on public lands do not refer to specific land areas. Events such as youth sports tournament, marathons, or bike races take place on a variety of local lands.

## Public Waters

Includes 700 water access sites operated by WDFW. Also Includes 398 boat launches maintained by port districts and other local land managers. Some double counting in terms of participation rates may happen with other land managers accounted for in this study.

## Private Lands

Data on private recreation lands is limited to the following activities and land types due to lack of data.

### *Private Timberlands*

It is estimated that there are about 9.4 million acres of non-public timberland in Washington State. Calculations for participation and expenditures were based on an estimated 1,426 tracts totaling 4,610,00 acres of which 3,050,468 acres were modeled as having recreation access. Therefore a limited number of timberlands were included.

### *Skiing Areas*

Northwest Ski Areas Association provided information on 13 major ski areas in Washington State. Ski areas that are privately managed on land leased from a public entity (usually national forests) are considered private lands for this report.

### *Private Golf Courses*

244 golf courses managed by private entities were identified in Washington State.

### *Private Horse-related businesses*

A total of 202 horseback riding businesses were identified in Washington State. All of these were assumed to be private.

# APPENDIX B

# Methodology and Data Sources for Participant Days and Expenditure Profiles by Land Type

## Methodology for Participant Days and Expenditures by Land Type

The core methodology used to estimate total participant days, expenditures, and contributions was based on specific data for each land type. Every land type (federal, state, local, private) was studied in reference to various management entities and businesses. Data-gathering for estimating visits and geographic allocation involved outreach to the management agencies, extensive review of the literature and existing research, and GIS modelling.

All visitation data was converted to "participant days" as the common unit of analysis. A participant day denotes one person's presence in a recreational area during the course of a 24 hour period. Overnight participants are counted as those who sleep onsite or near the site as a result of their visitation. When participation was estimated from specific activities for which there was no primary data or local study, the Washington's Statewide Comprehensive Outdoor Recreation Plan (SCORP, 2013) survey of Washington adults was used. The survey estimates participation rates (i.e. percent of residents participating in a recreational activity) as well as participation frequency (i.e. average numbers of days per year a resident recreates in a given activity). The product of these two variables and the adult population of the state yields the total number of participant days for any activity. The SCORP survey does not allocate participation to recreation destinations. Thus, triangulation of attendance data, participant days, and GIS datasets was necessary to generate site-specific visitation data, when this methodology was necessary.

Expenditures per trip were borrowed from existing studies and surveys. This data has been generated from both management agencies and activity-specific interest groups. From these figures, activity-based expenditure profiles were created to divide a typical participant day's expenditures into expense categories (e.g. gasoline and food, see Appendix D). Since individuals can engage in many activities in a single day or trip and thus result in "double counting," some activities were eliminated, consolidated, or adjusted.

Common concerns with participation data are the double counting of park visitors, the ability to estimate visitation at facilities with little or no access control, and differences in methods for estimation used by various facilities. The primary limitation of expenditure data is often the lack of specific data for particular facilities or facility types. The values presented here can be interpreted as best approximations given the data available. Most public agencies applied some kind of control for double counting in their collection of primary data.

Where participation data had site-specific resolution (such as with State and National Parks) and where sites were wholly contained within the boundary of a county or legislative district, we were able to assign

participant days and economic expenditures to the specific site. However, when county or legislative district boundaries traversed land areas, we allocated participation data between "competing" areas based on ratios derived from population or land area. Both of these methods require assumptions that do not take into account irregular distribution of activities and visitation within each site, let alone routes taken to such sites. Some entrance points may be more popular than others and hence economic activity within the county with the popular entrance may be higher. For visitation figures derived from the SCORP survey (e.g. swimming) and for data sources that did not break out visitation by site, (e.g. Washington Department of Natural Resources and Washington State Department of Fish and Wildlife) we employed a GIS tool called the "Huff Model" adapted for ESRI ArcMap 10.2 (GIS software) to model distribution based on population density and the distance of population centers (census tracts) to sites of interest. Where point datasets did not exist (e.g. surfing and SCUBA sites), we geocoded site locations from address lists. We were then able to use boundary shapefiles for legislative districts and counties to divide these points and sum their respective weighted visitation probabilities.

## Equipment Expenditures

Equipment expenditures were based on participant numbers for a set of activities selected from Washington's Statewide Comprehensive Outdoor Recreation Plan (SCORP, 2013) survey. Participant numbers refer to whether an individual engaged in an activity regardless of the frequency in which they did it. Equipment is assumed to be needed in the same amounts whether the participant did the activity once per year or 100 times per year. Equipment expenditures per participant were obtained or extrapolated for each activity based on U.S. Census Data of yearly sales for specific equipment that could be associated to the activity, expert consultation, and use of results from other studies on a given recreational activity or destination. For more information on the selection of activities, see Appendix D.

## Summary of Data Sources by Land Type

The table below summarizes data sources and use of this data by specific land types:

Table B-1. Data Sources and Site Allocation

| Type of Recreational Land Type | Data Source and Allocation Method |
|---|---|
| ***Federal Lands*** | |
| National Parks & National Recreation Areas | Public National Park Service-Managed Data, NRSS 2014, and Thomas et al. 2014 for visits, group size, and expenditures. Results for each area divided to county and legislative districts based on land area. The number used for visitation was updated by the NPS after analysis was conducted therefore current estimates are underestimates.. |
| National Forests | Data obtained from the US Forest Service; National Visitor Use Monitoring System – NVUM- reports from each of the National Forests for visits. Stynes and White (2005) data was used for expenditures. Results were allocated to county and legislative districts based on land area. |
| National Wildlife Refuge | Banking on Nature 2004, 2006, 2013; US Fish & Wildlife Service for visitation and expenditure data; allocated to county and legislative districts based on land area. |
| Corps of Engineers | Corps of Engineers public data (plus Lake Wallula/Umatilla Dam, OR counted to Benton County) for visits; Chang et al. 2003 for expenditure profiles; allocated to county and legislative districts based on land area. |
| Bureau of Land Management | Freedom of Information Act Data Request for visitor data. Stynes and White 2005 for expenditures; allocated to county and legislative districts based on land area. |

| Table B-1. Data Sources and Site Allocation (continued) | |
|---|---|
| Type of Recreational Land Type | Data Source and Allocation Method |
| ***State Lands*** | |
| State Parks | Public State park data for visit numbers at the park level; Dean Runyan 2002 for expenditures; Results allocated to counties/legislative districts by acreage where necessary. |
| State DNR | Visits based on data provided by DNR and noted to be slightly conservative (Millern 2014); 10.2 million visitors allocated based on GIS Huff Model using GIS point dataset derived from WADNR tract polygons. |
| WDFW Game Management Units | 2011 USFWS for visitor data. National Visitor Use Monitoring (NVUM) Program data for expenditure profiles. Large game hunting days (deer, elk, black bear)and small game hunting days (turkey, water fowl, hare) calculated with separate expenditure rates and totaled per GMU then converted to county/LD based on land area with GIS. |
| WDFW Management Areas | Estimated 4 million visitors, distributed based on Huff Model of WADFW areas using acreage as an attractiveness measure; numbers validated with email correspondence. Expenditures based on Banking for Nature 2004. |
| ***Local Lands*** | Validation of our assumptions for local lands was done with results from the SCORP Survey 2013 and the study commissioned by California State Parks 2011. |
| County | All counties were solicited for data and 5 responded (King, Pacific, Pierce, Snohomish, and Whatcom) with a weighted average of 4.15 visits per adult (total participation divided by total population); each county was attributed visitation based on the adult population. |
| City | Visitation of local recreation lands was projected from the Herbert Research Group study on MetroParks Tacoma, which conducted 769 surveys on a representative subset of parks (16) within the Tacoma MetroParks system (74 parks) estimating 29 participant days per capita - a more conservative estimate of 22 participant days per capita were attributed to city park systems; scaled to population. Note that city parks include parks managed by special districts. |
| Municipal Golf | All golf sites identified through GIS; participation based on SCORP survey; 16.8 % of total golf participant days attributed to municipal golf and evenly distributed to GIS data set for municipal courses and allocated to county/legislative district boundary. |
| ***Events on Public Lands*** | General lack of specific data for particular facilities and event types. Participation and expenditure data based on Avenue ISR 2012 and Pierce County outdoor participation estimates with 23.4% of total participant days due to events; scaled to population at each county and legislative district. |
| ***Public Waters*** | Data sources for categories below is for participation numbers only; for expenditure data see activity analysis source data in Appendix D. |
| Fishing | Licenses by WDFW and SCORP-derived fishing days; totals reduced by 25.9% (OIA 2013) to control for double counting with boating trips; distributed to counties based on ratios derived from 1-day fishing licenses issued in WA; distributed to legislative districts based on distribution of WADFW and RCO boat launches. |
| Motorized Boating & Sailing | SCORP-derived boating days; allocated to county/LD based on ratios of county boat registrations; for legislative districts the Huff Model was utilized with a combined RCO-WADFW boat launch point dataset. |
| Non-Motorized Paddle Sports | SCORP-derived activity days were allocated to county/LD based on Huff Model allocation to a combined point data set of RCO and WADFW boat launches. |

Table B-1. Data Sources and Site Allocation (continued)

| Type of Recreational Land Type | Data Source and Allocation Method |
|---|---|
| Inner tubing or floating | SCORP-derived activity days were allocated to county/LD based on Huff Model allocation to a combined point data set of RCO and WADFW boat launches that were within ¼ mile buffer of a river or stream. |
| Non-Motorized Windsurfing/ Surfing | SCORP-calculated number of windsurfing and surfing days distributed to county/legislative district by number of recreation destinations based on existing studies. |
| Swimming in natural waters | SCORP-derived swimming days were allocated to county/LD based on Huff Model allocation to a combined point data set of boat launches. |
| Swimming (outdoor pools) | SCORP-derived swimming days were allocated to county/LD based on population |
| Scuba diving | SCORP-calculated number of SCUBA days allocated with Huff Model to geocoded recreation destinations based on geo-coded scuba diving sites. |
| ***Private Lands*** | |
| Private Timberland Recreation | Only Weyerhauser responded to inquiries for data, yielding the number of permits allowed per acre on recreation permitted acres; this ratio was used for about half (4.5 million acres) of the total timberlands in WA (9.6 million acres) with an assumed activity frequency of 25.7 days per permit based on activities possible in timberlands; projected participant days were allocated to county/LD based on the ratio of private timberlands per county/LD. |
| Skiing | Number of ski days given by Northwest Ski Areas Association 2013 for thirteen resort sites, allocated using GIS data for ski sites. |
| Private Golf | All golf sites identified through GIS; participation based on SCORP survey; 83.2 % golf participant days evenly distributed to GIS data set for private courses and allocated by county/legislative district boundary. |
| Horseback Riding | SCORP-calculated number of horseback riding days allocated with Huff Model to the Top 200 Results for businesses in “Horseback Riding in Washington State” geocoded from Google Earth. |

# APPENDIX C

# Literature Used for Participant Days and Expenditures Data

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# APPENDIX D

## Participation and Expenditures for Major Recreational Activities in Washington State

A separate methodology was used to estimate expenditures attributable to popular outdoor recreational activities in Washington. These expenditures were calculated based on participant days derived from the 3000-person survey conducted by Responsive Management to develop the Statewide Comprehensive Outdoor Recreation Plan (SCORP 2013). The results used a regional proportionate sample of respondents from 10 different multi-county regions across Washington State. Expenditure profiles were created for each activity based on literature searches, U.S. Census data, and communication with activity associations. The activities were chosen based on their popularity among adults in Washington, their existence within at least one of the recreational lands studied, and their potential economic contribution. From a total of 300 activities studied in SCORP, only 42 activities were selected and organized into 14 general categories.

Calculation of expenditures was based on: a) participation rate b) participation frequency, and c) average activity expenditure rates. Trip expenditures were calculated by total number of participant days and equipment expenditures were calculated based on participation rates. Total expenditures derived through the activity analysis methodology resulted in about $41.6 billion in annual expenditures.

Double counting is not controlled for in this analysis and hence this contributes to the higher expenditure total obtained through this methodology. For example, if all participant days are added from the subset of activities analyzed, the average Washingtonian would recreate about 174 days per year. Other recreation studies have estimated ranges from 87 days per year (U.S.) to 96 days per year (California). The activity based calculation reflects the fact that several forms of recreation may happen simultaneously (e.g. boating and fishing, biking and swimming, hiking and camping). In addition the activity-based analysis is not limited to specific land types (e.g. public lands) and hence provides an estimate of all the outdoor recreation activities happening in Washington, regardless of where they happen.

The SCORP survey provides important insights into the relative popularity of various activities. For example, there are 357 million participant days attributed to walking for outdoor recreation and 151 million to jogging or running in outdoor settings. These activities have relatively low expenditures per trip but given their high frequency, they amount to high total expenditures (a combined amount of $2.7 billion). In contrast, other activities, such as windsurfing, only have about 740,000 participant days per year but contribute as much as $170 million in expenditures per year. In part, some of these high expenditures emerge from equipment needed for activities or high cost of trips to the site of the activity.

The results for participation and resulting expenditures based on the activity-based calculations are presented in the following table.

Table D-1. Activity Analysis

| Activity | Total Expenditures | Equipment Expenditures | Trip-Related Expenditures | Number of Participants | Participant Days |
|---|---|---|---|---|---|
| ***Sightseeing and Nature Activities Total*** | ***$10,425,033,323*** | ***$1,230,967,051*** | ***$9,194,066,272*** | ***8,388,536*** | ***204,904,530*** |
| Sightseeing | $1,673,209,290 | $360,006,918.14 | $1,673,209,290 | 2,453,300 | 37,290,156 |
| Visiting nature interpretive center | $491,919,470 | $220,381,593.49 | $491,919,470 | 1,501,810 | 10,963,215 |
| Wildlife viewing/ photographing/watching | $7,412,499,661 | $445,291,575.89 | $6,181,532,609 | 3,034,480 | 137,765,380 |
| Gathering/collecting things in nature setting | $847,404,903 | $205,286,963.80 | $847,404,903 | 1,398,947 | 18,885,779 |
| ***Fishing or Shellfishing Total*** | ***$1,547,453,670*** | ***$460,695,126*** | ***$1,086,758,545*** | ***1,753,826*** | ***26,307,396*** |
| ***Water-Related Activities Total*** | ***$2,085,846,773*** | ***$436,919,750*** | ***$1,648,927,023*** | ***3,888,249*** | ***55,368,455*** |
| Swimming in natural waters | $575,252,008 | $48,102,701 | $527,149,306 | 1,836,117 | 26,623,702 |
| Swimming (outdoor pools) | $315,368,876 | $48,102,701 | $267,266,175 | 930,917 | 13,498,292 |
| Surfboarding | $277,226,834 | $216,013,812 | $61,213,022 | 108,007 | 658,842 |
| Windsurfing | $171,674,611 | $102,863,720 | $68,810,891 | 51,432 | 740,619 |
| Inner tubing or floating | $573,410,901 | $13,192,272 | $560,218,629 | 879,485 | 12,752,530 |
| Scuba diving | $172,913,543 | $8,644,543 | $164,268,999 | 82,291 | 1,094,470 |
| ***Boating*** | ***$4,475,985,112*** | ***$2,206,319,937*** | ***$2,269,665,175*** | ***2,109,226*** | ***27,263,057*** |
| Motorized | $3,835,473,371 | $2,186,800,000 | $1,648,673,371 | 1,275,510 | 19,260,203 |
| Non-motorized | $588,428,495 | $9,759,968 | $578,668,526 | 766,855 | 7,668,547 |
| Rafting | $52,083,246 | $9,759,968 | $42,323,278 | 66,861 | 334,307 |
| ***Snow and Ice Activities Total*** | ***$1,726,729,167*** | ***$33,232,313*** | ***$1,693,496,854*** | ***1,919,469*** | ***14,457,917*** |
| Snowshoeing | $62,244,625 | $396,990 | $61,847,635 | 344,593 | 1,378,374 |
| Snowboarding | $641,911,727 | $5,524,072 | $636,387,655 | 494,970 | 4,207,244 |
| Skiing | $840,706,347 | $7,233,601 | $833,472,746 | 725,026 | 5,510,199 |
| XC Skiing | $110,327,122 | $8,993,114 | $101,334,008 | 231,443 | 1,967,269 |
| ATV snow/ice | $71,539,346 | $11,084,536 | $60,454,810 | 123,436 | 1,394,832 |
| ***Camping, Hiking, Climbing, Mountaineering Total*** | ***$3,979,727,445*** | ***$75,848,897*** | ***$3,903,878,547*** | ***$5,467,207*** | ***$79,612,919*** |
| Hiking | $2,164,952,296 | $38,459,600.78 | $2,127,027,847 | 2,772,177 | 47,404,231 |
| Climbing/Mountaineering | $250,237,224 | $7,135,361.93 | $212,312,775 | 514,319 | 4,731,731 |
| Camping | $1,564,537,925 | $30,253,934.57 | $1,564,537,925 | 2,180,711 | 27,476,957 |
| ***Bicycle Riding Total*** | ***$3,136,644,285*** | ***$113,494,490*** | ***$3,023,149,796*** | ***1,897,836*** | ***67,373,165*** |
| ***Horseback Riding Total*** | ***$2,292,986,614*** | ***$1,534,994,148*** | ***$757,992,466*** | ***396,025*** | ***12,633,208*** |
| ***Off-Roading for Recreation Total*** | ***$2,292,961,301*** | ***$1,416,433,424*** | ***$876,527,876*** | ***786,907*** | ***20,223,522*** |
| ***Hunting & Shooting Total*** | ***$1,883,052,842*** | ***$860,690,884*** | ***$1,022,361,958*** | ***1,100,642*** | ***17,500,205*** |

Table D-1. Activity Analysis (continued)

| Activity | Total Expenditures | Equipment Expenditures | Trip-Related Expenditures | Number of Participants | Participant Days |
|---|---|---|---|---|---|
| ***Ball Sports Total*** | ***$1,024,511,198*** | ***$107,446,795*** | ***$808,813,264*** | ***3,934,537*** | ***62,312,270*** |
| Volleyball outdoor | $66,146,479 | $11,938,533 | $54,207,946 | 298,305 | 4,176,267 |
| Basketball outdoor | $103,873,194 | $18,822,796 | $85,050,398 | 468,030 | 6,552,419 |
| Tennis outdoors | $123,263,495 | $19,380,509 | $103,882,986 | 468,030 | 8,003,312 |
| Field Sports | $114,746,706 | $11,938,533 | $102,808,174 | 565,750 | 7,920,506 |
| Soccer outdoors | $130,728,704 | $11,938,533 | $118,790,171 | 318,878 | 9,151,785 |
| Baseball | $54,385,306 | $3,915,839 | $50,469,467 | 277,732 | 3,888,249 |
| Softball | $78,535,329 | $5,634,987 | $72,900,341 | 401,169 | 5,616,359 |
| Football | $75,626,194 | $11,938,533 | $63,687,661 | 272,589 | 4,906,599 |
| Frisbee | $168,954,652 | $11,938,533 | $157,016,120 | 864,055 | 12,096,773 |
| ***Golf Total*** | ***$800,317,993*** | ***$77,103,750*** | ***$723,214,243*** | ***797,194*** | ***10,044,642*** |
| ***Other Recreation Total*** | ***$5,903,020,121*** | ***$344,248,028*** | ***$5,558,772,093*** | ***9,957,208*** | ***620,827,296*** |
| Playground Use | $343,433,351 | $38,830,731 | $304,602,619 | 1,897,836 | 60,920,524 |
| Running/Jogging/Trailrunning | $817,789,972 | $60,023,806 | $757,766,166 | 1,861,833 | 151,553,233 |
| Picknicking, BBQing, Cooking Out | $2,735,782,704 | $52,146,117 | $2,683,636,587 | 2,396,725 | 49,132,856 |
| Skateboarding | $108,251,139 | $81,147,166 | $27,103,973 | 149,152 | 2,088,134 |
| Walking | $1,897,762,956 | $112,100,208 | $1,785,662,747 | 3,651,662 | 357,132,549 |
| **Grand Total** | **$41,574,269,845** | **$8,898,394,594** | **$34,132,162,037** | **44,577,574** | **1,218,828,582** |

Expenditures for activities were derived as described in Table D-2. All expenditures were taken from different data sources and adjusted to 2014 dollars based on the Bureau of Labor Statistics consumer price index.

Table D-2. Expenditure Data and Extrapolation Method for the Activity Analysis

| Activity | Annual Equipment Expenditures (per year per participant or per year per capita) | Activity Expenditures (per activity day) |
|---|---|---|
| ***Sightseeing and Nature Activities*** | | |
| Sightseeing | Assumed to be the same as wildlife viewing | Assumed to be the same as hiking ($44.87) |
| Visiting Nature Interpretive Center | Assumed to be the same as wildlife viewing | Assumed to be the same as hiking ($44.87) |
| Wildlife viewing/ photographing/watching | $405 based on inflation-adjusted "Wildlife Watching" in 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation | Assumed to be the same as hiking ($44.87) |
| Gathering/Collecting Things in Nature | Assumed to be the same as wildlife viewing | Assumed to be the same as hiking ($44.87) |
| ***Fishing and Shellfishing*** | $263 based on inflation-adjusted "Fishing Total Equipment" 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation | Inflation-adjusted from "Trip related expenditures for all types of fishing" 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation ($41.31) |
| ***Water Related Activates*** | | |
| Swimming in Natural Waters | $6.90 per capita derived from per capita swimwear sales as cited by NPD Group in Sun Sentinel article split between both categories of swimming | Inflation-adjusted from "jogging/walking" in Economic Impacts of the 2013 Wisconsin State Park System: Connections to Gateway Communities ($19.80) |
| Swimming (outdoor pools) | Same as "Swimming in Natural Waters" | Same as "Swimming in Natural Waters" |
| Surfboarding | $2,000 per participant per year quoted from Casey Dennehy of Surfrider (August 2014) | Inflation-adjusted from "Coastal Visit" in "Non- Consumptive Ocean Recreation in Oregon" ($92.91) |
| Windsurfing | Same as "Surfboarding | Same as "Surfboarding |
| Innertubing and floating | $15 assumed for price of an innertube | Inflation –adjusted from average non-camping trip cost in 2009 The Economic and Social Values of Recreational Floating On The Niovara National Scenic River ($43.93) |
| Scuba Diving | $1.25 per capita per year for "2009 Skin diving & Scuba Diving" inflation adjusted from U.S. Census Table 1250 | Inflation-adjusted from "Market Value Expenditure Estimates for Diving at Artificial Reefs" in "Understand the Potential Economic Impacts of Sinking Ships for SCUBA Recreation"; figure validated by Washington State SCUBA Alliance ($150.09) |

Table D-2. Expenditure Data and Extrapolation Method for the Activity Analysis (continued)

| Activity | Annual Equipment Expenditures (per year per participant or per year per capita) | Activity Expenditures (per activity day) |
|---|---|---|
| ***Boating*** | | |
| Motorized boating | $9,232.03 per registered boat owner per year from "Retail and Service Sales" in 2012 Recreational Boating Economy | From 2013 Wisconsin State Park System: Connections to Gateway Community; validated by Northwest Marine Trade Association ($85.60) |
| Non-motorized paddlesports | $1.40 per capita per year derived from one year of U.S. paddle sport sales as calculated from LeisureTrends.com | Calculated from OIA using per day and per night overnight average expenditure rates and the ratio of day versus night activity days ($75.46) |
| Rafting | Assumed to be the same as non-motorized boating | Inflation-adjusted from "2009 Commercial River Use in the State of Colorado" ($126.60) |
| ***Snow and Ice Activities*** | | |
| Snowshoeing | $0.06 per capita per year derived from $137.49 for an inflation-adjusted price of snowshoes and 130,000 snowshoes as cited in Snowshoe Magazine and 2012 U.S. Census Population | Assumed to be the same as hiking ($44.87) |
| Snowboarding | $0.79 per capita per year based on inflation adjusted U.S. Census Table 1250 "Downhill skiing" multiplied by 43.3% for ski/snowboard ratio | Weighted averages from "Updates Spending Profiles for National Forest Recreation" ($151.26) |
| Skiing | $1.04 per capita per year based on inflation adjusted U.S. Census Table 1250 "Downhill skiing" multiplied by 56.7% for ski/snowboard ratio | Weighted averages from "Updates Spending Profiles for National Forest Recreation" ($151.26) |
| XC Skiing | $1.29 per capita per year based on "Cross Country Equipment Spending" Minnesota Trails: Economic Impact of Recreational Trail Use | Inflation adjusted figure from Minnesota Trails: Economic Impact of Recreational Trail Use($51.51) |
| ATV snow/ice | Assumed to be the same as OHV recreation | Weighted averages from "Updates Spending Profiles for National Forest Recreation" ($43.34) |
| ***Camping, Hiking, Climbing, Mountaineering*** | | |
| Hiking | Assumed to be the same as camping | Assumed to be the same as hiking ($44.87) |
| Climbing/Mountaineering | Assumed to be the same as camping | Assumed to be the same as hiking ($44.87) |
| Camping | $5.44 per capita per year 2009 U.S. Census Table 1250 expenditures for camping adjusted for inflation | Weighted averages from "Updates Spending Profiles for National Forest Recreation" ($56.94) |
| ***Bicycle Riding*** | $16.28 per capita per year based on 2009 U.S. Census Table 1250 "Bicycle and Supplies" expenditures for camping adjusted for inflation | Weighted averages from "Updates Spending Profiles for National Forest Recreation" ($44.87) |

| Table D-2. Expenditure Data and Extrapolation Method for the Activity Analysis (continued) | | |
|---|---|---|
| Activity | Annual Equipment Expenditures (per year per participant or per year per capita) | Activity Expenditures (per activity day) |
| ***Horseback Riding*** | $3,876 per horse per year from Maine Cooperative Extension Publications Bulletin #12004 | In-house estimation ($60) |
| ***Off-Roading for Recreation*** | $1,800 per participant per year calculated from Idaho Economic Importance of Off-Highway Vehicles | Weighted averages from "Updates Spending Profiles for National Forest Recreation" ($43.34) |
| ***Hunting & Shooting*** | $782 per participant derived from expenditures divided by hunter participants from "2011 U.S. Fish and Wildlife Survey"; excludes "other items" which are assumed to be implicit in activity figures | Weighted averages from "Updates Spending Profiles for National Forest Recreation" ($58.42) |
| ***Ball &Field Sports*** | | |
| Volleyball outdoors | Assumed average of other ball sports minus skateboarding ($1.71 per capita per year); data unavailable | Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact ($12.98) |
| Basketball outdoors | $2.70per capita per year 2009 U.S. Census Table 1250 expenditures for "basketball shoes" adjusted for inflation | Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact ($12.98) |
| Tennis outdoors | $5.57 per capita per year 2009 U.S. Census Table 1250 expenditures for "cross training shoes" adjusted for inflation | Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact ($12.98) |
| Field Sports | Assumed average of other ball sports minus skateboarding ($1.71 per capita per year); data unavailable | Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact ($12.98) |
| Soccer Outdoors | Assumed average of other ball sports minus skateboarding ($1.71 per capita per year); data unavailable | Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact ($12.98) |
| Baseball | $0.56 per capita per year 2009 U.S. Census Table 1250 expenditures for "baseball and softball" adjusted for inflation and ratio of baseball to softball participants | Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact ($12.98) |
| Softball | $0.81 per capita per year 2009 U.S. Census Table 1250 expenditures for "baseball and softball" adjusted for inflation adjusted for inflation and ratio of baseball to softball participants | Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact ($12.98) |
| Football | Assumed average of other ball sports minus skateboarding ($1.71 per capita per year); data unavailable | Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact ($12.98) |
| Frisbee | Assumed average of other ball sports minus skateboarding ($1.71 per capita per year); data unavailable | Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact ($12.98) |
| Skateboarding | $11.06 capita per year based on calculations from SIMA 2012 Specialty Retail Distribution Study for "U.S. surf/skate industry" reduced to eliminate surf | Figure for "local visit" from 2002 Dean Runyan State Park Economic Impact ($12.98) |

Table D-2. Expenditure Data and Extrapolation Method for the Activity Analysis (continued)

| Activity | Annual Equipment Expenditures (per year per participant or per year per capita) | Activity Expenditures (per activity day) |
|---|---|---|
| ***Golf*** | | Figure from The Washington Golf Economy: Summary Report, 2010($72.00) |
| ***Other Recreation*** | | |
| Playground Use | $5.57 per capita per year 2009 U.S. Census Table 1250 expenditures for "cross training shoes" adjusted for inflation | Estimated between "local day visit" from Dean Runayn ($12.98) and Trust for Public Land: Measuring the Value of a City Park System ($3.05) = ($5) |
| Running/Jogging/ Trailrunning | $8.61 per capita per year 2009 U.S. Census Table 1250 expenditures for "running and jogging shoes" adjusted for inflation | Estimated between "local day visit" from Dean Runayn ($12.98) and Trust for Public Land: Measuring the Value of a City Park System ($3.05) = ($5) |
| Picnicking, BBQing, Cooking Out | $7.48 per capita per year "Grill Sales" estimated from HPBA: 2011 State of the Barbeque Industry Report | Figure from Forbes: Fourth of July by the Numbers which quotes BIGresearch "average cook out cost" ($54.62) |
| Walking | $16.08 per capita per year 2009 U.S. Census Table 1250 expenditures for "walking shoes" adjusted for inflation | Estimated between "local day visit" from Dean Runayn ($12.98) and Trust for Public Land: Measuring the Value of a City Park System ($3.05) =( ($5) |

## Correlations between Expenditures and Participation by Activity

The correlation of participation with expenditure patterns reveals some interesting results in relation to the relative economic importance of different activities as well as their economic accessibility. The scatter plots in Figure D-1 and Figure D-2 illustrate which activities have the highest total expenditures (as a consequence of both their popularity and their respective total expenditures) as well as which activities have the highest expenditures per trip and per yearly equipment expenditures. Considering the top three costs of recreation determined by our expenditure analysis (sporting goods/apparel 19%, recreational motor vehicles 15%, and gas and oil 13%) and given the context of in which many activities happen, some inferences can be made in regards to economic barriers to participation and opportunities for economic development.

Figure D-1. Comparison between Total Trip and Equipment Expenditures for Outdoor Recreational Activities

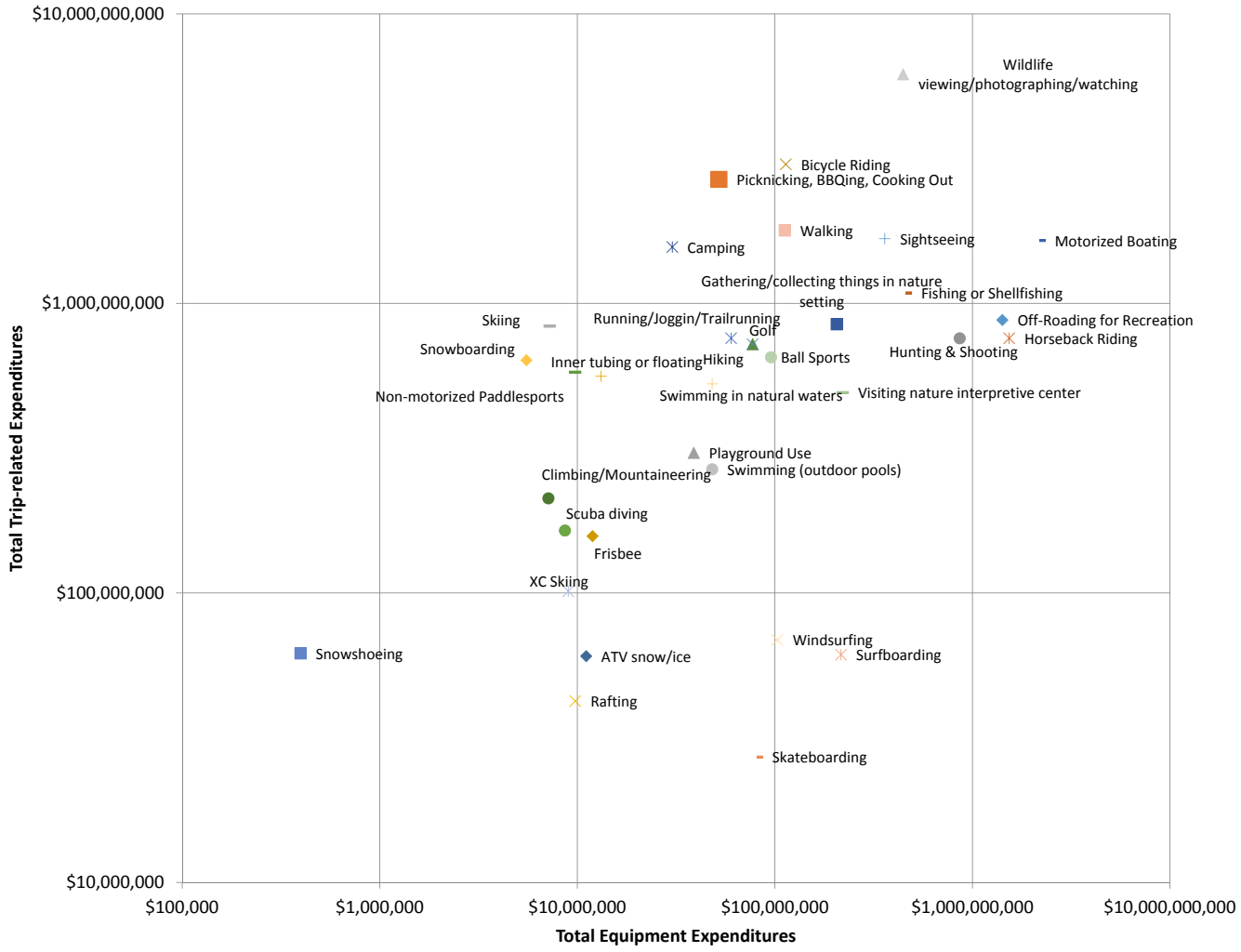
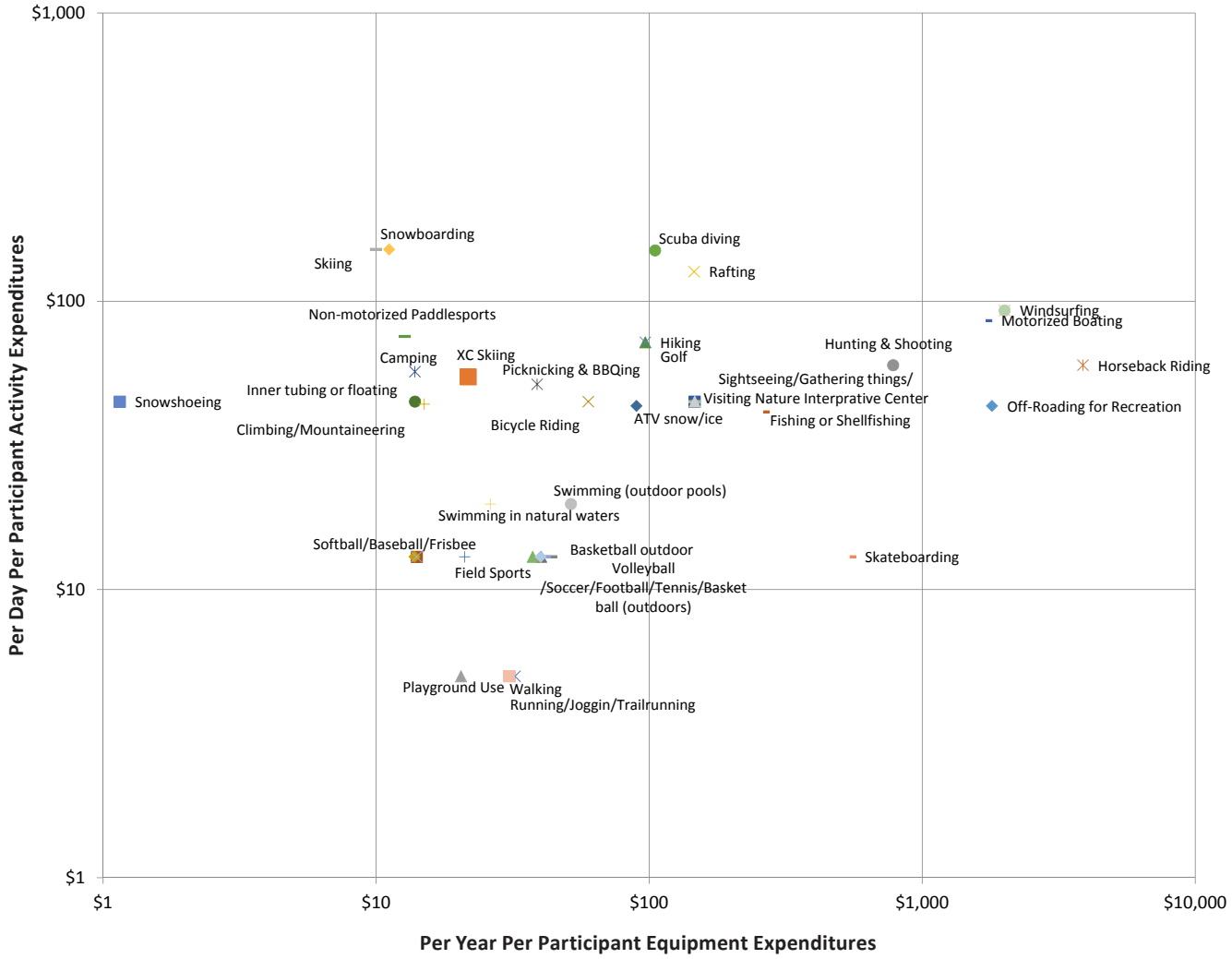


Figure D-2. Comparison between Per Year Per Participant Equipment Expenditures and Per Day Per Participant Activity Expenditures for Outdoor Recreational Activities



# The Values of Recreational Activities as Ecosystem Services in Washington State

As explained in Chapter 6, recreational activities are an important ecosystem service that natural landscapes provide. In order to measure the additional value outdoor recreational activities provide, the concept of consumer surplus is used to indicate the benefit, expressed in economic terms, consumers receive beyond what they pay to engage in an activity. Table D-3 shows the average consumer surplus, participant days, and total consumer surplus per year for activities occurring in Washington State, The estimated annual total economic benefit of recreation as an ecosystem service with this methodology is $31.2 billion dollars. Some of these activities may happen simultaneously, potentially affecting their combined value.

Table D-3. Consumer Surplus of Recreational Activities in Washington State

| Activity | Participant Days (000's) | Average Consumer Surplus per Day (2014 USD) | Consumer Surplus per Year (000's, 2014 USD) |
|---|---|---|---|
| ***Sightseeing and Nature Activities Total*** | ***204,905*** | ***-*** | ***$7,771,734*** |
| Sightseeing | 37,290 | $39 | $1,441,342 |
| Visiting nature interpretive center | 10,963 | $20 | $217,737 |
| Wildlife viewing/photographing/watching | 137,765 | $38 | $5,234,118 |
| Gathering/collecting things in nature setting | 18,886 | $47 | $878,536 |
| ***Fishing or Shellfishing Total*** | ***26,307*** | ***$66*** | ***$1,745,036*** |
| ***Water-Related Activities Total*** | ***55,368*** | ***-*** | ***$1,796,675*** |
| Swimming in natural waters | 26,624 | $38 | $1,008,316 |
| Swimming (outdoor pools) | 13,498 | - | - |
| Surfboarding | 659 | $50 | $33,152 |
| Windsurfing | 741 | $50 | $37,267 |
| Inner tubing or floating | 12,753 | $50 | $641,694 |
| Scuba diving | 1,094 | $70 | $76,246 |
| ***Boating Total*** | ***27,263*** | ***-*** | ***$832,203*** |
| Motorized | 19,260 | $26 | $500,462 |
| Non-motorized | 7,669 | $42 | $320,176 |
| Rafting | 334 | $35 | $11,565 |
| ***Snow and Ice Activities Total*** | ***14,458*** | ***-*** | ***$456,769*** |
| Snowshoeing | 1,378 | $20 | $27,496 |
| Snowboarding | 4,207 | $55 | $231,645 |
| Skiing | 5,510 | $19 | $104,470 |
| XC Skiing | 1,967 | $20 | $39,244 |
| ATV snow/ice | 1,395 | $39 | $53,914 |
| ***Hiking, Climbing, Mountaineering Total*** | ***52,136*** | ***-*** | ***$3,286,291*** |
| Hiking | 47,404 | $65 | $3,086,521 |
| Climbing/Mountaineering | 4,732 | $42 | $199,770 |

Table D-3. Consumer Surplus of Recreational Activities in Washington State (continued)

| Activity | Participant Days (000's) | Average Consumer Surplus per Day (2014 USD) | Consumer Surplus per Year (000's, 2014 USD) |
|---|---|---|---|
| ***Bicycle Riding Total*** | ***67,373*** | ***$37*** | ***$2,491,010*** |
| ***Horseback Riding Total*** | ***12,633*** | ***$24*** | ***$300,202*** |
| ***Off-Roading for Recreation Total*** | ***20,224*** | ***$31*** | ***$634,858*** |
| ***Camping Total*** | ***27,477*** | ***$44*** | ***$1,196,828*** |
| ***Hunting & Shooting Total*** | ***17,500*** | ***$95*** | ***$1,670,210*** |
| ***Ball Sports Total*** | ***64,400*** | ***-*** | ***-*** |
| ***Golf Total*** | ***10,045*** | ***-*** | ***-*** |
| ***Other Recreation Total*** | ***618,739*** | ***-*** | ***$9,010,621*** |
| Playground Use | 60,921 | $5 | $330,798 |
| Running/Jogging/Trailrunning | 151,553 | $5 | $755,019 |
| Picknicking, BBQing, Cooking Out | 49,133 | $23 | $1,150,488 |
| Walking | 357,133 | $19 | $6,774,316 |
| **Grand Total** | **1,218,829** | | **$31,192,437** |

Note: A dash indicates no estimate for this category.

Average consumer surplus per day ranges from $5 to $95 among recreational activities. Activities with low consumer surplus tend to be those that are inexpensive. High consumer surplus tends to occur with expensive activities; hunting and scuba diving have the two highest consumer surplus estimates.

Some activities are not associated with a consumer surplus. These activities were excluded for two reasons. One, the benefits people derive from these activities do not stem from ecosystems—rather, they are performed on very developed areas. As such, it is not appropriate to value them as ecosystem services. Some activities are also associated with high damage to ecosystems, which would also be inappropriate to value as an ecosystem service. For example, swimming in outdoor pools is excluded because it is not a benefit derived from nature.

# APPENDIX E

# Expenditure Profiles, Sector Mapping, & IMPLAN Assumptions

## Methodology Summary

Completing an Input-Output Analysis in IMPLAN is a multi-step process. Total participant days and expenditures were calculated at the county and state levels for 26 land cover, activities, and equipment categories. For each category, we allocate expenditures into industry sectors based on survey data. Industries from supporting materials were mapped to specific IMPLAN sectors. The IMPLAN model calculated the direct, indirect, and induced contributions of these activities. Models were built for both total outdoor recreation expenditures and outdoor recreation on public lands at the county and state level. In this Appendix, additional details are provided on the assumptions for each step in this process.

## Expenditure Profiles & Industry Allocation

Expenditures were modeled in Washington State in 26 different categories. These included expenditures resulting from recreation on federal, state, local, and private lands; water-based activity spending; and expenditures at events and on equipment. Each of these categories involves different average trip lengths, equipment requirements, and average distance to site. For example, the average participant day at a national park would have different purchases than the average participant day at a Fish & Wildlife recreation area, due to average length of stays and activities available. To account for this, different expenditure profiles were adopted for each activity or land cover category. These expenditure profiles were calculated based on a literature review (see references in Appendix C). These profiles are typically calculated using survey data from actual activity-participants.

## IMPLAN Sector Mapping

After selecting expenditure profiles for each activity category, the next step was to map the spending categories to IMPLAN industry sectors. IMPLAN V3.1, which was used in this study, includes 440 industry sectors based Bureau of Economic Analysis' latest Benchmark Input-Output Study. North American Industry Classification System (NAICS) codes are 2-6 digit codes created by the U.S. Office of Management and Budget, with increasing specificity for longer codes. Using NAICS codes, research methodology descriptions in the source data, and previous IMPLAN studies, all spending categories in the expenditure profiles were mapped to one of the 440 IMPLAN sectors. In the end, all sectors were mapped to 1 of 18 IMPLAN categories. For example, the expenditure "Eat/Beverage in Premise" for Federal Lands (Source: Longwoods 2000) was mapped to IMPLAN Sector "413 Food services and drinking places," called "food and beverage services" in this report, based on its description. Table E-1 is the list of all sectors that were utilized in this analysis.

Table E-1. IMPLAN Sector List

| IMPLAN Sector | Description |
|---|---|
| 328 | Retail - Sporting goods, hobby, book and music |
| 320 | Retail - Motor vehicle and parts |
| 326 | Retail - Gasoline stations |
| 413 | Food and beverage services |
| 324 | Retail - Food and beverage |
| 410 | Other amusement and recreation industries |
| 330 | Retail – Miscellaneous |
| 411 | Hotels and motels |
| 322 | Retail - Electronics and appliances |
| 432 | Other state and local government enterprises |
| 418 | Personal and household goods repair and maintenance |
| 363 | General and consumer goods rental except video tapes and discs |
| 429 | Other Federal Government enterprises |
| 336 | Transit and ground passenger transportation |
| 412 | Other accommodations |
| 338 | Scenic and sightseeing transportation and support activities for transportation |
| 70 | Soft drink and ice manufacturing |
| 61 | Seafood product preparation and packaging |

## IMPLAN Model Construction

In order to construct the county models, expenditures were summed across all activities by IMPLAN sector. This resulted in sector-based subtotals within each county and for the entire state. Totals were calculated for all expenditures, public lands, and private lands. IMPLAN sector expenditure sub-totals were entered into IMPLAN for each county model as well as the state.

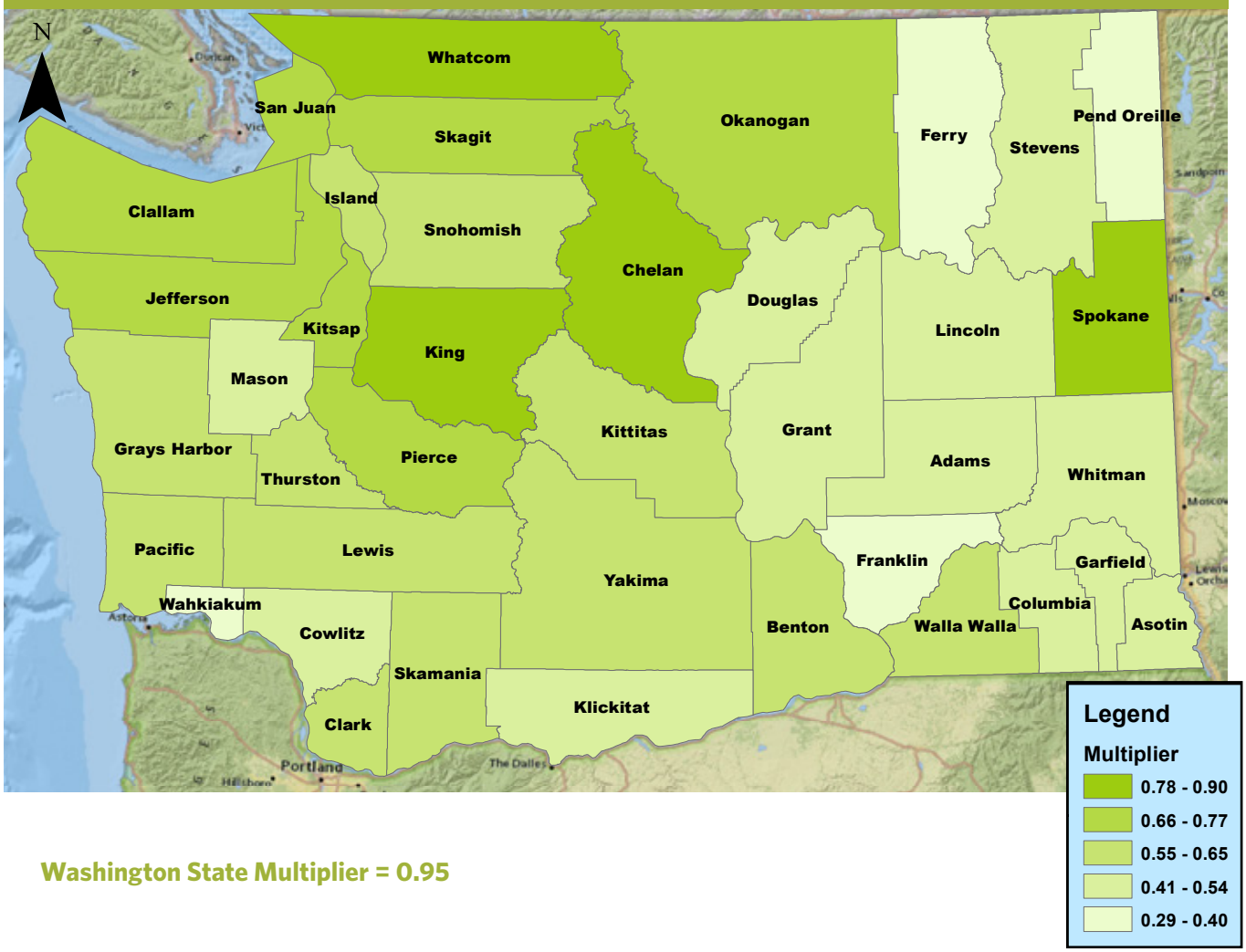
Retail purchases generally involve consumers purchasing goods from outlets that did not produce the product. Consumers will pay an amount above the original producer price due to transportation fees, wholesaler fees, and the retailer's markup. However, IMPLAN prices are in terms of producer prices. When entering retail or wholesale spending categories (such as purchases at a grocery or sporting goods store), IMPLAN provides the option of whether the amount represents total value or marginal value. This study utilized expenditure profiles that indicate the total value spent at retail outlets. Selecting to apply margins, IMPLAN will take that total value spent and apply wholesale, trade, and transport margins to appropriately capture how much of the retail purchase stays with the retail outlet. This ensures that consumer expenditure at the retail outlet is properly allocated amongst the supply chain participants. If the option to not apply margins was selected, IMPLAN would allocate 100% of the retail purchase to the retail outlet as opposed to its suppliers.

IMPLAN modeling also requires the selection of the appropriate Local Purchase Percentage (LPP). The LPP is used to determine what percentage of sales is applied to the county and state multipliers. The default LPP is 100%. However, not all industries are available in every county, and trips taken to one county (or the state) may involve purchases outside of that region. For this reason, we utilize the Social Accounts Multiplier (SAM) Model Value provided by IMPLAN. This value models the region's ability to meet local demand with local supply of a good, service, or commodity. We used LPPs of 100% for IMPLAN sectors hotels and motels, including casino hotels, other accommodations, and other amusement and recreation industries, as the methodology of allocating visitor days estimated that trips to a region were using such services locally.

For gasoline, the analysis captures the fact that Washington does a significant amount of refining. To do this, expenditures on gasoline were entered into IMPLAN as a Commodity Change for industry 3115 Refined Petroleum Products. IMPLAN then allocated these expenditures across the relevant supply chain industries including Refineries, Wholesale Distribution and Gasoline Stations. The allocation to gasoline stations was given a Local Purchase Percentage of 100%. This was more accurate than allocating all gasoline expenditures to Retail Gasoline stations because this does not distinguish gasoline from other gas station purchases. With all expenditures and assumptions properly entered into IMPLAN, the model was run separately for each region and group of activities.

Regional IMPLAN models exist for zip codes, counties, and the state. Zip code data may be inaccurate due to data suppression in the source County Business Pattern program data. When confidential data such as precise employment at a given firm might be interpreted from zip code level data, the U.S. Census Bureau suppresses that information. Due to the way Legislative Districts are drawn in Washington State, it was not possible to construct Legislative District models in IMPLAN. While Legislative District expenditures were calculated using a variety of methodologies (See Table "Allocation of Visitors To County and Legislative Districts"), this study does not calculate the Total Contribution Effects for Legislative Districts. It is possible to extract the multipliers from County-Level Regional Models (see Figure E-1) and apply them to Legislative District expenditures. However, County and Legislative District boundaries cross each other quite frequently, making these estimates imperfect.

Figure E-1. Multipliers for Counties in Washington State




**Washington State Multiplier = 0.95**

# APPENDIX F

## County Economic Expenditures and Contribution Results for All Recreational Lands

The following tables do not include equipment expenditures. Counties do not total to the Washington State total due to region-specific modeling.

Table F-1. Economic Contribution Results, By County

| County | Total Expenditures* (000's) | Economic Contribution (000's) | Multiplier | Employment | State and Local Tax (000's) |
|---|---|---|---|---|---|
| ADAMS | $49,305 | $21,760 | 0.44 | 342 | $2,133 |
| ASOTIN | $80,375 | $41,817 | 0.52 | 622 | $3,365 |
| BENTON | $743,771 | $451,326 | 0.61 | 7,074 | $32,518 |
| CHELAN | $341,811 | $298,912 | 0.87 | 3,843 | $22,942 |
| CLALLAM | $355,841 | $245,335 | 0.69 | 3,709 | $19,635 |
| CLARK | $1,186,068 | $719,141 | 0.61 | 9,229 | $54,096 |
| COLUMBIA | $29,925 | $15,049 | 0.50 | 220 | $1,227 |
| COWLITZ | $359,701 | $191,957 | 0.53 | 2,625 | $15,683 |
| DOUGLAS | $136,057 | $68,267 | 0.50 | 932 | $5,660 |
| FERRY | $82,572 | $26,855 | 0.33 | 381 | $2,438 |
| FRANKLIN | $205,464 | $81,959 | 0.40 | 1,114 | $5,942 |
| GARFIELD | $42,113 | $19,433 | 0.46 | 427 | $1,632 |
| GRANT | $301,300 | $161,617 | 0.54 | 2,187 | $13,094 |
| GRAYS HARBOR | $343,267 | $218,642 | 0.64 | 2,900 | $16,885 |
| ISLAND | $358,610 | $211,909 | 0.59 | 3,321 | $18,187 |
| JEFFERSON | $317,207 | $215,059 | 0.68 | 3,335 | $17,850 |
| KING | $5,441,083 | $4,552,283 | 0.84 | 50,191 | $310,612 |
| KITSAP | $694,367 | $467,113 | 0.67 | 6,461 | $37,533 |
| KITTITAS | $185,325 | $118,805 | 0.64 | 1,762 | $9,459 |
| KLICKITAT | $155,499 | $74,242 | 0.48 | 1,110 | $5,836 |
| LEWIS | $326,661 | $205,140 | 0.63 | 2,398 | $25,206 |
| LINCOLN | $48,343 | $23,397 | 0.48 | 272 | $3,179 |
| MASON | $255,196 | $118,927 | 0.47 | 1,614 | $16,272 |
| OKANOGAN | $222,002 | $151,343 | 0.68 | 1,819 | $18,646 |
| PACIFIC | $176,860 | $107,385 | 0.61 | 1,364 | $13,354 |

Table F-1. Economic Contribution Results, By County (continued)

| County | Total Expenditures* (000's) | Economic Contribution (000's) | Multiplier | Employment | State and Local Tax (000's) |
|---|---|---|---|---|---|
| PEND OREILLE | $68,066 | $19,736 | 0.29 | 250 | $2,829 |
| PIERCE | $2,252,445 | $1,612,372 | 0.72 | 17,243 | $176,352 |
| SAN JUAN | $121,776 | $94,363 | 0.77 | 1,134 | $10,557 |
| SKAGIT | $479,877 | $349,972 | 0.73 | 3,805 | $38,281 |
| SKAMANIA | $199,386 | $120,784 | 0.61 | 1,481 | $15,873 |
| SNOHOMISH | $2,073,726 | $1,225,092 | 0.59 | 14,926 | $150,405 |
| SPOKANE | $1,308,264 | $1,177,345 | 0.90 | 12,460 | $118,766 |
| STEVENS | $235,766 | $125,812 | 0.53 | 1,719 | $18,133 |
| THURSTON | $755,537 | $476,050 | 0.63 | 5,616 | $58,735 |
| WAHKIAKUM | $20,717 | $6,710 | 0.32 | 111 | $1,057 |
| WALLA WALLA | $159,949 | $94,593 | 0.59 | 1,133 | $11,504 |
| WHATCOM | $705,093 | $584,754 | 0.83 | 6,502 | $62,712 |
| WHITMAN | $146,083 | $67,389 | 0.46 | 926 | $9,417 |
| YAKIMA | $669,931 | $433,425 | 0.65 | 5,398 | $55,037 |
| **Washington**** | **$21,635,336** | **$20,520,858** | **0.95** | **198,658** | **$2,010,992** |

*Includes equipment expenditures
**Counties do not total to Washington State due to region-specific modeling

Table F-2. Economic Expenditure* Results By County on Federal Lands, State Lands, Public Waters, and Local Parks

| County | Federal Lands | State Lands | Public Waters | Local Parks |
|---|---|---|---|---|
| ADAMS | $1,337,655 | $2,014,780 | $9,459,675.20 | $4,170,081.49 |
| ASOTIN | $2,044,130 | $3,700,573 | $30,161,750.68 | $4,236,776.43 |
| BENTON | $227,713,776 | $4,404,342 | $139,020,229.51 | $38,356,119.28 |
| CHELAN | $51,584,455 | $33,971,283 | $86,841,619.72 | $15,833,274.11 |
| CLALLAM | $64,526,785 | $11,424,439 | $119,940,692.32 | $13,990,786.85 |
| CLARK | $5,708,781 | $50,312,534 | $261,064,452.65 | $88,995,977.26 |
| COLUMBIA | $6,409,454 | $3,957,732 | $6,886,049.95 | $1,481,662.06 |
| COWLITZ | $2,808,403 | $10,484,724 | $126,138,645.54 | $22,481,758.73 |
| DOUGLAS | $6,693,440 | $7,362,428 | $45,059,513.95 | $8,162,947.14 |
| FERRY | $58,250,087 | $4,399,922 | $5,984,850.98 | $1,479,531.00 |
| FRANKLIN | $7,791,915 | $6,936,501 | $42,579,591.87 | $16,934,988.28 |
| GARFIELD | $31,946,502 | $1,305,092 | $4,021,116.15 | $1,062,755.77 |
| GRANT | $1,161,992 | $50,752,728 | $69,947,392.51 | $19,506,318.89 |
| GRAYS HARBOR | $7,230,862 | $64,870,346 | $120,223,555.98 | $14,263,729.07 |
| ISLAND | $12,630 | $91,944,551 | $92,662,146.07 | $15,382,341.50 |

Table F-2. Economic Expenditure* Results By County on Federal Lands, State Lands, Public Waters, and Local Parks (continuted)

| County | Federal Lands | State Lands | Public Waters | Local Parks |
|---|---|---|---|---|
| JEFFERSON | $118,442,220 | $58,248,702 | $76,115,624.67 | $5,853,072.44 |
| KING | $44,429,081 | $232,397,012 | $1,003,029,219.54 | $422,645,574.74 |
| KITSAP | $0 | $26,397,482 | $147,630,032.24 | $53,643,150.00 |
| KITTITAS | $8,312,310 | $51,404,981 | $33,777,097.98 | $8,016,820.40 |
| KLICKITAT | $73,272,195 | $12,866,456 | $28,918,000.56 | $3,981,076.79 |
| LEWIS | $38,766,113 | $18,035,738 | $70,032,484.06 | $14,784,533.38 |
| LINCOLN | $934,646 | $3,570,947 | $21,802,640.15 | $2,071,069.09 |
| MASON | $6,069,028 | $27,845,364 | $80,216,923.06 | $11,893,266.08 |
| OKANOGAN | $56,865,568 | $27,548,385 | $41,611,094.39 | $8,056,987.78 |
| PACIFIC | $2,604,236 | $70,628,521 | $48,502,935.22 | $4,099,031.72 |
| PEND OREILLE | $12,600,829 | $5,741,557 | $25,657,508.79 | $2,547,395.38 |
| PIERCE | $70,149,236 | $79,284,844 | $418,634,928.81 | $172,263,115.28 |
| SAN JUAN | $593,626 | $36,895,707 | $47,704,583.95 | $3,089,752.92 |
| SKAGIT | $28,193,008 | $32,140,363 | $165,967,068.38 | $24,807,839.00 |
| SKAMANIA | $147,546,598 | $9,071,241 | $19,818,583.91 | $2,168,254.54 |
| SNOHOMISH | $50,878,780 | $74,788,351 | $456,480,071.67 | $153,522,011.57 |
| SPOKANE | $1,238,076 | $97,792,374 | $226,438,036.29 | $102,983,457.70 |
| STEVENS | $55,711,863 | $8,942,705 | $47,492,791.74 | $8,529,395.30 |
| THURSTON | $2,389,999 | $35,821,030 | $194,181,132.33 | $53,093,072.29 |
| WAHKIAKUM | $12,630 | $393,488 | $10,009,778.01 | $779,443.03 |
| WALLA WALLA | $8,418,901 | $3,047,308 | $31,522,271.34 | $11,517,456.19 |
| WHATCOM | $68,695,018 | $46,785,893 | $145,532,305.26 | $42,538,822.53 |
| WHITMAN | $32,675,715 | $5,302,521 | $22,078,608.91 | $8,773,338.64 |
| YAKIMA | $19,524,742 | $34,398,864 | $107,841,072.92 | $51,098,742.12 |
| **Washington** | **$1,323,545,284** | **$1,347,191,809** | **$4,630,986,077.27** | **$1,439,095,726.75** |

*Does not include equipment expenditures

Table F-3. Economic Expenditure* Results By County for Events, Private Lands, Equipment, and Total

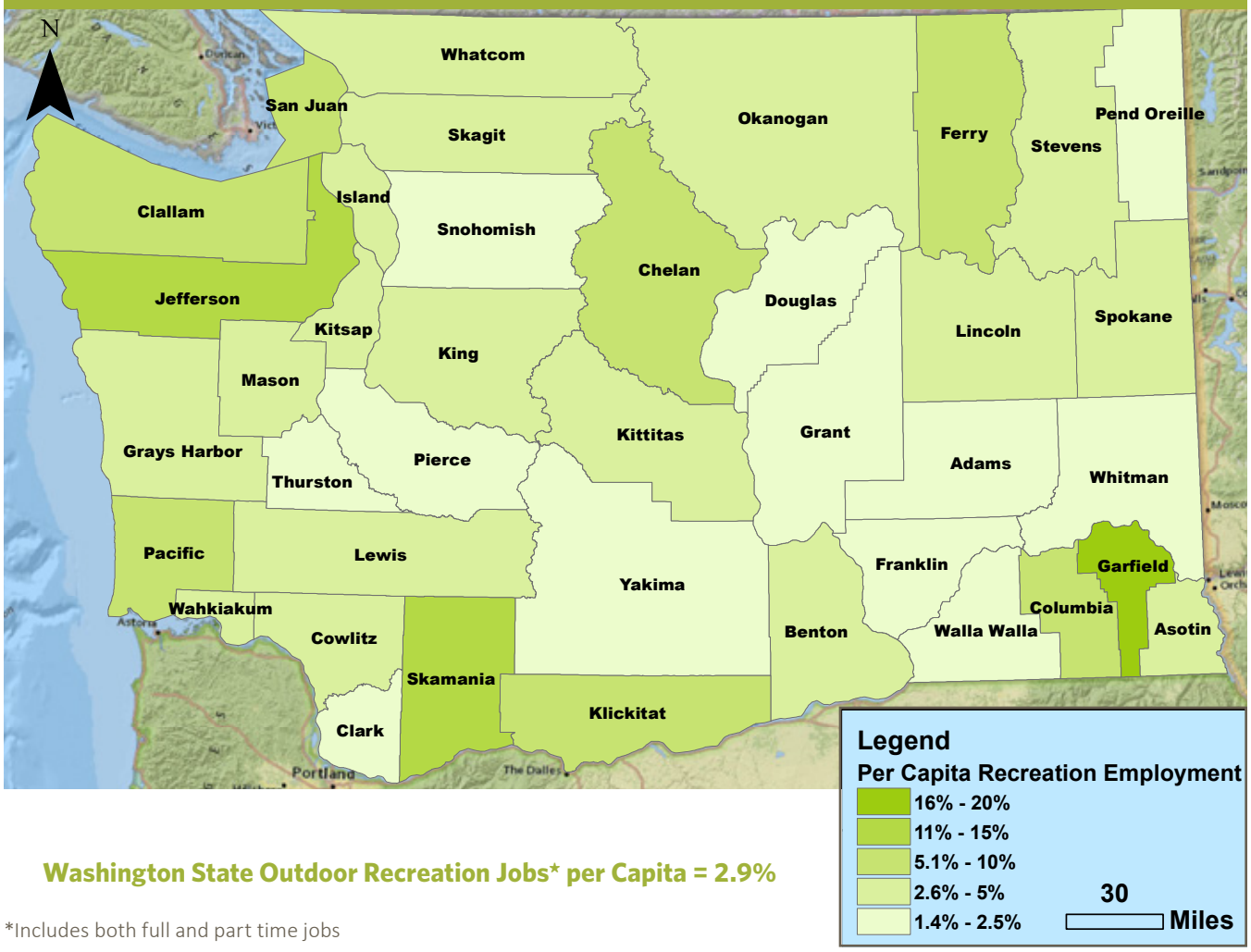
| County | Events | Private Lands | Equipment | Total |
|---|---|---|---|---|
| ADAMS | $5,555,482.20 | $1,773,995.06 | $24,993,476.45 | $49,305,145.47 |
| ASOTIN | $6,330,305.66 | $5,044,928.54 | $28,857,002.41 | $80,375,466.95 |
| BENTON | $51,870,194.69 | $48,623,842.77 | $233,782,690.28 | $743,771,193.82 |
| CHELAN | $21,448,981.22 | $35,438,784.39 | $96,692,244.18 | $341,810,641.40 |
| CLALLAM | $20,904,090.33 | $29,761,623.26 | $95,292,299.88 | $355,840,716.95 |
| CLARK | $125,349,293.84 | $86,968,687.73 | $567,668,737.81 | $1,186,068,464.94 |
| COLUMBIA | $1,293,027.12 | $4,454,758.26 | $5,442,300.14 | $29,924,983.00 |
| COWLITZ | $30,332,256.38 | $30,783,617.98 | $136,671,396.99 | $359,700,802.47 |

Table F-3. Economic Expenditure* Results By County for Events, Private Lands, Equipment, and Total (continued)

| County | Events | Private Lands | Equipment | Total |
|---|---|---|---|---|
| DOUGLAS | $11,342,909.52 | $6,147,392.57 | $51,288,140.40 | $136,056,770.70 |
| FERRY | $2,210,615.46 | $169,491.81 | $10,077,196.75 | $82,571,694.94 |
| FRANKLIN | $23,118,146.09 | $3,790,643.68 | $104,312,532.01 | $205,464,317.88 |
| GARFIELD | $753,272.33 | $- | $3,024,093.21 | $42,112,831.15 |
| GRANT | $26,387,549.62 | $14,608,785.72 | $118,935,210.43 | $301,299,977.32 |
| GRAYS HARBOR | $21,311,902.19 | $18,215,021.81 | $97,151,329.82 | $343,266,746.53 |
| ISLAND | $22,983,257.46 | $30,854,405.99 | $104,770,283.10 | $358,609,615.22 |
| JEFFERSON | $8,745,266.18 | $9,936,624.08 | $39,865,715.96 | $317,207,225.44 |
| KING | $571,814,929.85 | $589,416,093.04 | $2,577,350,832.66 | $5,441,082,743.03 |
| KITSAP | $74,165,653.77 | $57,380,903.32 | $335,149,867.60 | $694,367,088.82 |
| KITTITAS | $11,978,192.48 | $17,232,011.89 | $54,603,165.78 | $185,324,579.34 |
| KLICKITAT | $5,948,256.50 | $3,397,721.21 | $27,115,412.99 | $155,499,118.88 |
| LEWIS | $22,090,052.88 | $62,253,095.95 | $100,698,567.13 | $326,660,584.59 |
| LINCOLN | $3,094,451.78 | $2,762,612.21 | $14,106,207.07 | $48,342,573.21 |
| MASON | $17,770,116.22 | $30,395,139.43 | $81,005,928.39 | $255,195,765.19 |
| OKANOGAN | $12,038,207.86 | $21,005,078.79 | $54,876,748.80 | $222,002,070.84 |
| PACIFIC | $6,124,496.80 | $16,982,223.37 | $27,918,812.86 | $176,860,256.03 |
| PEND OREILLE | $3,806,146.41 | $361,948.13 | $17,350,501.24 | $68,065,886.53 |
| PIERCE | $235,197,741.36 | $215,646,104.23 | $1,061,268,544.81 | $2,252,444,514.03 |
| SAN JUAN | $4,616,500.48 | $7,831,430.58 | $21,044,539.20 | $121,776,140.88 |
| SKAGIT | $34,500,054.05 | $38,258,623.13 | $156,010,379.65 | $479,877,335.73 |
| SKAMANIA | $3,239,659.73 | $2,773,535.11 | $14,768,144.51 | $199,386,016.40 |
| SNOHOMISH | $210,832,204.80 | $175,242,065.28 | $951,982,140.17 | $2,073,725,625.01 |
| SPOKANE | $139,501,213.78 | $111,442,015.77 | $628,868,590.60 | $1,308,263,763.93 |
| STEVENS | $12,744,047.34 | $44,251,140.71 | $58,094,351.94 | $235,766,295.27 |
| THURSTON | $74,384,665.98 | $59,007,872.53 | $336,659,245.11 | $755,537,017.23 |
| WAHKIAKUM | $1,164,591.22 | $3,047,927.70 | $5,308,845.01 | $20,716,703.34 |
| WALLA WALLA | $17,208,606.43 | $9,787,768.20 | $78,446,259.02 | $159,948,569.36 |
| WHATCOM | $59,339,687.52 | $73,769,449.21 | $268,431,645.26 | $705,092,821.32 |
| WHITMAN | $13,108,531.01 | $4,388,231.85 | $59,755,868.29 | $146,082,814.80 |
| YAKIMA | $71,707,583.54 | $60,755,798.57 | $324,604,243.36 | $669,931,046.15 |
| **Washington** | **$1,986,312,142.09** | **$1,933,961,393.86** | **$8,974,243,491.27** | **$21,635,335,924.06** |

Note: A dash indicates no estimate for this category.
*Does not include equipment expenditures

Figure F-1. Employment Associated with Expenditures across all Outdoor Recreational Lands Controlled for Local Population




**Washington State Outdoor Recreation Jobs* per Capita = 2.9%**

*Includes both full and part time jobs

Figure F-1 shows the relative importance of outdoor recreation for county employment. The percentages were calculated by dividing the IMPLAN-modeled outdoor recreation jobs per county (numerator) by the total county population (denominator). The resulting percentages would likely be greater if the employed population or adult population were used as the denominator instead of total population, however this data was not obtained.

# APPENDIX G

## Legislative District Expenditures and Participant Days

Table G-1. Legislative District Expenditures* Resulting from Recreation on Federal Lands, State Lands, Public Waters, Local Lands, and Private Lands

| Legislative District | Federal Lands ('000s) | State Lands ('000s) | Public Waters ('000s) | Local Lands ('000s) | Private Lands ('000s) |
|---|---|---|---|---|---|
| State Legislative District 1 | $7 | $13,284 | $8,812 | $51,649 | $54,475 |
| State Legislative District 2 | $41,101 | $36,620 | $38,550 | $51,636 | $45,056 |
| State Legislative District 3 | $.5 | $63,088 | - | $56,044 | - |
| State Legislative District 4 | $5 | $49,846 | $67,717 | $54,150 | $31,541 |
| State Legislative District 5 | $12,086 | $67,906 | $58,278 | $53,987 | $129,124 |
| State Legislative District 6 | $7.1 | $26,741 | $55,336 | $55,405 | $33,082 |
| State Legislative District 7 | $122,150 | $57,238 | $146,031 | $51,659 | $199,636 |
| State Legislative District 8 | $247 | $1,233 | $129,795 | $55,668 | $14,796 |
| State Legislative District 9 | $83,861 | $26,986 | $99,001 | $52,763 | $26,525 |
| State Legislative District 10 | $4,686 | $82,480 | $147,731 | $51,648 | $78,858 |
| State Legislative District 11 | $1 | $3,198 | $23,853 | $62,245 | $2,466 |
| State Legislative District 12 | $101,684 | $56,321 | $177,853 | $53,937 | $92,466 |
| State Legislative District 13 | $43,106 | $86,073 | $136,214 | $53,710 | $123,929 |
| State Legislative District 14 | $242,832 | $39,742 | $42,259 | $55,083 | $73,877 |
| State Legislative District 15 | $297 | $12,158 | $86,337 | $51,645 | $20,246 |
| State Legislative District 16 | $176,763 | $10,885 | $55,978 | $53,937 | $56,806 |
| State Legislative District 17 | $10 | $4,322 | - | $51,647 | $14,027 |
| State Legislative District 18 | $7,241 | $30,180 | $86,579 | $57,293 | $43,707 |
| State Legislative District 19 | $2,440 | $89,999 | $76,614 | $54,063 | $34,592 |
| State Legislative District 20 | $50,396 | $42,553 | $134,791 | $51,637 | $74,314 |
| State Legislative District 21 | $6 | $1,753 | $89,336 | $51,658 | $2,466 |
| State Legislative District 22 | $980 | $6,460 | $122,945 | $55,315 | $21,790 |
| State Legislative District 23 | - | $14,860 | $139,682 | $51,642 | $29,529 |
| State Legislative District 24 | $172,486 | $112,920 | $134,629 | $51,666 | $47,395 |
| State Legislative District 25 | $1 | $2,812 | - | $51,649 | $13,732 |
| State Legislative District 26 | $2 | $19,189 | $209,047 | $54,240 | $23,458 |
| State Legislative District 27 | $1 | $6,307 | $186,408 | $51,645 | $4,932 |

Table G-1. Legislative District Expenditures* Resulting from Recreation on Federal Lands, State Lands, Public Waters, Local Lands, and Private Lands (continued)

| Legislative District | Federal Lands ('000s) | State Lands ('000s) | Public Waters ('000s) | Local Lands ('000s) | Private Lands ('000s) |
|---|---|---|---|---|---|
| State Legislative District 28 | $845 | $8,232 | $59,584 | $57,431 | $44,486 |
| State Legislative District 29 | $1 | $1,651 | $9,215 | $58,942 | $21,579 |
| State Legislative District 30 | $1 | $7,091 | $54,806 | $51,658 | $26,396 |
| State Legislative District 31 | $34,827 | $53,907 | $59,007 | $56,499 | $46,791 |
| State Legislative District 32 | $3 | $2,152 | - | $55,941 | $7,398 |
| State Legislative District 33 | $2 | $7,815 | $132,125 | $55,167 | $7,398 |
| State Legislative District 34 | $4 | $8,807 | $112,794 | $54,897 | $8,445 |
| State Legislative District 35 | $13,725 | $44,500 | $157,090 | $53,503 | $47,505 |
| State Legislative District 36 | $44,747 | $2,514 | $384,675 | $55,360 | - |
| State Legislative District 37 | $1 | $1,816 | $81,041 | $51,632 | - |
| State Legislative District 38 | $15 | $4,151 | $52,000 | $58,284 | $7,508 |
| State Legislative District 39 | $101,058 | $100,794 | $76,774 | $56,361 | $77,148 |
| State Legislative District 40 | $645 | $42,195 | $130,262 | $54,785 | $29,835 |
| State Legislative District 41 | $2 | $28,985 | $156,389 | $51,654 | $25,786 |
| State Legislative District 42 | $65,172 | $30,867 | $90,740 | $51,647 | $83,221 |
| State Legislative District 43 | $.4 | $985 | $198,493 | $56,156 | $2,466 |
| State Legislative District 44 | $11 | $3,064 | $46,499 | $51,653 | $16,299 |
| State Legislative District 45 | $3 | $6,852 | $35,320 | $51,666 | $129,114 |
| State Legislative District 46 | $1 | $12,829 | $117,226 | $55,916 | $4,932 |
| State Legislative District 47 | $2 | $4,272 | $31,485 | $54,899 | $30,555 |
| State Legislative District 48 | $1 | $5,046 | $93,134 | $58,969 | $16,875 |
| State Legislative District 49 | $83 | $3,512 | $98,552 | $51,652 | $7,398 |
| **State Total** | **$1,323,545** | **$1,347,192** | **$4,630,986** | **$2,652,293** | **$1,933,961** |

Note: A dash indicates no estimate for this category.
*Does not include equipment expenditures

Table G-2. Legislative District Expenditures for Events, Equipment Expenditures, Public Lands, and Total

| Legislative District | Total ('000s) | Public lands | Events ('000s) | Equipment Contribution ('000s) |
|---|---|---|---|---|
| State Legislative District 1 | $327,153 | $89,530 | $15,778 | $183,148 |
| State Legislative District 2 | $411,840 | $183,681 | $15,774 | $183,103 |
| State Legislative District 3 | $318,045 | $134,910 | $15,777 | $183,135 |
| State Legislative District 4 | $402,249 | $187,500 | $15,783 | $183,209 |
| State Legislative District 5 | $520,268 | $208,031 | $15,775 | $183,114 |
| State Legislative District 6 | $369,442 | $153,262 | $15,774 | $183,098 |
| State Legislative District 7 | $775,680 | $392,860 | $15,781 | $183,185 |
| State Legislative District 8 | $400,617 | $202,718 | $15,774 | $183,103 |
| State Legislative District 9 | $488,044 | $278,388 | $15,776 | $183,131 |
| State Legislative District 10 | $564,324 | $302,322 | $15,778 | $183,144 |
| State Legislative District 11 | $290,750 | $105,080 | $15,783 | $183,205 |
| State Legislative District 12 | $681,259 | $405,579 | $15,784 | $183,214 |
| State Legislative District 13 | $642,021 | $334,886 | $15,783 | $183,207 |
| State Legislative District 14 | $652,693 | $395,691 | $15,776 | $183,124 |
| State Legislative District 15 | $369,592 | $166,213 | $15,777 | $183,132 |
| State Legislative District 16 | $553,241 | $313,337 | $15,774 | $183,098 |
| State Legislative District 17 | $268,923 | $71,756 | $15,777 | $183,140 |
| State Legislative District 18 | $423,899 | $197,069 | $15,776 | $183,123 |
| State Legislative District 19 | $456,628 | $238,893 | $15,777 | $183,143 |
| State Legislative District 20 | $552,571 | $295,151 | $15,774 | $183,106 |
| State Legislative District 21 | $344,181 | $158,534 | $15,781 | $183,181 |
| State Legislative District 22 | $406,420 | $201,478 | $15,778 | $183,152 |
| State Legislative District 23 | $434,612 | $221,960 | $15,776 | $183,123 |
| State Legislative District 24 | $718,085 | $487,483 | $15,783 | $183,207 |
| State Legislative District 25 | $267,119 | $70,239 | $15,778 | $183,147 |
| State Legislative District 26 | $504,917 | $298,260 | $15,782 | $183,199 |
| State Legislative District 27 | $448,202 | $260,137 | $15,777 | $183,132 |
| State Legislative District 28 | $369,475 | $141,867 | $15,776 | $183,122 |
| State Legislative District 29 | $290,344 | $85,589 | $15,780 | $183,177 |
| State Legislative District 30 | $338,916 | $129,338 | $15,781 | $183,182 |
| State Legislative District 31 | $449,925 | $220,015 | $15,775 | $183,119 |
| State Legislative District 32 | $264,405 | $73,873 | $15,777 | $183,134 |
| State Legislative District 33 | $401,436 | $210,888 | $15,778 | $183,150 |
| State Legislative District 34 | $383,832 | $192,276 | $15,775 | $183,111 |
| State Legislative District 35 | $515,226 | $284,595 | $15,776 | $183,126 |

| Table G-2. Legislative District Expenditures for Events, Equipment Expenditures, Public Lands, and Total (continued) | | | | |
|---|---|---|---|---|
| Legislative District | Total ('000s) | Public lands | Events ('000s) | Equipment Contribution ('000s) |
| State Legislative District 36 | $686,239 | $503,075 | $15,779 | $183,163 |
| State Legislative District 37 | $333,353 | $150,263 | $15,773 | $183,090 |
| State Legislative District 38 | $320,893 | $130,229 | $15,779 | $183,156 |
| State Legislative District 39 | $611,012 | $350,762 | $15,774 | $183,102 |
| State Legislative District 40 | $456,682 | $243,668 | $15,781 | $183,179 |
| State Legislative District 41 | $461,763 | $252,810 | $15,780 | $183,167 |
| State Legislative District 42 | $520,567 | $254,204 | $15,777 | $183,142 |
| State Legislative District 43 | $457,049 | $271,413 | $15,780 | $183,170 |
| State Legislative District 44 | $316,467 | $117,007 | $15,779 | $183,162 |
| State Legislative District 45 | $421,947 | $109,624 | $15,783 | $183,209 |
| State Legislative District 46 | $389,855 | $201,752 | $15,780 | $183,171 |
| State Legislative District 47 | $320,102 | $106,433 | $15,775 | $183,114 |
| State Legislative District 48 | $372,937 | $172,927 | $15,777 | $183,135 |
| State Legislative District 49 | $360,135 | $169,578 | $15,779 | $183,159 |
| **State Total** | **$21,635,336** | **$10,727,131** | **$773,114** | **$8,974,243** |

# APPENDIX H

## Economic Contributions Resulting From Recreation on Public Lands, by County

Table H-1. Economic Contributions by County

| County | Total Expenditures* ('000s) | Total Contribution** ('000s) | Multiplier | Employment | State Tax ('000s) |
|---|---|---|---|---|---|
| ADAMS | $22,538 | $15,624 | 0.69 | 231 | $1,419 |
| ASOTIN | $46,474 | $33,701 | 0.73 | 488 | $2,528 |
| BENTON | $461,365 | $318,670 | 0.69 | 5,073 | $20,220 |
| CHELAN | $209,680 | $211,333 | 1.01 | 2,663 | $15,341 |
| CLALLAM | $230,787 | $191,363 | 0.83 | 2,831 | $14,512 |
| CLARK | $531,431 | $496,869 | 0.93 | 6,242 | $35,343 |
| COLUMBIA | $20,028 | $10,810 | 0.54 | 162 | $820 |
| COWLITZ | $192,246 | $135,733 | 0.71 | 1,794 | $10,312 |
| DOUGLAS | $78,621 | $51,058 | 0.65 | 677 | $4,059 |
| FERRY | $72,325 | $26,208 | 0.36 | 373 | $2,378 |
| FRANKLIN | $97,361 | $63,660 | 0.65 | 862 | $4,180 |
| GARFIELD | $39,089 | $18,713 | 0.48 | 407 | $1,511 |
| GRANT | $167,756 | $125,438 | 0.75 | 1,625 | $9,475 |
| GRAYS HARBOR | $227,900 | $182,421 | 0.80 | 2,346 | $13,350 |
| ISLAND | $222,985 | $159,408 | 0.71 | 2,366 | $12,393 |
| JEFFERSON | $267,405 | $197,525 | 0.74 | 3,016 | $15,722 |
| KING | $2,274,316 | $2,543,776 | 1.12 | 27,130 | $158,256 |
| KITSAP | $301,836 | $270,498 | 0.90 | 3,589 | $19,249 |
| KITTITAS | $113,489 | $85,399 | 0.75 | 1,203 | $6,041 |
| KLICKITAT | $124,986 | $69,374 | 0.56 | 1,038 | $5,368 |
| LEWIS | $163,709 | $125,785 | 0.77 | 1,423 | $14,569 |
| LINCOLN | $31,474 | $19,986 | 0.63 | 218 | $2,617 |
| MASON | $143,795 | $86,908 | 0.60 | 1,123 | $11,156 |
| OKANOGAN | $146,120 | $117,353 | 0.80 | 1,354 | $13,655 |
| PACIFIC | $131,959 | $91,723 | 0.70 | 1,154 | $11,066 |
| PEND OREILLE | $50,353 | $18,467 | 0.37 | 235 | $2,659 |

Table H-1. Economic Contributions by County (continued)

| County | Total Expenditures* ('000s) | Total Contribution** ('000s) | Multiplier | Employment | State Tax ('000s) |
|---|---|---|---|---|---|
| PIERCE | $975,530 | $922,776 | 0.95 | 9,130 | $90,059 |
| SAN JUAN | $92,900 | $80,639 | 0.87 | 937 | $8,636 |
| SKAGIT | $285,608 | $251,514 | 0.88 | 2,556 | $25,375 |
| SKAMANIA | $181,844 | $117,108 | 0.64 | 1,422 | $15,275 |
| SNOHOMISH | $946,501 | $713,075 | 0.75 | 8,083 | $78,328 |
| SPOKANE | $567,953 | $703,765 | 1.24 | 7,013 | $64,450 |
| STEVENS | $133,421 | $84,638 | 0.63 | 1,131 | $11,594 |
| THURSTON | $359,870 | $285,425 | 0.79 | 3,158 | $32,790 |
| WAHKIAKUM | $12,360 | $5,185 | 0.42 | 78 | $757 |
| WALLA WALLA | $71,715 | $59,592 | 0.83 | 658 | $6,615 |
| WHATCOM | $362,892 | $382,270 | 1.05 | 3,947 | $37,193 |
| WHITMAN | $81,939 | $46,658 | 0.57 | 589 | $5,950 |
| YAKIMA | $284,571 | $249,554 | 0.88 | 2,847 | $28,160 |
| **Washington** | **$10,727,131** | **$13,605,257** | **1.27** | **122,562** | **$1,215,897** |

*Does not include equipment expenditures

**Does not add to state total due to region specific modeling

# APPENDIX I

## Calculations for Out-of-State Visitors

The number of out-of-state visitors and their expenditures were calculated for every recreational land type. In some cases there was direct data available on the number of out-of-state visitors with places of origin while in other cases it had to be extrapolated from other land types for which data was available (see Table I-1). General statistics for the state of Washington on tourism and spending were also used when no data was available. Equipment was assumed to be made in the resident state or country so no equipment purchases were assumed for visitors. The table below summarizes the data sources and methodology for calculating visitor numbers, expenditures, and the distribution across sectors of these expenditures.

Table I-1. Data Source and Methodology for Out-of-State Visitors

| Land Type | Data source and general methodology |
|---|---|
| ***Federal Lands*** | |
| National Parks & National Recreation Areas (National Park Service) | Origin of visitors available from Public National Park Service-Managed Data, NRSS 2014, and Thomas et al. 2014. Spending profiles from Dean Runyan 2002, adopted from Longwood. Averaged types of overnight visitors from "National Park Visitor Spending Effects"; National Park Service lodge, national park service campground, motel outside of campground, campsite out of National Park, and other. Used weighted averages for dollar value spending per day. |
| National Forests | Data obtained from the US Forest Service; National Visitor Use Monitoring System – NVUM- reports from each of the National Forests for visits and from Stynes and White 2005 for expenditures. Overnight visitors from NVUM "Four Year Report"; OVN National Forest, Overnight Other (assumed to be hotels and motels). Used ratio of total visitor spending to overnight visitor spending, then applied it to the in-state expenditure rate. |
| National Wildlife Refuge | Banking on Nature 2004, 2006, 2013; US Fish & Wildlife Service for visitation and expenditure data. Applied ratio of day use and overnight use to the in-state expenditure rate to get overnight expenditure rate. Used Corps of Engineers data for overnight non-boater spending profile percentages applied to overnight expenditure rate from "Banking on Nature" report. |
| Corps of Engineers | Corps of Engineers public data (plus Lake Wallula/Umatilla Dam, OR counted to Benton County) for visits; Chang et al. 2003 for expenditure profiles. Overnight spending profiles from "Recreation Visitor Spending Profiles and Economic Benefit to Corps of Engineers Projects", excluding sporting goods (equipment is assumed to be purchased in state of residence). |
| Bureau of Land Management | Freedom of Information Act Data Request for visits data and Stynes and White 2005 for expenditures. Calculated ratio of average total spending to non-local overnight spending. Applied ratio to in state daily expenditure rate. |

| Table I-1. Data Source and Methodology for Out-of-State Visitors (continued) | |
|---|---|
| Land Type | Data source and general methodology |
| ***State Lands*** | |
| State Parks | State Park data for visit numbers per park and Dean Runyan 2002 for expenditures. Overnight expenditure profiles available. Used weighted average to find total overnight spending per-person per-night. Converted 8% for all accommodations to 7% hotels, 1% camping based on ratio of overnight hotel to camp visitors and relative expenditures. |
| State DNR | Utilized National Forest Profile for overnight visitors. Email confirmation from DNR that out of state visitors is 10%. |
| WDFW Game Management Units | Based on hunting as main activity. Percentage of out of state visitors taken from 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Overnight expenditure profiles from NVUM. Used ratio of average to overnight and apply it to the in-state daily expenditure rate. |
| WDFW Management Areas | Same as National Wildlife Refuge areas (Hunting in these areas is already accounted for by Game Management Units counts, so these are other types of visits). |
| ***Local Lands*** | Total visitation was projected from the Herbert Research Group study and responses from some individual counties. Validation was done with results from the SCORP survey 2013 and from the study by California State Parks 2011. Based on these a total of 10% of visitations were assumed for out-of-state visitors. |
| County Parks | Assumed no additional out of state travel expenditures. It is assumed that these visitors will visit another recreational land type where their expenditures will be counted. |
| City Parks | Assumed no additional out of state travel expenditures. It is assumed that these visitors will visit another recreational land type where their expenditures will be counted. |
| Municipal Golf | Used overnight spending profiles extracted from "Michigan Golf Tourists-Economic Impacts". Used ratio of average total spending to non-local overnight spending. Applied ratio to in-state daily expenditure rate. |
| Events on Public Lands | Expenditure profiles from Avenue ISR 2012. Adjusted to per-person per-day expenditures. Report estimates that 20.4% of people attending a special event are from out of state. |
| ***Public Waters*** | Methodology for total visit numbers assumed from SCORP 2013. Base expenditure data comes from methodology described in the activity analysis, Appendix D. The study by Wisconsin Department of Natural Resources 2013 was used to calculate the ratio of local to non-local spending and applied to all activities. |
| ***Private Lands*** | |
| Private Timberland Recreation | Used overnight national forest proportion of visitors and spending profiles from Stynes and White 2005. Allocated 4% directly to timber companies for permits bought. |
| Skiing | Percent of non-local visitors validated by Northwest Ski Areas Association. Non-local overnight spending profiles from Stynes & White. |
| Private Golf | Same methodology as municipal golf. Combined the two expenditure categories ("fees for golf" and "Recreation") into one category (fees to recreation agencies) instead of state and local enterprises. |
| Horseback Riding | Used profiles from Wisconsin Department of Natural Resources 2013 study. Overnight expenditures were allocated 2/3 of lodging to hotels and 1/3 to camping. |

# APPENDIX J

# Ecosystem Service Valuation Methodology

## Study Limitations of the Benefit Transfer Approach

Valuation exercises have limitations that must be noted, although these limitations should not detract from the core finding that ecosystems produce a significant economic value to society. A benefit transfer analysis estimates the economic value of a given ecosystem (e.g., wetlands) from prior studies of that ecosystem type. In this report, studies from Washington, Oregon, and British Columbia were selected first to ensure better comparability. If no study existed in this region for an activity, studies generalized from the US or similar sites were used. Some recreation activities' consumer surplus had to be derived from other activities due to lack of published data (Table J-1). The activities in the SCORP analysis were categorized differently than the consumer surplus database, as such; some activities had no consumer surplus estimates associated with them. The activities listed in Table J-1 were determined to have similar consumer-surplus to appropriately fill in the gaps in the data. The most similar categories were chosen based on the similarity in gear required, expenditures needed for the activity, and where the activity took place.

Table J-1. Consumer-surplus transferred activities

| SCORP Recreation Activity | Transferred consumer-surplus activity |
|---|---|
| Surfboarding | Inner tubing or floating |
| Windsurfing | Inner tubing or floating |
| Snowshoeing | Cross-country skiing |
| Playground Use | Running, jogging, or trail running |

That not all ecosystems have been valued or studied well is perhaps the most serious issue, because it results in a significant underestimate of the value of ecosystem services. More complete coverage would almost certainly increase the values shown in this report, since no known valuation studies have reported estimated values of zero or less for an ecosystem service. See the table below for a full list of ecosystem service-land cover combinations included in the analysis.

Table J-2. Ecosystem Services Valued on Land Cover Type

| National Land Cover Database (NLCD) Code and Name | Aesthetic Information | Wildlife Habitat | Water Quality |
|---|---|---|---|
| 11 Open Water | X | X | X |
| 12 Perennial Snow/Ice | | | |
| 21 Developed, Open Space | X | | X |
| 22 Developed, Low Intensity | | | |
| 23 Developed, Medium Intensity | | | |
| 24 Developed, High Intensity | | | |
| 31 Barren Land | X | | |
| 41 Deciduous Forest | X | X | X |
| 42 Evergreen Forest | X | X | X |
| 43 Mixed Forest | X | X | X |
| 52 Shrub/Scrub | | | |
| 71 Grassland/Herbaceous | X | X | X |
| 81 Pasture/Hay | X | X | X |
| 82 Cultivated Crops | X | X | |
| 90 Woody Wetlands | X | X | X |
| 95 Emergent Herbaceous Wetlands | X | X | X |

| Key | |
|---|---|
| Ecosystem service present on land cover type and valuedin this analysis | X |
| Ecosystem service present on land cover type | |
| Ecosystem service not present on land cover type | |

Other limitations include:

- Selection Bias. Bias can be introduced in choosing the valuation studies, as in any appraisal methodology. The use of ranges partially mitigates this problem.
- Static Analysis. It is important to note that the ecosystem service valuations presented in the report are static analyses. As such, they ignore interdependencies and dynamics, the omission of which is difficult to assess.
- Increases in Scarcity. The valuation also probably underestimates shifts in the relevant demand curves as the sources of ecosystem services become more limited. If ecosystem services are scarcer than assumed, their value has been underestimated in this study. Such reductions in supply appear likely as land conversion and development proceed.
- GIS Data. Since this valuation approach involves using benefit transfer methods to assign values to land cover types based, in some cases, on the context of their surroundings, one of the most important issues with GIS quality assurance is reliability of the land cover maps used in the benefits transfer, both in terms of categorical precision and accuracy.
- Ecosystem Health. There is the potential that ecosystems identified in the GIS analysis are fully functioning to the point where they are delivering higher values than those assumed in the original primary studies, which would result in an underestimate of current value. On the other hand, if ecosystems are less healthy than those in primary studies, this valuation will overestimate current value.
- Spatial Effects. This ecosystem service valuation assumes spatial homogeneity of services within ecosystems, i.e. that every acre of forest produces the same ecosystem services. This is clearly not the case. Whether this would increase or decrease valuations depends on the spatial patterns and services involved.
- Price Distortions. Distortions in the current prices used to estimate ecosystem service values are carried through the analysis. These prices do not reflect environmental externalities and are therefore again likely to be underestimates of true values.

# Definition of Ecosystem Service Categories

Below is a table defining all 21 of the Ecosystem Services used by Earth Economics. Our classification is based on de Groot et al. (2002).[i]

Table J-3. Definition of Ecosystem Services

| Good/Service | Economic Benefit to People |
|---|---|
| **Provisioning Services** | |
| Food | Producing crops, fish, game, and fruits |
| Medicinal Resources | Providing traditional medicines, pharmaceuticals, and assay organisms |
| Ornamental Resources | Providing resources for clothing, jewelry, handicraft, worship and decoration |
| Energy and Raw Materials | Providing fuel, fiber, fertilizer, minerals, and energy |
| Water Supply | Provisioning of surface and ground water for drinking water, irrigation and industrial use |
| **Regulating Services** | |
| Biological Control | Providing pest and disease control |
| Climate Stability | Supporting a stable climate at global and local levels through carbon sequestration and other processes |
| Air Quality | Providing clean, breathable air |
| Moderation of Extreme Events | Preventing and mitigating natural hazards such as floods, hurricanes, fires, and droughts |
| Pollination | Pollination of wild and domestic plant species |
| Soil Formation | Creating soils for agricultural and ecosystems integrity; maintenance of soil fertility |
| Soil Retention | Retaining arable land, slope stability and coastal integrity |
| Waste Treatment | Improving soil, water, and air quality by decomposing human and animal waste, and removing pollutants |
| Water Regulation | Providing natural irrigation, drainage, ground water recharge, river flows, and navigation |
| **Supporting Services** | |
| Habitat and Nursery | Maintaining genetic and biological diversity, the basis for most other ecosystem functions; promoting growth of commercially harvested species |
| Genetic Resources | Improving crop and livestock resistance to pathogens and pests |
| **Information Services** | |
| Aesthetic Information | Enjoying and appreciating the presence, scenery, sounds, and smells of nature |
| Cultural and Artistic Inspiration | Using nature as motifs in art, film, folklore, books, cultural symbols, architecture, and media |
| Recreation and Tourism | Experiencing natural ecosystems and enjoying outdoor activities |
| Science and Education | Using natural systems for education and scientific research |
| Spiritual and Historical | Using nature for religious and spiritual purposes |

i de Groot, R.S., Wilson, M.A., Boumans, R.M.J., 2002. A typology for the classification, description, and valuation of ecosystem functions, goods, and services. Ecological Economics 41, 393-408.

# Comprehensive Ecosystem Value Tables

The following tables provide the values used in the ecosystems service analysis in detail. Total values for similar land cover types were combined and summarized in the report.

**Table J-4. Ecosystem Service Values on Deciduous, Evergreen, and Mixed Forests**

| Ecosystem Service | Deciduous Forest | | Evergreen Forest | | Mixed Forest | |
|---|---|---|---|---|---|---|
| | Low ($/acre/year) | High ($/acre/year) | Low ($/acre/year) | High ($/acre/year) | Low ($/acre/year) | High ($/acre/year) |
| Aesthetic Information | 5,917 | 11,214 | 5,435 | 10,732 | 5,435 | 10,732 |
| Habitat and Nursery | 22 | 63 | 829 | 877 | 22 | 63 |
| Water Quality | 50 | 742 | 50 | 742 | 50 | 742 |
| **Total** | **5,988** | **12,020** | **6,314** | **12,352** | **5,507** | **11,538** |

**Table J-5. Ecosystem Service Values on Grasslands, Croplands, and Pastures**

| Ecosystem Service | Grassland/Herbaceous | | Pasture/Hay | | Cultivated Crops | |
|---|---|---|---|---|---|---|
| | Low ($/acre/year) | High ($/acre/year) | Low ($/acre/year) | High ($/acre/year) | Low ($/acre/year) | High ($/acre/year) |
| Aesthetic Information | 1 | 1 | 0.4 | 7 | 9,189 | 18,398 |
| Habitat and Nursery | 35 | 93 | 0.1 | 3 | 509 | 1,509 |
| Water Quality | 7,932 | 12,569 | 5 | 5 | | |
| **Total** | **7,968** | **12,663** | **5** | **15** | **9,698** | **19,907** |

**Table J-6. Ecosystem Service Values on Urban Greenspace, Beach, and Fresh Water**

| Ecosystem Service | Urban Greenspace | | Beach | | Fresh Water | |
|---|---|---|---|---|---|---|
| | Low ($/acre/year) | High ($/acre/year) | Low ($/acre/year) | High ($/acre/year) | Low ($/acre/year) | High ($/acre/year) |
| Aesthetic Information | 36 | 2,552 | 251 | 662 | 252 | 515 |
| Habitat and Nursery | | | | | 3 | 57 |
| Water Quality | 444 | 444 | | | 2 | 2 |
| **Total** | **480** | **2,996** | **251** | **662** | **256** | **574** |

**Table J-7. Ecosystem Service Values on Saltwater, Woody Wetlands, and Emergent Herbaceous Wetlands**

| Ecosystem Service | Saltwater | | Woody Wetland | | Emergent Herbaceous Wetland | |
|---|---|---|---|---|---|---|
| | Low ($/acre/year) | High ($/acre/year) | Low ($/acre/year) | High ($/acre/year) | Low ($/acre/year) | High ($/acre/year) |
| Aesthetic Information | 4 | 1,776 | 37 | 10,106 | 37 | 10,106 |
| Habitat and Nursery | 9,197 | 9,212 | 63 | 12,778 | 472 | 505 |
| Water Quality | | | 430 | 10,149 | 430 | 10,149 |
| **Total** | **9,201** | **10,989** | **530** | **33,033** | **939** | **20,760** |

EARTH ECONOMICS

WASHINGTON STATE
Recreation and Conservation Office

2012 CENSUS OF AGRICULTURE

# Washington

## State and County Data

**Volume 1 • Geographic Area Series • Part 47**

**AC-12-A-47**

Issued May 2014

United States Department of Agriculture
**Tom Vilsack,** Secretary
National Agricultural Statistics Service
**Cynthia Z.F. Clark,** Administrator

## Acknowledgments

The U.S. Department of Agriculture's National Agricultural Statistics Service (NASS) conducted the 2012 Census of Agriculture, analyzed the data, and prepared this and other reports. The census provides a comprehensive picture of American agriculture in 2012, and NASS recognizes and appreciates that many individuals and organizations contributed to the effort.

Most importantly, the success of the agriculture census depends directly on the cooperation of farmers and ranchers across the country. Recognizing that participating in the census is their responsibility and gives them a voice in their future, agricultural producers took the time to provide the information requested. We are grateful to every producer who participated in the 2012 Census of Agriculture.

Also essential were the many partners who communicated about the census and encouraged producers to respond. Farm organizations, stakeholder groups, agricultural media, community-based organizations, and land grant and other universities helped to build awareness of the census and its importance to producers, their communities, and U.S. agriculture as a whole. We appreciate their help in reaching all kinds of agricultural operations, thereby ensuring a comprehensive census.

Various USDA agencies and State departments of agriculture provided valuable advice during the planning, data collection, and processing phases of the census, as well as critical assistance at the local level to farmers and ranchers completing census forms. Our thanks to them and to the enumerators who collected data locally through NASS' cooperative agreement with the National Association of State Departments of Agriculture.

Members of the Advisory Committee on Agriculture Statistics offered advice on census questions, as well as their strong and consistent support and thoughtful recommendations for census and other programs. Representatives of public and private organizations provided input as well.

Finally, we acknowledge and appreciate the support services of the U.S. Department of Commerce National Processing Center in Jeffersonville, Indiana.

To learn more about the Census of Agriculture, visit www.agcensus.usda.gov, where you can access new and historic data through the Quick Stats database. To learn about other NASS reports and activities, visit www.nass.usda.gov. You can also send an inquiry to nass@nass.usda.gov or call (800) 727-9540.

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# Introduction

## HISTORY

The 2012 Census of Agriculture is the 28th Federal census of agriculture and the fourth conducted by the U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS). The U.S. Department of Commerce, Bureau of the Census conducted the census of agriculture for 156 years (1840-1996). The 1997 Appropriations Act contained a provision that transferred the responsibility for the census of agriculture to NASS.

The history of collecting data on U.S. agriculture dates back as far as President George Washington, who kept meticulous statistical records describing his own and other farms. In 1791, President Washington wrote to farmers requesting information on land values, crop acreages, crop yields, livestock prices, and taxes. Washington compiled the results on an area extending roughly 250 miles from north to south and 100 miles from east to west which today lies in Maryland, Pennsylvania, Virginia, West Virginia, and the District of Columbia, where most of the young country's population lived. In effect, Washington's inquiry was an attempt to fulfill the need for sound agricultural data for a nation that was heavily reliant on the success of agriculture. Such informal inquiries worked while the Nation was young, but were insufficient as the country expanded.

In 1839, Congress appropriated $1,000 for "carrying out agricultural investigations, and procuring agricultural statistics." The first agriculture census was taken in 1840 as part of the sixth decennial census of population. As the country expanded and agriculture evolved, the decade between censuses became too long an interval to capture the changes in agricultural production. After the 1920 census, the census interval was changed to every five years resulting in a separate mid-decade census of agriculture being conducted in 1925, 1935, and 1945. The agriculture census continued to be taken as part of the decennial census through 1950. From 1954 to 1974, the census was taken for the years ending in 4 and 9. In 1976, Congress changed the 5-year data collection cycle to years ending in 2 and 7 to coincide with other economic censuses. That 5-year cycle continues to this day.

## USES OF CENSUS DATA

The census of agriculture provides a detailed picture of U.S. farms and ranches every five years. It is the only source of uniform, comprehensive agricultural data for every State and county or county equivalent. Census of agriculture data are routinely used by farm organizations, businesses, State departments of agriculture, elected representatives and legislative bodies at all levels of government, public and private sector analysts, the news media, and colleges and universities. The data are frequently used to:

- Show the importance and value of agriculture at the county, state, and national levels;
- Provide agricultural news media and agricultural associations' benchmark statistics for stories and articles on U.S. agriculture and the foods we produce;
- Compare the income and costs of production;
- Provide important data about the demographics and financial well being of producers;
- Evaluate historical agricultural trends to formulate farm and rural policies and develop programs that help agricultural producers;
- Allocate local and national funds for farm programs, e.g. extension service projects,

agricultural research, soil conservation programs, and land-grant colleges and universities;

- Identify the assets needed to support agricultural production such as land, buildings, machinery, and other equipment;

- Create an extensive database of information on uncommon crops and livestock and the value of those commodities for assessing the need to develop policies and programs to support those commodities;

- Provide geographic data on production so agribusinesses will locate near major production areas for efficiencies for both producers and agribusinesses;

- Measure the usage of modern technologies such as conservation practices, organic production, renewable energy systems, internet access, and specialized marketing strategies;

- Develop new and improved methods to increase agricultural production and profitability;

- Plan for operations during drought and emergency outbreaks of diseases or infestations of pests.

## AUTHORITY

The 2012 Census of Agriculture is required by law under the "Census of Agriculture Act of 1997," Public Law 105-113 (Title 7, United States Code, Section 2204g). The law directs the Secretary of Agriculture to conduct a census of agriculture every fifth year. The census of agriculture includes each State, Puerto Rico, Guam, the U.S. Virgin Islands, the Commonwealth of Northern Mariana Islands, and American Samoa.

## FARM DEFINITION

The census definition of a farm is any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. The definition has changed nine times since it was established in 1850. The current definition was first used for the 1974 Census of Agriculture and has been used in each subsequent agriculture census. This definition is consistent with the definition used for current USDA surveys. The farm definition used for each U.S. territory varies. The report for each territory includes a discussion of its farm definition.

## DATA COMPARABILITY

Most data are comparable between the 2012 and 2007 censuses. A few changes were made to the 2012 census that affect comparability for some data items. See Appendix B, General Explanation and Census of Agriculture Report Form, Data Changes for a detailed discussion of these changes. Dollar figures are expressed in current dollars and have not been adjusted for inflation or deflation. In general, data for censuses since 1974 are not fully comparable with data for 1969 and earlier censuses due to changes in the farm definition.

## REFERENCE PERIOD

Reference periods for the 2012 Census of Agriculture were similar to those used in the 2007 Census of Agriculture. Reference periods used were:

- Crop production is measured for the calendar year, except for a few crops such as avocados, citrus, and olives for which the production year overlaps the calendar year. See Appendix B, General Explanation and Census of Agriculture Report Form for details.

- Livestock, poultry, and machinery and equipment inventories, market value of land and buildings, and grain storage capacity are measured as of December 31 of the census year.

- Crop and livestock sales, other farm-related income, direct sales income, income from federal farm programs, Commodity Credit Corporation loans, Conservation Reserve, Farmable Wetlands, Conservation Reserve Enhancement, and Wetlands Reserve Program participation, farm expenses, chemical and fertilizer use, irrigated acreage, and hired farm labor data are measured for the calendar year.

## TABLES AND APPENDICES

**Chapter 1.** Table 1 shows State-level historical data through the 1982 census and tables 2 through 63 show detailed State-level data usually accompanied by historical data from the 2007 census. Tables 64 through 70 show detailed State-level data cross-tabulated by several categories for the 2012 census only.

**Chapter 2.** County-level data are presented in 55 tables in 2 different table formats - county and county summary. Most tables include 2007 historical data. County tables include general data for all counties within the State. The county names are listed in alphabetical order in the column headings. County summary tables provide comprehensive data for all counties reporting a data item.

**Appendix A.** Provides information about data collection and data processing activities and discusses the statistical methodology used in conducting and evaluating the census. Table A summarizes coverage, nonresponse, and misclassification adjustment for selected items for the State. Table B provides reliability estimates of State totals for selected items. Table C summarizes coverage, nonresponse, and misclassification adjustment for selected items at the county level. Table D provides total number of American Indian or Alaska Native farm operators both on and off reservations by county.

**Appendix B.** Includes definitions of specific terms and phrases used in this publication, including items in the publication tables that carry the note "see text." It also provides facsimiles of the report form and instruction sheet used to collect data.

## RESPONDENT CONFIDENTIALITY

In keeping with the provisions of Title 7 of the United States Code, no data are published that would disclose information about the operations of an individual farm or ranch. All tabulated data are subjected to an extensive disclosure review prior to publication. Any tabulated item that identifies data reported by a respondent or allows a respondent's data to be accurately estimated or derived, was suppressed and coded with a 'D'. However, the number of farms reporting an item is not considered confidential information and is provided even though other information is withheld.

## SPECIAL EFFORTS DIRECTED AT MINORITIES

NASS implemented several activities to improve coverage of minority farm operators. These activities included, but were not limited to:

- Obtaining mail lists from organizations likely to contain names and addresses of minority farm operators;
- Conducting pre-census promotion activities that targeted women, American Indian and Alaska Native, Black and African American, and Spanish, Hispanic, or Latino origin farm operators;
- Special emphasis was placed on collecting data from individual operators on American Indian reservations in three States.

## SPECIAL STUDIES AND CUSTOM TABULATIONS

Special studies such as the 2013 Farm and Ranch Irrigation Survey and the 2013 Census of Aquaculture are part of the census program and provide supplemental information to the 2012 Census of Agriculture in the respective subject area. Results are published on the internet.

Custom-designed tabulations may be developed when data are not published elsewhere. These tabulations are developed to individual user specifications on a cost-reimbursable basis and shared with the public. Quick Stats, NASS's online database that allows data users to build customized queries, should be investigated before requesting a custom tabulation.

All special studies and custom tabulations are subject to a thorough disclosure review prior to release to prevent the disclosure of any individual respondent data. Requests for custom tabulations can be submitted via the internet from the NASS home

page, by mail, or by e-mail to:

DataLab
National Agricultural Statistics Service
Room 6436A, Stop 2054
1400 Independence Avenue, S.W.
Washington, D.C. 20250 – 2054
or
Datalab@nass.usda.gov

## ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used throughout the tables:

- Represents zero.

(D) Withheld to avoid disclosing data for individual farms.

(H) Coefficient of variation is greater than or equal to 99.95 percent or the standard error is greater than or equal to 99.95 percent of mean.

(L) Coefficient of variation is less than 0.05 percent or the standard error is less than 0.05 percent of the mean.

(IC) Independent city.

(NA) Not available.

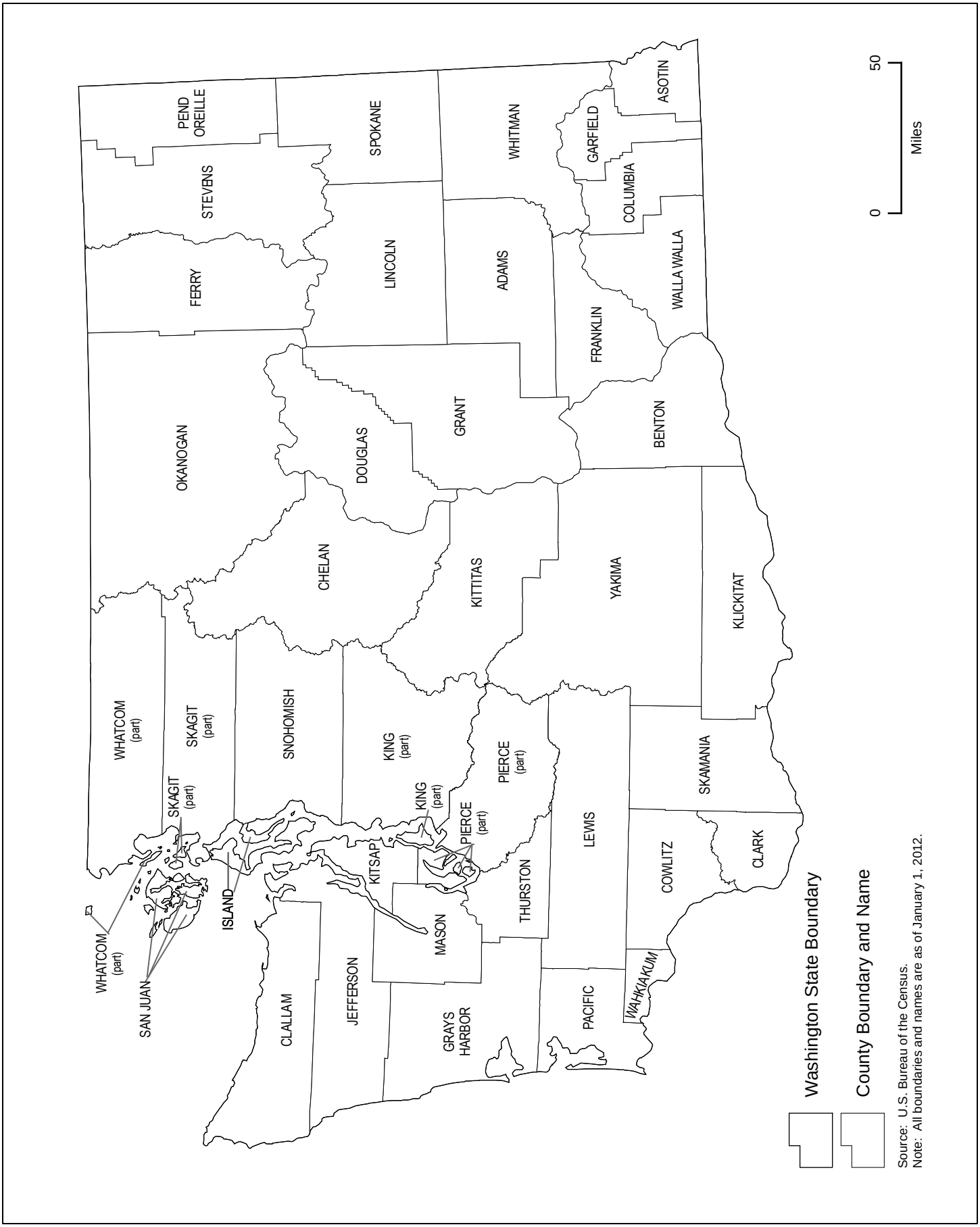
(X) Not applicable.

(Z) Less than half of the unit shown.

cwt Hundredweight.

sq ft Square feet.

## Washington - County




Source: U.S. Bureau of the Census.
Note: All boundaries and names are as of January 1, 2012.

Figure 1. **Profile of the State's Agriculture**

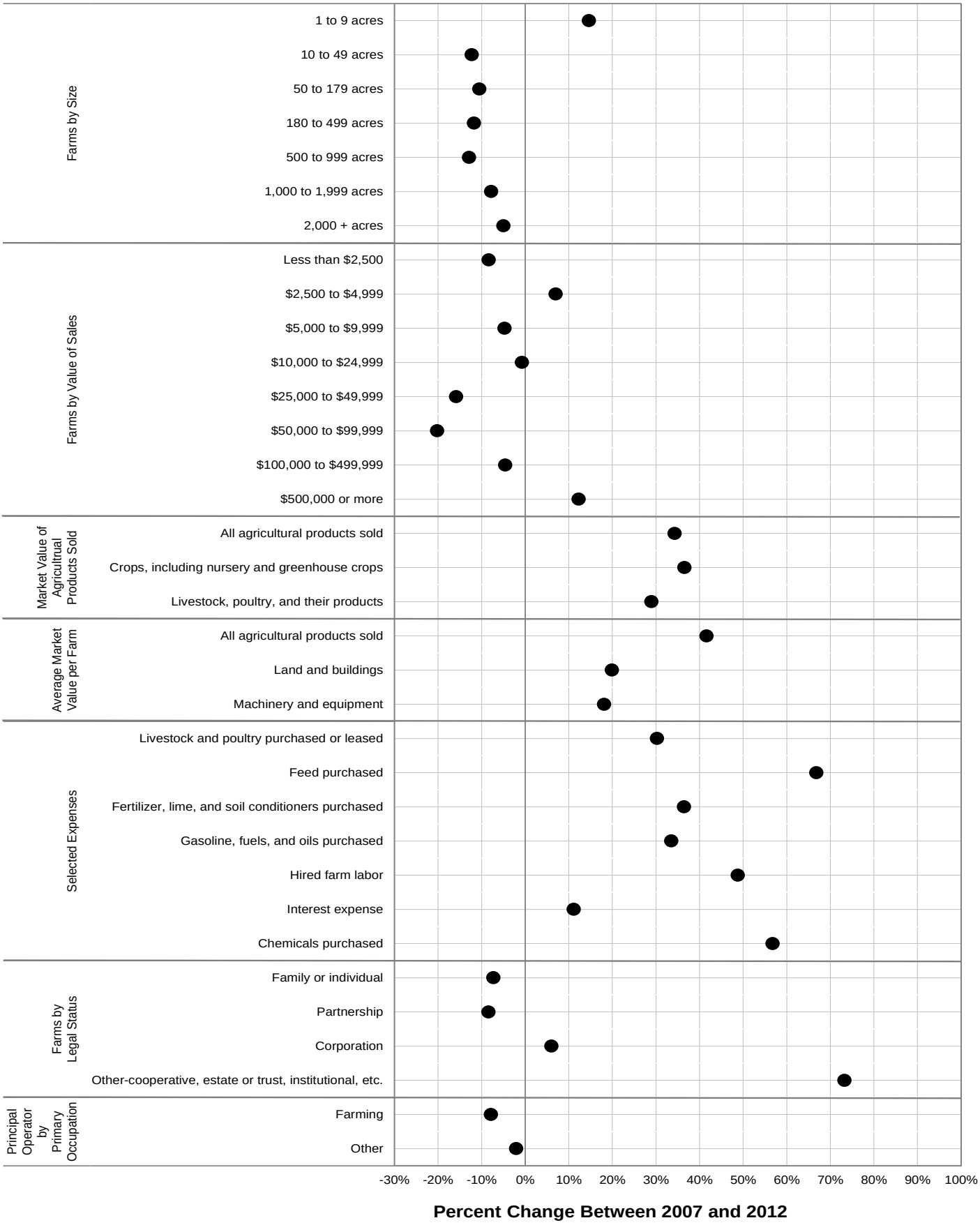


Figure 2. **Farms by Size**

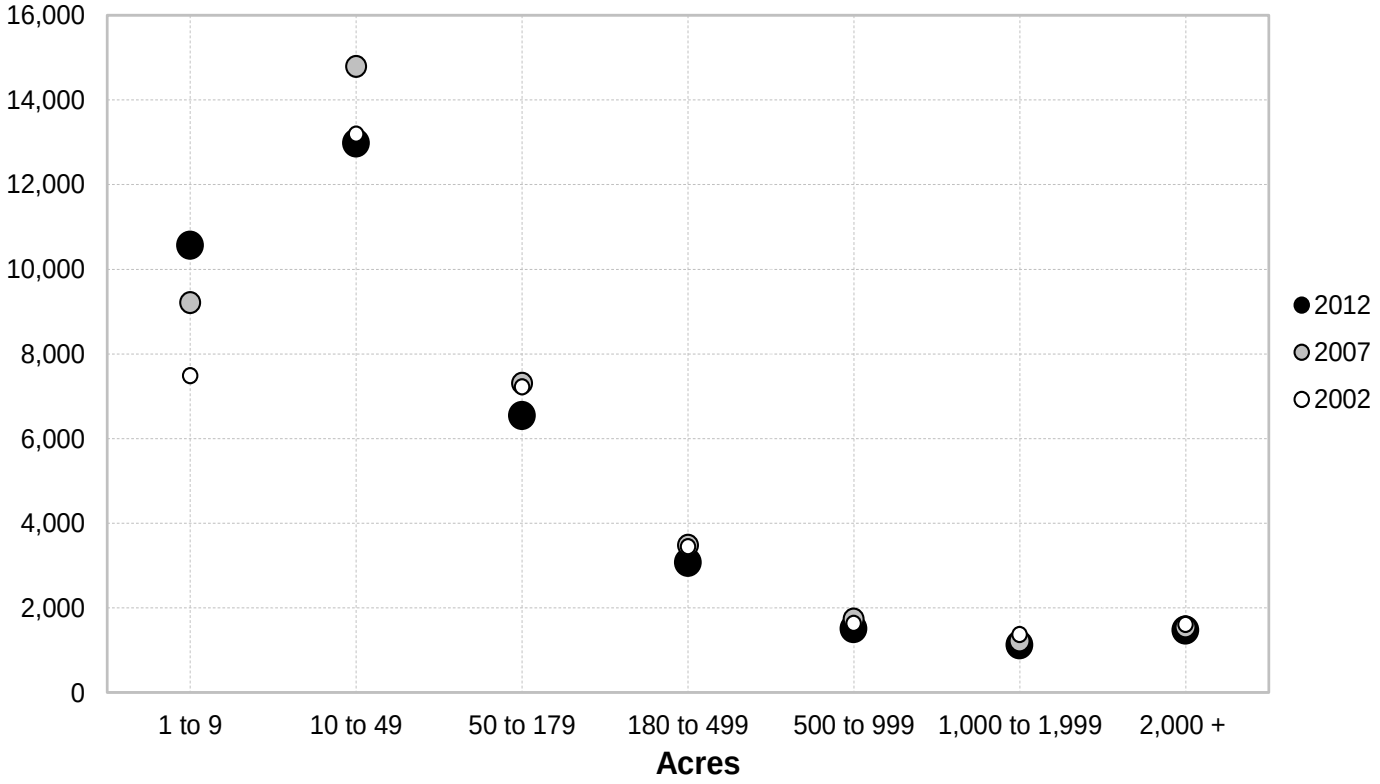



Figure 3. **Farms by Market Value of Agricultural Products Sold**

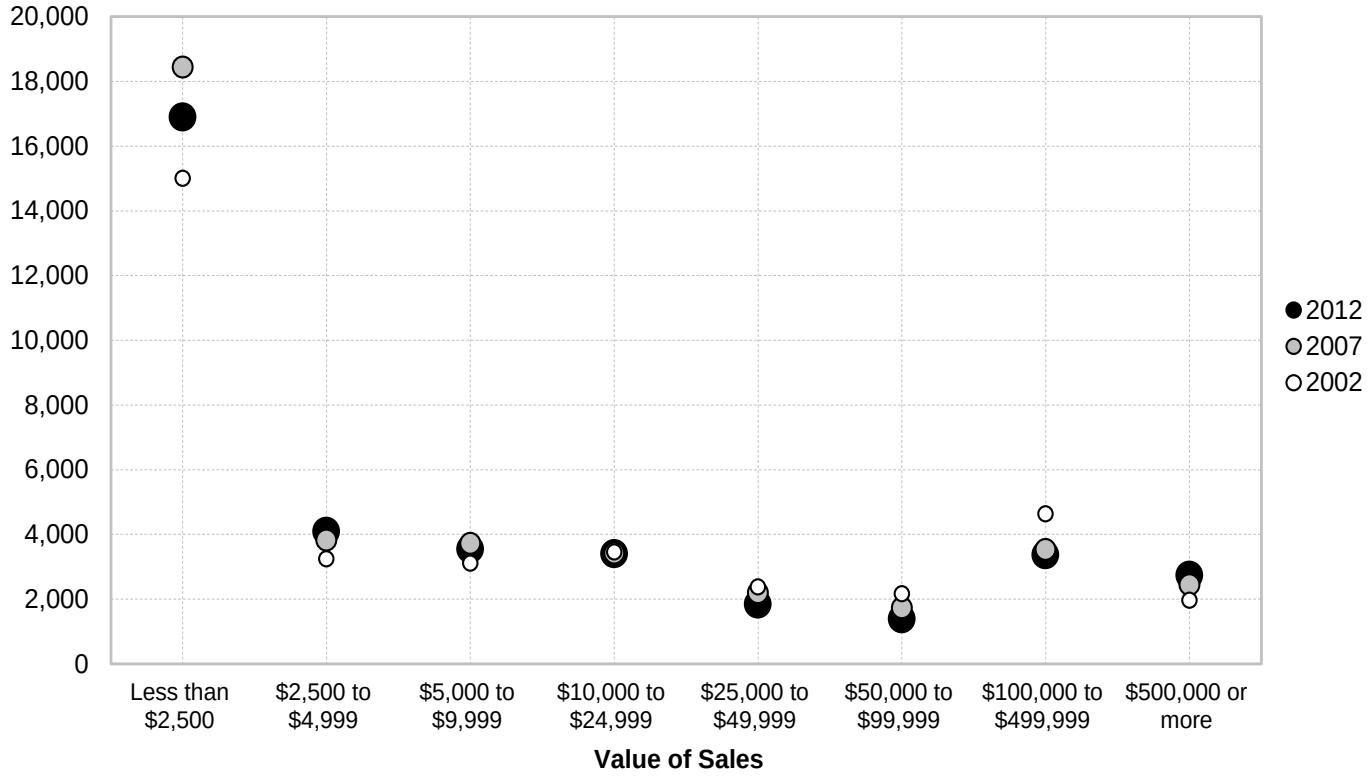


Figure 4. **Market Value of Agricultural Products Sold**

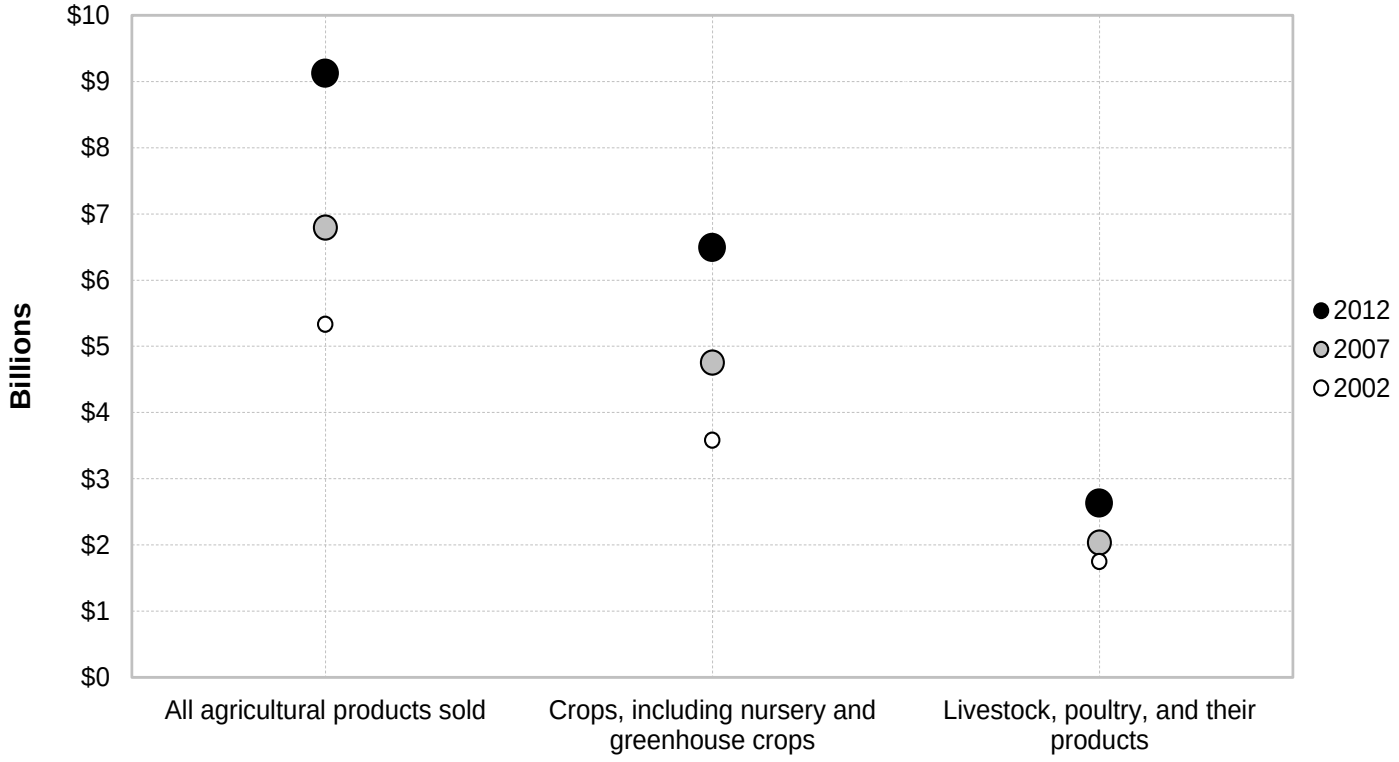



Figure 5. **Average Market Value per Farm**

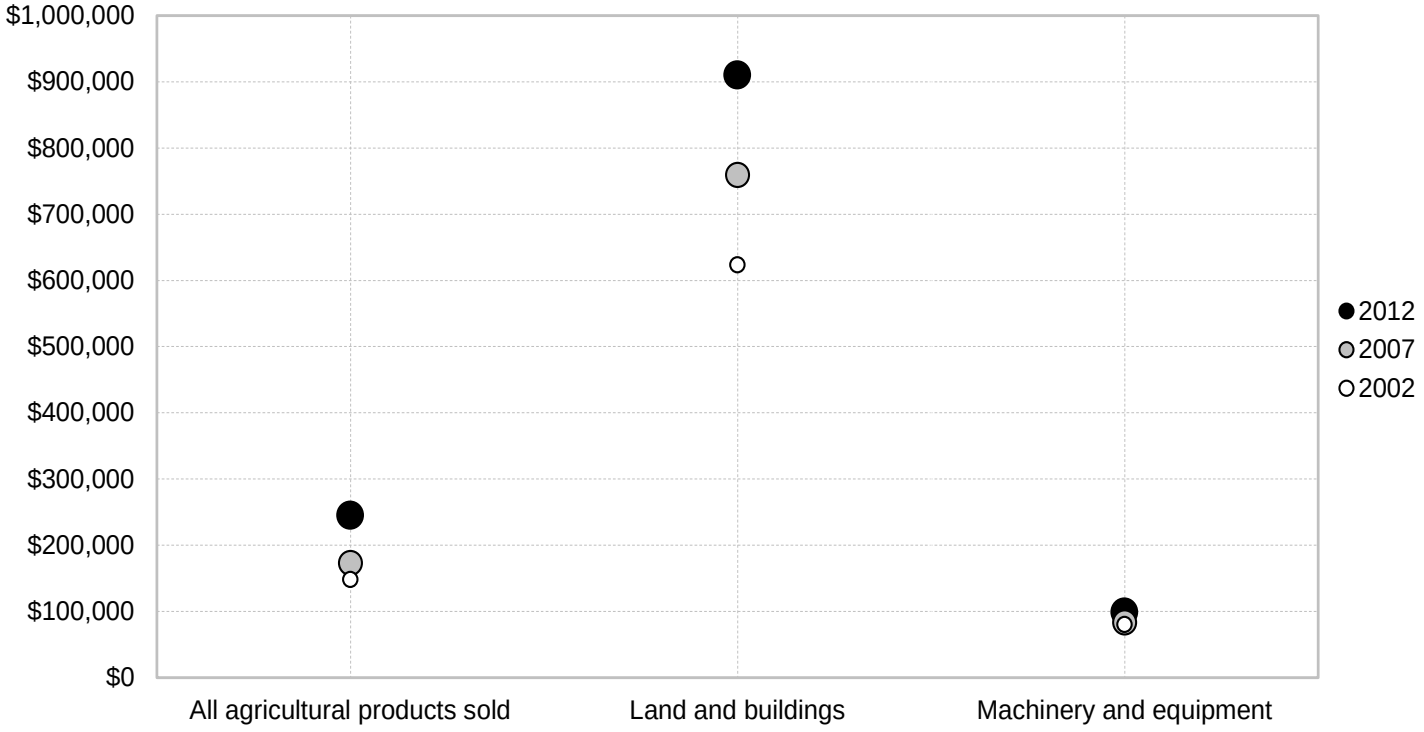


Figure 6. **Selected Farm Production Expenses**

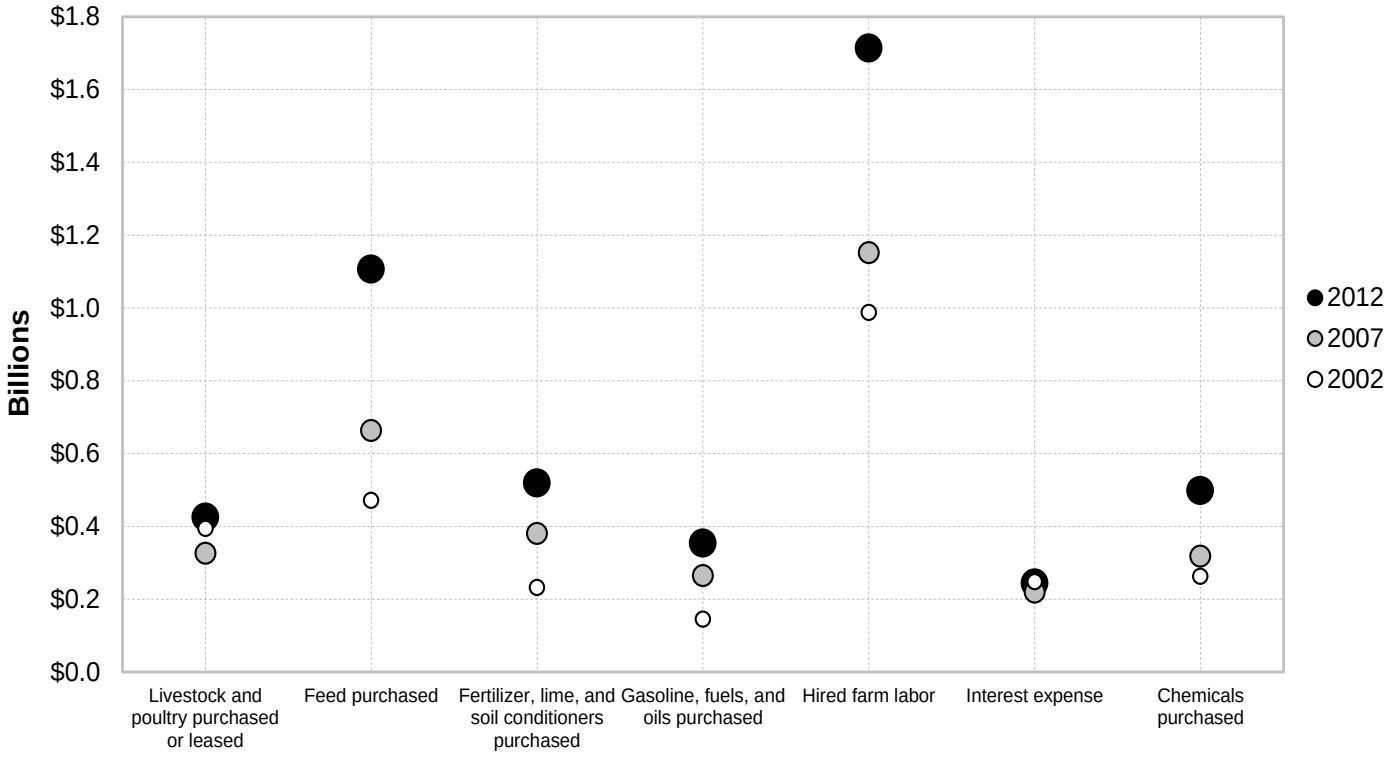



Figure 7. **Selected Farm Production Expenses - Percent of Total**

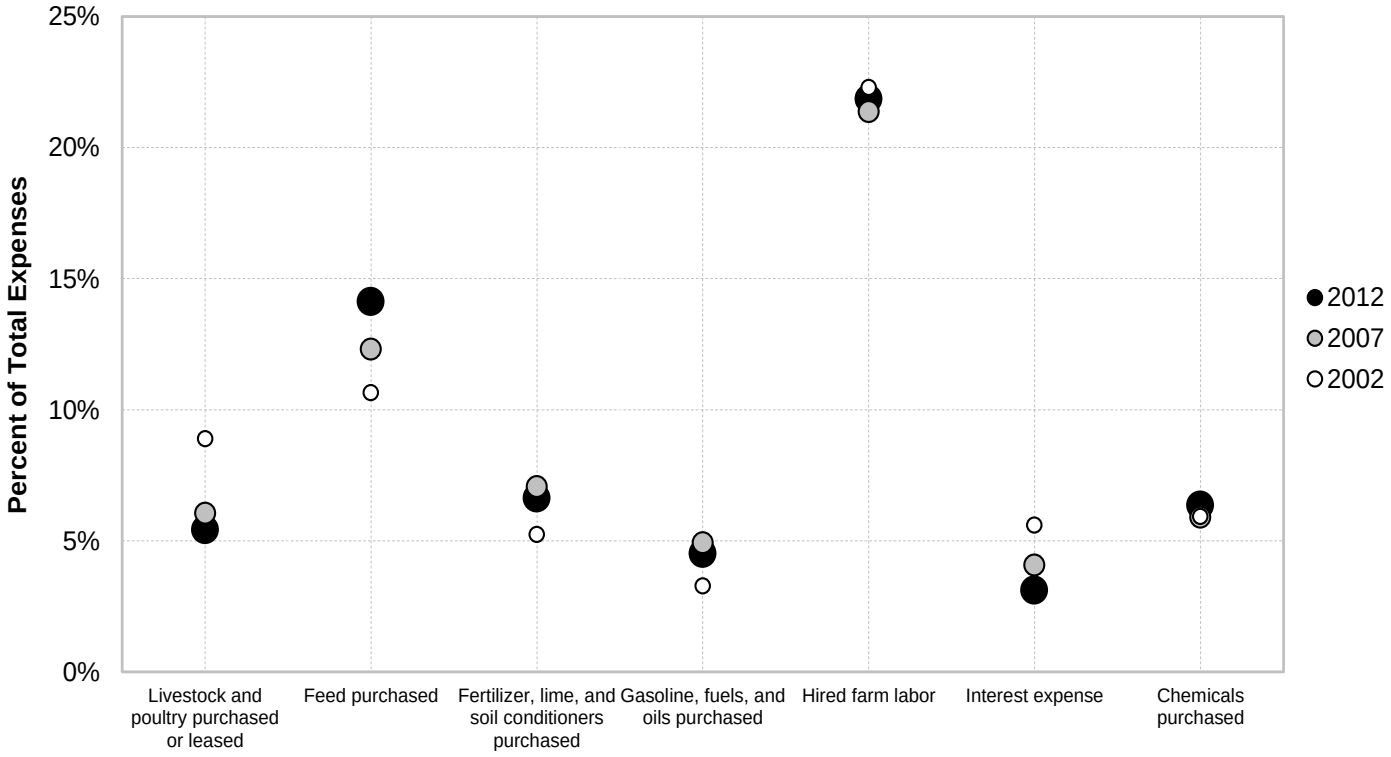


Figure 8. **Farms by Legal Status - Percent of Total**

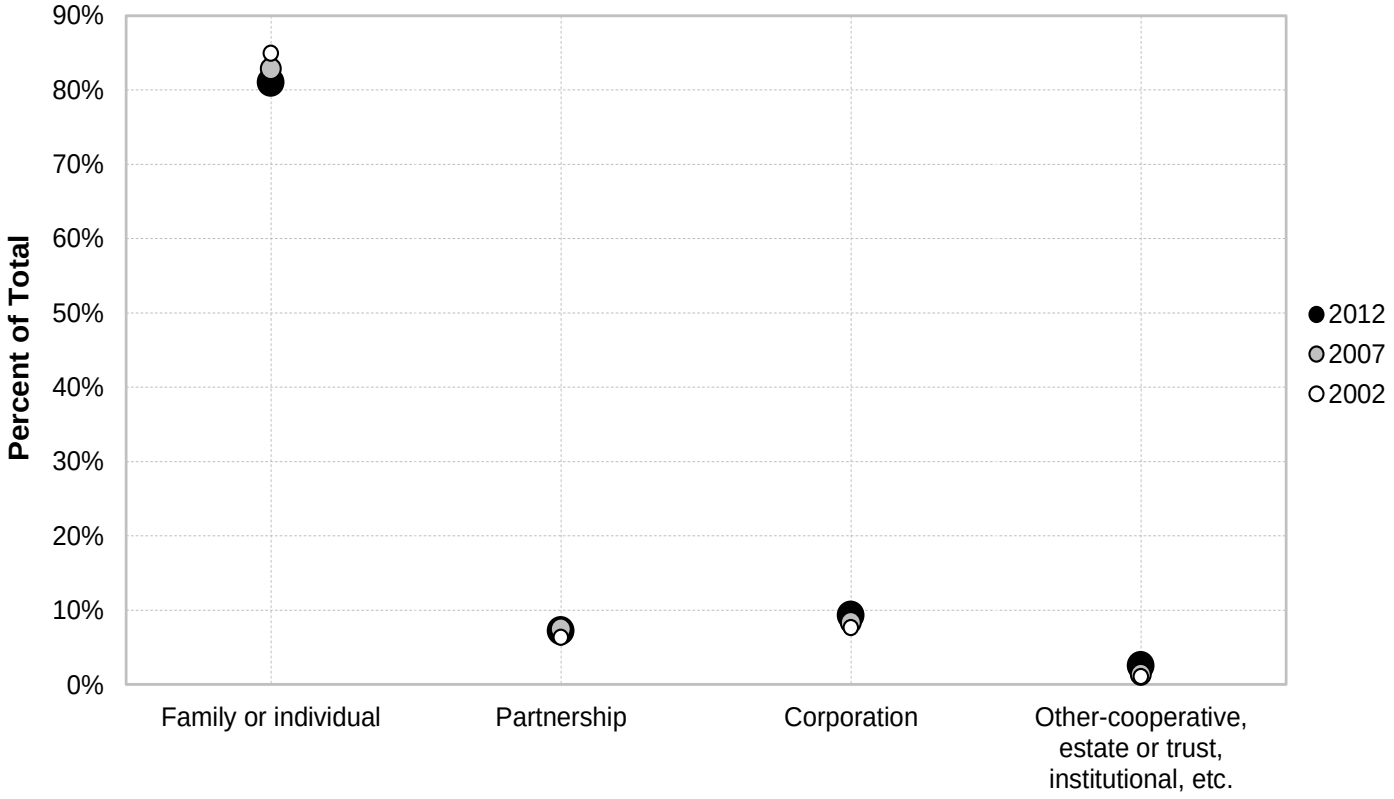
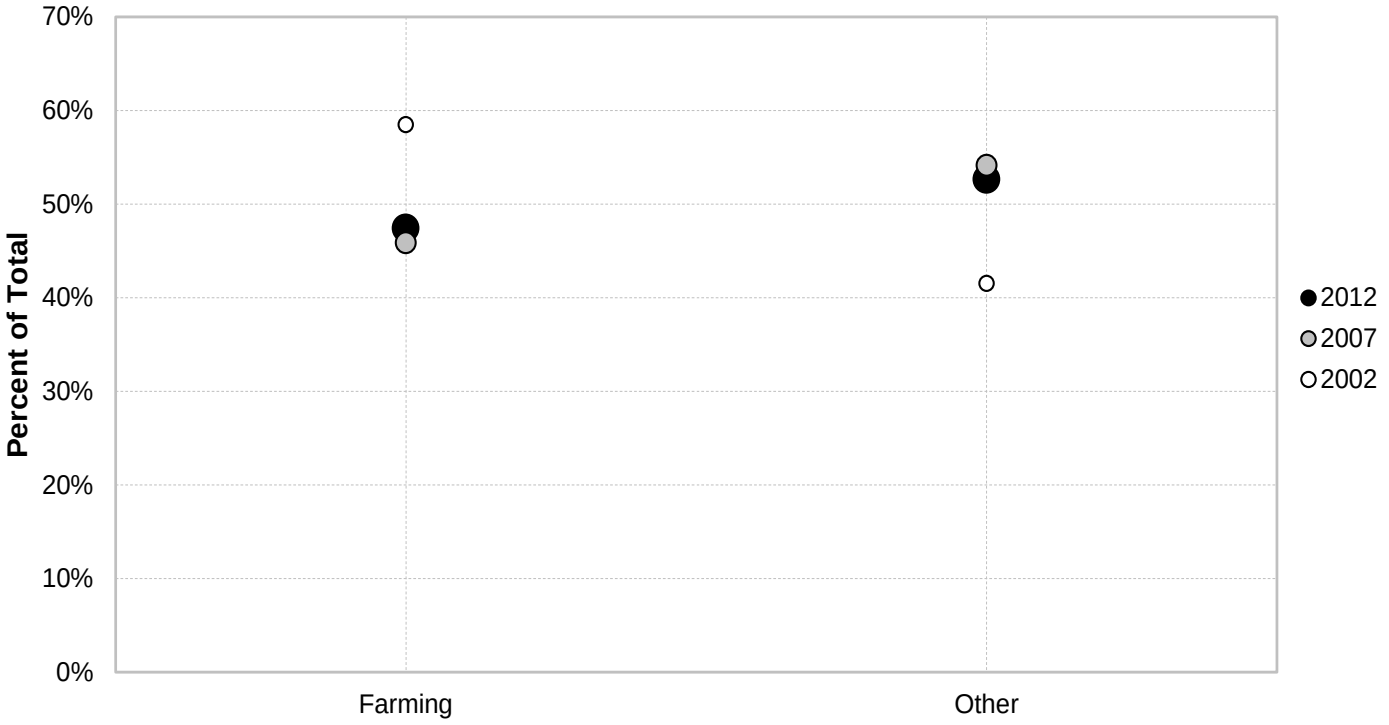



Figure 9. **Principal Operator by Primary Occupation - Percent of Total**



## Table 1. **Historical Highlights: 2012 and Earlier Census Years**

[For meaning of abbreviations and symbols, see introductory text.]

| All farms | 2012 | 2007 | 2002 | 1997 | Not adjusted for coverage | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 1997 | 1992 | 1987 | 1982 |
| Farms ..... number | 37,249 | 39,284 | 35,939 | 40,113 | 29,011 | 30,264 | 33,559 | 36,080 |
| Land in farms ..... acres | 14,748,107 | 14,972,789 | 15,318,008 | 15,778,606 | 15,179,710 | 15,726,007 | 16,115,568 | 16,469,678 |
| Average size of farm ..... acres | 396 | 381 | 426 | 393 | 523 | 520 | 480 | 456 |
| Estimated market value of land and buildings [1]: | | | | | | | | |
| Average per farm ..... dollars | 910,249 | 759,146 | 623,333 | 520,306 | 634,619 | 468,482 | 355,976 | 423,352 |
| Average per acre ..... dollars | 2,299 | 1,992 | 1,486 | 1,292 | 1,192 | 892 | 739 | 933 |
| Estimated market value of all machinery and equipment [1] ..... $1,000 | 3,672,289 | 3,278,858 | 2,690,548 | 2,325,580 | 2,021,640 | 1,843,190 | 1,537,272 | 1,652,940 |
| Average per farm ..... dollars | 98,588 | 83,468 | 80,212 | 57,987 | 69,693 | 61,053 | 45,905 | 45,947 |
| Farms by size: | | | | | | | | |
| 1 to 9 acres ..... | 10,559 | 9,211 | 7,482 | 9,208 | 5,195 | 5,408 | 6,040 | 6,425 |
| 10 to 49 acres ..... | 12,980 | 14,790 | 13,187 | 14,791 | 9,727 | 10,115 | 11,362 | 12,717 |
| 50 to 179 acres ..... | 6,537 | 7,307 | 7,223 | 7,646 | 6,250 | 6,536 | 7,216 | 7,755 |
| 180 to 499 acres ..... | 3,071 | 3,479 | 3,439 | 3,536 | 3,138 | 3,336 | 3,796 | 4,038 |
| 500 to 999 acres ..... | 1,508 | 1,731 | 1,635 | 1,770 | 1,618 | 1,699 | 1,855 | 1,927 |
| 1,000 to 1,999 acres ..... | 1,123 | 1,218 | 1,364 | 1,502 | 1,436 | 1,461 | 1,626 | 1,548 |
| 2,000 acres or more ..... | 1,471 | 1,548 | 1,609 | 1,660 | 1,647 | 1,709 | 1,664 | 1,670 |
| Total cropland ..... farms | 25,045 | 26,005 | 28,184 | 30,082 | 24,656 | 25,765 | 28,891 | 31,317 |
| acres | 7,526,742 | 7,609,210 | 8,038,469 | 8,291,529 | 7,913,709 | 7,999,419 | 8,168,454 | 8,190,984 |
| Harvested cropland ..... farms | 20,846 | 20,091 | 21,802 | 24,168 | 20,445 | 21,282 | 24,027 | 26,067 |
| acres | 4,342,904 | 4,387,169 | 4,894,634 | 5,160,717 | 4,895,633 | 4,734,673 | 4,597,476 | 5,278,772 |
| Irrigated land ..... farms | 14,736 | 15,492 | 15,534 | 16,261 | 13,131 | 14,068 | 15,437 | 16,252 |
| acres | 1,633,571 | 1,735,917 | 1,823,155 | 1,787,120 | 1,705,025 | 1,641,437 | 1,518,684 | 1,638,470 |
| Market value of agricultural products sold (see text) ..... $1,000 | 9,120,749 | 6,792,856 | 5,330,740 | 4,947,886 | 4,767,727 | 3,821,222 | 2,919,634 | 2,831,159 |
| Average per farm ..... dollars | 244,859 | 172,917 | 148,327 | 123,349 | 164,342 | 126,263 | 87,000 | 78,469 |
| Crops, including nursery and greenhouse crops ..... $1,000 | 6,492,042 | 4,754,898 | 3,582,818 | 3,403,524 | 3,251,291 | 2,451,605 | 1,688,656 | 1,714,741 |
| Livestock, poultry, and their products ..... $1,000 | 2,628,708 | 2,037,958 | 1,747,922 | 1,544,362 | 1,516,436 | 1,369,617 | 1,230,978 | 1,116,418 |
| Farms by value of sales [2]: | | | | | | | | |
| Less than $2,500 ..... | 16,900 | 18,443 | 15,005 | 16,290 | 8,698 | 8,980 | 10,599 | 12,483 |
| $2,500 to $4,999 ..... | 4,084 | 3,817 | 3,244 | 4,617 | 3,299 | 3,489 | 4,166 | 4,312 |
| $5,000 to $9,999 ..... | 3,542 | 3,717 | 3,106 | 3,674 | 2,954 | 3,078 | 3,507 | 3,631 |
| $10,000 to $24,999 ..... | 3,398 | 3,423 | 3,454 | 3,805 | 3,242 | 3,327 | 3,684 | 3,681 |
| $25,000 to $49,999 ..... | 1,843 | 2,190 | 2,378 | 2,294 | 1,972 | 2,305 | 2,668 | 2,660 |
| $50,000 to $99,999 ..... | 1,380 | 1,729 | 2,157 | 2,343 | 2,093 | 2,426 | 2,995 | 3,110 |
| $100,000 to $499,999 ..... | 3,367 | 3,529 | 4,634 | 5,145 | 4,872 | 5,243 | 4,978 | 5,358 |
| $500,000 or more ..... | 2,735 | 2,436 | 1,961 | 1,945 | 1,881 | 1,416 | 962 | 812 |
| Farms by legal status for tax purposes (see text): | | | | | | | | |
| Family or individual ..... | 30,167 | 32,547 | 30,525 | 33,711 | 23,466 | 25,126 | 28,289 | 31,107 |
| Partnership ..... | 2,685 | 2,932 | 2,280 | 2,998 | 2,548 | 2,675 | 2,850 | 2,748 |
| Corporation ..... | 3,463 | 3,266 | 2,748 | 3,112 | 2,776 | 2,271 | 2,248 | 2,043 |
| Other-cooperative, estate or trust, institutional, etc ..... | 934 | 539 | 386 | 292 | 221 | 192 | 172 | 182 |
| Principal operator by days of work off farm [3]: | | | | | | | | |
| None ..... | 14,862 | 13,701 | 16,798 | 15,210 | 12,363 | 12,848 | 13,268 | 13,062 |
| Any ..... | 22,387 | 25,583 | 19,141 | 22,908 | 15,079 | 15,691 | 18,561 | 20,757 |
| 200 days or more ..... | 14,180 | 15,396 | 12,948 | 15,894 | 9,924 | 10,441 | 12,330 | 13,943 |
| Principal operator by primary occupation: | | | | | | | | |
| Farming ..... | 17,650 | 18,021 | 21,013 | 18,649 | 15,465 | 16,491 | 17,654 | 17,968 |
| Other ..... | 19,599 | 21,263 | 14,926 | 21,464 | 13,546 | 13,773 | 15,905 | 18,112 |
| Average age of principal operator ..... years | 58.8 | 57.0 | 55.4 | 53.2 | 54.2 | 53.1 | 51.6 | 50.1 |
| Total farm production expenses [1] ..... $1,000 | 7,839,554 | 5,390,313 | 4,430,693 | 3,795,253 | 3,607,282 | 3,122,970 | 2,425,028 | (NA) |
| Selected farm production expenses [1]: | | | | | | | | |
| Livestock and poultry purchased or leased ..... $1,000 | 424,941 | 326,256 | 394,109 | 361,019 | 353,157 | 360,704 | 320,026 | 347,434 |
| Feed purchased ..... $1,000 | 1,106,416 | 663,387 | 471,553 | 506,594 | 495,975 | 445,993 | 341,396 | 348,833 |
| Fertilizer, lime, and soil conditioners purchased [4 5] ..... $1,000 | 519,041 | 380,358 | 231,964 | 242,558 | 231,396 | 185,614 | 153,949 | 174,198 |
| Gasoline, fuels, and oils purchased ..... $1,000 | 353,923 | 265,061 | 145,339 | 133,534 | 124,646 | 115,163 | 90,991 | 126,610 |
| Hired farm labor ..... $1,000 | 1,713,124 | 1,151,383 | 987,399 | 810,500 | 771,003 | 601,614 | 420,768 | 313,100 |
| Interest expense [6] ..... $1,000 | 244,078 | 219,629 | 248,172 | 228,197 | 214,518 | 191,779 | 176,125 | 241,997 |
| Chemicals purchased [4] ..... $1,000 | 498,212 | 317,784 | 262,331 | 219,606 | 208,739 | 170,128 | 132,723 | 102,290 |
| Livestock and poultry: | | | | | | | | |
| Cattle and calves inventory ..... farms | 11,861 | 12,731 | 12,215 | 17,381 | 11,721 | 13,484 | 15,434 | 20,147 |
| number | 1,162,792 | 1,088,846 | 1,100,181 | 1,211,350 | 1,204,265 | 1,270,275 | 1,304,673 | 1,321,820 |
| Beef cows ..... farms | 9,285 | 10,065 | 9,128 | 11,735 | 8,627 | 9,555 | 10,799 | 14,018 |
| number | 211,852 | 274,001 | 248,664 | 301,814 | 304,473 | 310,554 | 334,966 | 339,997 |
| Milk cows ..... farms | 798 | 817 | 1,208 | 1,590 | 1,302 | 1,842 | 2,410 | 3,608 |
| number | 266,989 | 243,132 | 246,753 | 247,437 | 247,191 | 242,787 | 220,849 | 210,254 |
| Cattle and calves sold ..... farms | 8,420 | 9,521 | 8,979 | 14,401 | 10,857 | 12,259 | 14,371 | 17,675 |
| number | 877,290 | 912,299 | 1,081,584 | 1,109,756 | 1,086,270 | 1,014,365 | 1,089,642 | 1,127,460 |
| Hogs and pigs inventory ..... farms | 934 | 1,463 | 961 | 1,219 | 978 | 1,407 | 1,525 | 2,460 |
| number | 19,861 | 28,545 | 30,289 | 40,152 | 38,030 | 56,171 | 59,195 | 73,836 |
| Hogs and pigs sold ..... farms | 1,303 | 1,596 | 1,067 | 1,092 | 818 | 1,150 | 1,355 | 1,934 |
| number | 27,141 | 58,917 | 80,159 | 76,981 | 72,045 | 93,660 | 104,934 | 116,934 |

See footnote(s) at end of table.

--continued

## Table 1. **Historical Highlights: 2012 and Earlier Census Years** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| All farms | 2012 | 2007 | 2002 | 1997 | Not adjusted for coverage | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 1997 | 1992 | 1987 | 1982 |
| Livestock and poultry: - Con. | | | | | | | | |
| Layers inventory (see text) ..... farms | 6,276 | 4,878 | 2,533 | (NA) | (NA) | (NA) | (NA) | (NA) |
| number | 7,236,128 | 5,785,648 | 5,008,881 | (NA) | (NA) | (NA) | (NA) | (NA) |
| Broilers and other meat-type chickens sold ..... farms | 527 | 307 | 327 | 222 | 162 | 164 | 245 | 351 |
| number | 28,252,490 | 31,669,170 | 33,017,116 | 30,327,052 | 30,183,641 | 33,720,007 | 36,068,869 | 16,903,405 |
| Selected crops harvested: | | | | | | | | |
| Corn for grain ..... farms | 575 | 550 | 382 | 560 | 514 | (NA) | (NA) | (NA) |
| acres | 114,516 | 118,665 | 73,703 | 87,564 | 84,300 | (NA) | (NA) | (NA) |
| bushels | 23,824,561 | 24,553,928 | 14,155,973 | 16,725,028 | 16,163,861 | (NA) | (NA) | (NA) |
| Corn for silage or greenchop ..... farms | 529 | 537 | 596 | 667 | 633 | (NA) | (NA) | (NA) |
| acres | 93,239 | 83,353 | 63,303 | 54,424 | 53,417 | (NA) | (NA) | (NA) |
| tons | 2,320,924 | 2,129,010 | 1,633,993 | 1,366,377 | 1,340,460 | (NA) | (NA) | (NA) |
| Wheat for grain, all ..... farms | 2,871 | 2,612 | 3,414 | 4,416 | 4,097 | 5,032 | 5,562 | 6,232 |
| acres | 2,186,813 | 2,096,350 | 2,355,451 | 2,584,849 | 2,422,506 | 2,495,940 | 2,160,641 | 2,716,305 |
| bushels | 141,020,565 | 120,617,390 | 128,410,931 | 160,547,364 | 151,124,143 | 120,833,207 | 114,781,997 | 128,069,408 |
| Winter wheat for grain ..... farms | 2,415 | 2,303 | 3,002 | (NA) | (NA) | (NA) | (NA) | (NA) |
| acres | 1,669,175 | 1,652,961 | 1,802,614 | (NA) | (NA) | (NA) | (NA) | (NA) |
| bushels | 112,180,184 | 100,463,766 | 104,532,829 | (NA) | (NA) | (NA) | (NA) | (NA) |
| Durum wheat for grain ..... farms | 3 | 9 | 21 | (NA) | (NA) | (NA) | (NA) | (NA) |
| acres | 3,264 | 1,793 | 5,930 | (NA) | (NA) | (NA) | (NA) | (NA) |
| bushels | (D) | 138,646 | 306,205 | (NA) | (NA) | (NA) | (NA) | (NA) |
| Spring wheat for grain ..... farms | 1,408 | 1,232 | 1,792 | 1,856 | 1,723 | (NA) | (NA) | (NA) |
| acres | 514,374 | 441,596 | 546,907 | 416,332 | 379,142 | (NA) | (NA) | (NA) |
| bushels | (D) | 20,014,978 | 23,571,897 | 22,988,799 | 20,973,057 | (NA) | (NA) | (NA) |
| Oats for grain ..... farms | 139 | 138 | 251 | 307 | 286 | (NA) | (NA) | (NA) |
| acres | 6,129 | 8,956 | 12,097 | 12,947 | 13,081 | (NA) | (NA) | (NA) |
| bushels | 466,810 | 426,027 | 769,381 | 1,006,880 | 1,032,614 | (NA) | (NA) | (NA) |
| Barley for grain ..... farms | 817 | 843 | 1,254 | 1,877 | 1,787 | 2,428 | 3,722 | 4,176 |
| acres | 175,074 | 223,598 | 337,483 | 447,039 | 436,299 | 422,447 | 609,133 | 751,963 |
| bushels | 12,073,493 | 13,928,713 | 18,934,918 | 31,800,594 | 30,939,269 | 19,565,135 | 31,889,132 | 43,923,993 |
| Sorghum for grain ..... farms | 2 | - | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| acres | (D) | - | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| bushels | (D) | - | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| Sorghum for silage or greenchop ..... farms | - | 1 | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| acres | - | (D) | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| tons | - | (D) | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| Soybeans for beans ..... farms | 2 | 8 | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| acres | (D) | 725 | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| bushels | (D) | 27,781 | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| Dry edible beans, excluding limas ..... farms | 420 | 269 | 343 | 347 | 315 | (NA) | (NA) | (NA) |
| acres | 114,506 | 61,055 | 49,429 | 39,891 | 37,155 | (NA) | (NA) | (NA) |
| cwt | 2,275,125 | 1,049,750 | 936,604 | 873,366 | 819,343 | (NA) | (NA) | (NA) |
| Forage-land used for all hay and haylage, grass silage, and greenchop (see text) ..... farms | 10,396 | 10,243 | 10,473 | (NA) | (NA) | (NA) | (NA) | (NA) |
| acres | 748,909 | 846,140 | 914,054 | (NA) | (NA) | (NA) | (NA) | (NA) |
| tons, dry | 2,873,198 | 3,595,392 | 3,783,219 | (NA) | (NA) | (NA) | (NA) | (NA) |
| Sunflower seed, all ..... farms | 15 | 4 | - | 17 | 13 | (NA) | (NA) | (NA) |
| acres | 1,603 | (D) | - | (D) | 758 | (NA) | (NA) | (NA) |
| pounds | 2,144,124 | 61,858 | - | (D) | 853,708 | (NA) | (NA) | (NA) |
| Sugarbeets for sugar ..... farms | 4 | 3 | 7 | (NA) | (NA) | (NA) | (NA) | (NA) |
| acres | (D) | 2,076 | 3,711 | (NA) | (NA) | (NA) | (NA) | (NA) |
| tons | (D) | 80,206 | 130,149 | (NA) | (NA) | (NA) | (NA) | (NA) |
| Vegetables harvested for sale (see text) [7] ..... farms | 2,836 | 2,026 | 1,804 | 1,882 | 1,506 | 1,605 | 1,724 | 2,031 |
| acres | 351,639 | 343,787 | 215,135 | 226,745 | 209,456 | 172,057 | 144,097 | 169,170 |
| Potatoes ..... farms | 1,205 | 618 | 408 | 458 | 415 | 431 | 486 | 533 |
| acres | 163,925 | 157,499 | 159,317 | 156,776 | 155,074 | 129,110 | 110,157 | 104,738 |
| Sweet potatoes ..... farms | - | 3 | 1 | (NA) | (NA) | (NA) | (NA) | (NA) |
| acres | - | (Z) | (D) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Land in orchards ..... farms | 4,846 | 5,470 | 6,108 | 6,781 | 5,700 | 6,220 | 6,839 | 6,946 |
| acres | 315,456 | 299,174 | 311,194 | 318,256 | 301,376 | 256,282 | 241,423 | 215,585 |

[1] Data for 2002 and prior years are based on a sample of farms.
[2] Data for 1982 exclude abnormal farms.
[3] Data for 1997 and prior years do not include imputation for item nonresponse.
[4] Data for 1982 exclude cost of custom applications.
[5] Data for 1997 and prior years exclude cost of lime and manure.
[6] Data for 1982 do not include imputation for item nonresponse.
[7] Data for 2002 and prior years exclude potatoes, sweet potatoes, and ginseng.

# Table 1. **County Summary Highlights: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Farms ..... number | 37,249 | 713 | 185 | 1,509 | 890 | 536 | 1,929 | 308 |
| Land in farms ..... acres | 14,748,107 | 1,036,975 | 263,166 | 703,505 | 75,820 | 23,640 | 74,758 | 297,412 |
| Average size of farm ..... acres | 396 | 1,454 | 1,423 | 466 | 85 | 44 | 39 | 966 |
| Median size of farm ..... acres | 24 | 421 | 151 | 10 | 20 | 12 | 10 | 211 |
| Estimated market value of land and buildings: | | | | | | | | |
| Average per farm ..... dollars | 910,249 | 1,790,387 | 1,210,467 | 1,276,306 | 746,305 | 549,722 | 490,328 | 1,038,700 |
| Average per acre ..... dollars | 2,299 | 1,231 | 851 | 2,738 | 8,760 | 12,464 | 12,652 | 1,076 |
| Estimated market value of all machinery and equipment ..... $1,000 | 3,672,289 | 180,195 | 19,121 | 193,101 | 57,357 | 19,313 | 74,842 | 54,792 |
| Average per farm ..... dollars | 98,588 | 252,727 | 103,356 | 127,966 | 64,446 | 36,032 | 38,798 | 177,896 |
| Farms by size: | | | | | | | | |
| 1 to 9 acres ..... | 10,559 | 48 | 38 | 686 | 292 | 220 | 851 | 19 |
| 10 to 49 acres ..... | 12,980 | 79 | 27 | 461 | 351 | 207 | 814 | 52 |
| 50 to 179 acres ..... | 6,537 | 133 | 31 | 161 | 175 | 71 | 195 | 71 |
| 180 to 499 acres ..... | 3,071 | 121 | 15 | 84 | 46 | 35 | 59 | 50 |
| 500 to 999 acres ..... | 1,508 | 106 | 19 | 29 | 14 | 2 | 6 | 50 |
| 1,000 acres or more ..... | 2,594 | 226 | 55 | 88 | 12 | 1 | 4 | 66 |
| Total cropland ..... farms | 25,045 | 621 | 119 | 813 | 776 | 306 | 1,101 | 260 |
| acres | 7,526,742 | 815,010 | 84,330 | 519,123 | 31,537 | 8,124 | 28,986 | 184,477 |
| Harvested cropland ..... farms | 20,846 | 370 | 74 | 675 | 734 | 278 | 1,022 | 147 |
| acres | 4,342,904 | 364,428 | 35,811 | 296,362 | 23,458 | 6,513 | 24,099 | 98,182 |
| Irrigated land ..... farms | 14,736 | 261 | 29 | 1,177 | 783 | 210 | 438 | 65 |
| acres | 1,633,571 | 127,046 | 482 | 197,305 | 22,778 | 4,164 | 3,721 | 4,083 |
| Market value of agricultural products sold (see text) ..... $1,000 | 9,120,749 | 430,155 | 20,508 | 923,163 | 206,479 | 10,648 | 50,861 | 57,732 |
| Average per farm ..... dollars | 244,859 | 603,302 | 110,857 | 611,772 | 231,999 | 19,865 | 26,367 | 187,443 |
| Crops, including nursery and greenhouse crops ..... $1,000 | 6,492,042 | 339,990 | 16,376 | (D) | 202,854 | 4,136 | 18,856 | 53,936 |
| Livestock, poultry, and their products ..... $1,000 | 2,628,708 | 90,164 | 4,133 | (D) | 3,625 | 6,511 | 32,005 | 3,797 |
| Farms by value of sales: | | | | | | | | |
| Less than $2,500 ..... | 16,900 | 314 | 86 | 640 | 180 | 306 | 1,091 | 150 |
| $2,500 to $4,999 ..... | 4,084 | 19 | 16 | 197 | 74 | 79 | 306 | 17 |
| $5,000 to $9,999 ..... | 3,542 | 20 | 8 | 152 | 52 | 62 | 216 | 20 |
| $10,000 to $24,999 ..... | 3,398 | 28 | 12 | 161 | 133 | 42 | 167 | 17 |
| $25,000 to $49,999 ..... | 1,843 | 20 | 9 | 73 | 75 | 20 | 62 | 19 |
| $50,000 to $99,999 ..... | 1,380 | 31 | 7 | 60 | 76 | 6 | 37 | 11 |
| $100,000 or more ..... | 6,102 | 281 | 47 | 226 | 300 | 21 | 50 | 74 |
| Government payments ..... farms | 7,235 | 486 | 91 | 164 | 62 | 12 | 46 | 226 |
| $1,000 | 159,269 | 15,567 | 2,504 | 6,225 | 658 | 47 | 293 | 5,273 |
| Total income from farm-related sources, gross before taxes and expenses (see text) ..... farms | 12,086 | 396 | 67 | 336 | 336 | 125 | 384 | 135 |
| $1,000 | 311,995 | 23,802 | 759 | 14,776 | 7,315 | 2,622 | 5,980 | 3,160 |
| Total farm production expenses ..... $1,000 | 7,839,554 | 338,575 | 18,915 | 784,532 | 183,961 | 16,534 | 54,736 | 37,522 |
| Average per farm ..... dollars | 210,463 | 474,860 | 102,243 | 519,902 | 206,697 | 30,846 | 28,375 | 121,825 |
| Net cash farm income of operation (see text) ..... farms | 37,249 | 713 | 185 | 1,509 | 890 | 536 | 1,929 | 308 |
| $1,000 | 1,752,459 | 130,948 | 4,857 | 159,631 | 30,492 | -3,218 | 2,398 | 28,644 |
| Average per farm ..... dollars | 47,047 | 183,658 | 26,252 | 105,786 | 34,260 | -6,003 | 1,243 | 92,999 |
| Principal operator by primary occupation: | | | | | | | | |
| Farming ..... number | 17,650 | 391 | 112 | 676 | 496 | 246 | 682 | 131 |
| Other ..... number | 19,599 | 322 | 73 | 833 | 394 | 290 | 1,247 | 177 |
| Principal operator by days worked off farm: | | | | | | | | |
| Any ..... number | 22,387 | 396 | 109 | 948 | 525 | 308 | 1,261 | 147 |
| 200 days or more ..... number | 14,180 | 268 | 67 | 710 | 326 | 181 | 847 | 105 |
| Livestock and poultry: | | | | | | | | |
| Cattle and calves inventory ..... farms | 11,861 | 131 | 78 | 573 | 51 | 207 | 733 | 71 |
| number | 1,162,792 | 46,445 | 10,348 | 86,294 | 586 | 5,063 | 16,169 | 5,896 |
| Beef cows ..... farms | 9,285 | 114 | 56 | 464 | 26 | 170 | 592 | 61 |
| number | 211,852 | 11,341 | 3,960 | 5,779 | (D) | (D) | 4,698 | (D) |
| Milk cows ..... farms | 798 | 7 | 3 | 23 | 1 | 9 | 45 | 2 |
| number | 266,989 | 6,972 | 3 | (D) | (D) | (D) | 3,574 | (D) |
| Cattle and calves sold ..... farms | 8,420 | 104 | 58 | 421 | 45 | 119 | 476 | 64 |
| number | 877,290 | 29,482 | 3,939 | (D) | 329 | 1,784 | 8,184 | 2,909 |
| Hogs and pigs inventory ..... farms | 934 | 5 | 10 | 39 | 9 | 19 | 36 | 5 |
| number | 19,861 | (D) | 107 | (D) | 55 | 318 | 636 | 10 |
| Hogs and pigs sold ..... farms | 1,303 | 5 | 7 | 39 | 21 | 27 | 68 | 9 |
| number | 27,141 | (D) | 51 | 1,929 | 144 | 396 | 777 | 44 |
| Sheep and lambs inventory ..... farms | 1,967 | 15 | 7 | 72 | 23 | 53 | 106 | 4 |
| number | 44,863 | 1,078 | (D) | 1,371 | 322 | 882 | 1,158 | 212 |
| Layers inventory (see text) ..... farms | 6,276 | 37 | 25 | 168 | 73 | 123 | 457 | 18 |
| number | 7,236,128 | (D) | 293 | 4,530 | 1,458 | 3,311 | 13,548 | 230 |
| Broilers and other meat-type chickens sold ..... farms | 527 | - | - | 3 | 5 | 4 | 42 | - |
| number | 28,252,490 | - | - | (D) | 27 | (D) | 2,546,036 | - |
| Selected crops harvested: | | | | | | | | |
| Corn for grain ..... farms | 575 | 65 | - | 9 | 3 | - | 5 | 2 |
| acres | 114,516 | 13,646 | - | 14,038 | 8 | - | (D) | (D) |
| bushels | 23,824,561 | 2,282,753 | - | 3,571,120 | 1,232 | - | (D) | (D) |
| Corn for silage or greenchop ..... farms | 529 | 13 | - | 13 | - | 1 | 10 | - |
| acres | 93,239 | 2,216 | - | 1,361 | - | (D) | 2,181 | - |
| tons | 2,320,924 | 34,793 | - | 37,649 | - | (D) | 35,590 | - |
| Wheat for grain, all ..... farms | 2,871 | 224 | 38 | 48 | 6 | 2 | 10 | 94 |
| acres | 2,186,813 | 276,807 | 27,172 | 119,533 | 1,104 | (D) | 570 | 74,251 |
| bushels | 141,020,565 | 15,969,949 | 1,628,205 | 6,867,150 | 21,069 | (D) | 31,817 | 5,861,603 |
| Winter wheat for grain ..... farms | 2,415 | 204 | 38 | 46 | 2 | 2 | 6 | 88 |
| acres | 1,669,175 | 258,623 | 22,469 | 96,099 | (D) | (D) | 468 | 55,052 |
| bushels | 112,180,184 | 14,824,688 | 1,428,433 | 5,774,072 | (D) | (D) | 25,838 | 4,727,810 |
| Spring wheat for grain ..... farms | 1,408 | 71 | 18 | 19 | 5 | 2 | 4 | 41 |
| acres | 514,374 | 18,184 | 4,703 | 23,434 | (D) | (D) | 102 | (D) |
| bushels | (D) | 1,145,261 | 199,772 | 1,093,078 | (D) | (D) | 5,979 | (D) |

--continued

Table 1. **County Summary Highlights: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| Farms ....number | 492 | 849 | 255 | 883 | 211 | 1,552 | 557 | 377 |
| Land in farms ....acres | 39,009 | 814,109 | 792,250 | 625,047 | 308,486 | 963,784 | 119,440 | 15,249 |
| Average size of farm ....acres | 79 | 959 | 3,107 | 708 | 1,462 | 621 | 214 | 40 |
| Median size of farm ....acres | 15 | 83 | 103 | 155 | 500 | 134 | 31 | 16 |
| Estimated market value of land and buildings: | | | | | | | | |
| Average per farm ....dollars | 689,236 | 976,847 | 1,320,859 | 2,071,814 | 1,384,442 | 2,128,600 | 450,821 | 575,839 |
| Average per acre ....dollars | 8,693 | 1,019 | 425 | 2,927 | 947 | 3,428 | 2,102 | 14,236 |
| Estimated market value of all machinery and equipment ....$1,000 | 33,227 | 110,864 | 14,147 | 266,947 | 32,299 | 451,764 | 37,082 | 15,499 |
| Average per farm ....dollars | 67,534 | 130,582 | 55,478 | 302,318 | 153,078 | 291,085 | 66,574 | 41,111 |
| Farms by size: | | | | | | | | |
| 1 to 9 acres .... | 166 | 142 | 17 | 210 | 12 | 189 | 132 | 122 |
| 10 to 49 acres .... | 190 | 223 | 54 | 121 | 21 | 295 | 224 | 182 |
| 50 to 179 acres .... | 81 | 167 | 94 | 137 | 41 | 405 | 136 | 56 |
| 180 to 499 acres .... | 41 | 97 | 49 | 175 | 29 | 261 | 39 | 14 |
| 500 to 999 acres .... | 3 | 39 | 13 | 111 | 35 | 176 | 16 | 3 |
| 1,000 acres or more .... | 11 | 181 | 28 | 129 | 73 | 226 | 10 | - |
| Total cropland ....farms | 243 | 768 | 170 | 715 | 188 | 1,272 | 329 | 231 |
| acres | 18,633 | 545,449 | 19,413 | 452,174 | 187,523 | 720,023 | 22,786 | 7,422 |
| Harvested cropland ....farms | 221 | 545 | 145 | 563 | 113 | 1,047 | 293 | 219 |
| acres | 17,462 | 191,252 | 8,895 | 261,364 | 90,550 | 525,432 | 20,461 | 6,454 |
| Irrigated land ....farms | 99 | 408 | 76 | 637 | 21 | 1,172 | 120 | 99 |
| acres | 7,556 | 18,311 | 2,823 | 207,151 | 795 | 428,200 | 8,635 | 1,586 |
| Market value of agricultural products sold (see text) ....$1,000 | 28,773 | 199,041 | 5,331 | 740,014 | 48,208 | 1,762,295 | 31,353 | 11,467 |
| Average per farm ....dollars | 58,481 | 234,442 | 20,905 | 838,068 | 228,475 | 1,135,499 | 56,289 | 30,416 |
| Crops, including nursery and greenhouse crops ....$1,000 | (D) | 195,912 | 2,880 | 503,196 | 44,328 | 1,333,149 | 16,697 | 3,281 |
| Livestock, poultry, and their products ....$1,000 | (D) | 3,129 | 2,451 | 236,818 | 3,880 | 429,145 | 14,656 | 8,185 |
| Farms by value of sales: | | | | | | | | |
| Less than $2,500 .... | 286 | 309 | 117 | 258 | 90 | 425 | 295 | 201 |
| $2,500 to $4,999 .... | 55 | 46 | 32 | 30 | 5 | 82 | 73 | 45 |
| $5,000 to $9,999 .... | 55 | 25 | 34 | 60 | 9 | 68 | 63 | 40 |
| $10,000 to $24,999 .... | 36 | 45 | 37 | 41 | 12 | 91 | 57 | 57 |
| $25,000 to $49,999 .... | 19 | 70 | 14 | 48 | 11 | 79 | 16 | 15 |
| $50,000 to $99,999 .... | 7 | 51 | 2 | 38 | 6 | 76 | 15 | 6 |
| $100,000 or more .... | 34 | 303 | 19 | 408 | 78 | 731 | 38 | 13 |
| Government payments ....farms | 8 | 412 | 34 | 342 | 170 | 598 | 30 | 16 |
| $1,000 | 44 | 12,940 | 159 | 8,142 | 4,878 | 11,429 | 186 | 56 |
| Total income from farm-related sources, gross before taxes and expenses (see text) ....farms | 113 | 388 | 72 | 389 | 123 | 702 | 135 | 139 |
| $1,000 | 659 | 6,937 | 959 | 31,079 | 3,490 | 40,048 | 3,309 | 1,008 |
| Total farm production expenses ....$1,000 | 31,573 | 181,943 | 5,897 | 657,161 | 38,879 | 1,546,504 | 33,561 | 13,813 |
| Average per farm ....dollars | 64,173 | 214,303 | 23,124 | 744,237 | 184,261 | 996,459 | 60,253 | 36,638 |
| Net cash farm income of operation (see text) ....farms | 492 | 849 | 255 | 883 | 211 | 1,552 | 557 | 377 |
| $1,000 | -2,098 | 36,975 | 553 | 122,074 | 17,698 | 267,268 | 1,287 | -1,282 |
| Average per farm ....dollars | -4,264 | 43,551 | 2,167 | 138,249 | 83,875 | 172,209 | 2,311 | -3,401 |
| Principal operator by primary occupation: | | | | | | | | |
| Farming ....number | 230 | 475 | 133 | 554 | 120 | 1,034 | 249 | 176 |
| Other ....number | 262 | 374 | 122 | 329 | 91 | 518 | 308 | 201 |
| Principal operator by days worked off farm: | | | | | | | | |
| Any ....number | 253 | 482 | 144 | 467 | 89 | 723 | 335 | 226 |
| 200 days or more ....number | 166 | 329 | 85 | 259 | 49 | 518 | 216 | 124 |
| Livestock and poultry: | | | | | | | | |
| Cattle and calves inventory ....farms | 211 | 79 | 104 | 193 | 60 | 375 | 243 | 130 |
| number | 3,651 | 7,496 | 4,344 | 93,038 | 8,050 | 159,552 | 5,958 | 6,032 |
| Beef cows ....farms | 170 | 62 | 94 | 131 | 59 | 276 | 211 | 110 |
| number | (D) | (D) | (D) | 9,494 | (D) | 13,697 | 2,087 | (D) |
| Milk cows ....farms | 2 | 2 | 1 | 16 | - | 26 | 13 | 5 |
| number | (D) | (D) | (D) | 24,504 | - | 28,103 | 1,182 | (D) |
| Cattle and calves sold ....farms | 134 | 62 | 75 | 158 | 49 | 280 | 162 | 83 |
| number | 1,384 | 3,835 | 2,143 | 65,610 | 4,077 | 194,896 | 2,212 | 2,778 |
| Hogs and pigs inventory ....farms | 10 | 5 | 6 | 17 | 1 | 27 | 19 | 8 |
| number | 51 | 10 | 26 | 151 | (D) | 120 | 250 | 92 |
| Hogs and pigs sold ....farms | 14 | 14 | 9 | 21 | - | 32 | 29 | 21 |
| number | 94 | 72 | 312 | 506 | - | 224 | 396 | 121 |
| Sheep and lambs inventory ....farms | 23 | 9 | 27 | 11 | 6 | 49 | 18 | 38 |
| number | 518 | 82 | 320 | 306 | 1,014 | 880 | 136 | 655 |
| Layers inventory (see text) ....farms | 95 | 31 | 58 | 58 | 11 | 101 | 123 | 95 |
| number | 1,924 | 421 | 1,050 | (D) | 721 | (D) | 2,013 | 2,822 |
| Broilers and other meat-type chickens sold ....farms | 6 | - | 8 | 3 | - | 7 | 10 | 10 |
| number | 1,782,920 | - | 373 | 86 | - | 128 | 959 | 431 |
| Selected crops harvested: | | | | | | | | |
| Corn for grain ....farms | - | 3 | 1 | 131 | - | 212 | - | 2 |
| acres | - | 275 | (D) | 20,400 | - | 46,337 | - | (D) |
| bushels | - | 42,078 | (D) | 4,592,711 | - | 9,516,688 | - | (D) |
| Corn for silage or greenchop ....farms | 8 | 1 | - | 32 | - | 49 | 8 | 3 |
| acres | 601 | (D) | - | 9,020 | - | 13,130 | 730 | 408 |
| tons | 13,840 | (D) | - | 228,568 | - | 357,943 | 18,230 | (D) |
| Wheat for grain, all ....farms | 15 | 159 | 8 | 161 | 94 | 281 | 13 | 1 |
| acres | 1,248 | 163,595 | 502 | 73,387 | 82,649 | 150,364 | 2,281 | (D) |
| bushels | 105,716 | 7,043,342 | 24,903 | 4,548,014 | 5,320,258 | 10,736,634 | 217,627 | (D) |
| Winter wheat for grain ....farms | - | 148 | 1 | 121 | 90 | 186 | 13 | 1 |
| acres | - | 149,939 | (D) | 61,713 | 54,730 | 110,323 | (D) | (D) |
| bushels | - | 6,503,843 | (D) | 3,601,962 | 3,943,017 | 7,329,724 | (D) | (D) |
| Spring wheat for grain ....farms | 15 | 42 | 7 | 62 | 61 | 141 | 1 | - |
| acres | 1,248 | 13,656 | (D) | 11,674 | 27,919 | (D) | (D) | - |
| bushels | 105,716 | 539,499 | (D) | 946,052 | 1,377,241 | (D) | (D) | - |

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Table 1. **County Summary Highlights: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Farms ..... number | 221 | 1,837 | 706 | 1,006 | 760 | 1,647 | 897 | 377 |
| Land in farms ..... acres | 15,556 | 46,717 | 10,070 | 183,124 | 551,097 | 132,839 | 1,114,940 | 23,743 |
| Average size of farm ..... acres | 70 | 25 | 14 | 182 | 725 | 81 | 1,243 | 63 |
| Median size of farm ..... acres | 33 | 8 | 6 | 25 | 72 | 30 | 464 | 10 |
| Estimated market value of land and buildings: | | | | | | | | |
| Average per farm ..... dollars | 643,060 | 545,036 | 377,215 | 804,841 | 1,033,423 | 507,676 | 1,383,491 | 522,431 |
| Average per acre ..... dollars | 9,136 | 21,432 | 26,446 | 4,421 | 1,425 | 6,294 | 1,113 | 8,295 |
| Estimated market value of all machinery and equipment ..... $1,000 | 8,155 | 71,692 | 19,069 | 78,059 | 63,535 | 79,917 | 156,074 | 15,416 |
| Average per farm ..... dollars | 36,901 | 39,027 | 27,010 | 77,593 | 83,599 | 48,523 | 173,996 | 40,892 |
| Farms by size: | | | | | | | | |
| 1 to 9 acres ..... | 51 | 975 | 439 | 204 | 66 | 303 | 23 | 159 |
| 10 to 49 acres ..... | 92 | 688 | 231 | 464 | 272 | 748 | 127 | 157 |
| 50 to 179 acres ..... | 50 | 125 | 34 | 170 | 153 | 424 | 174 | 45 |
| 180 to 499 acres ..... | 26 | 42 | 1 | 101 | 96 | 137 | 137 | 9 |
| 500 to 999 acres ..... | 2 | 6 | 1 | 37 | 66 | 23 | 111 | 4 |
| 1,000 acres or more ..... | - | 1 | - | 30 | 107 | 12 | 325 | 3 |
| Total cropland ..... farms | 147 | 972 | 358 | 615 | 537 | 1,067 | 770 | 180 |
| acres | 4,173 | 19,654 | 2,527 | 68,314 | 192,258 | 54,331 | 808,471 | 4,754 |
| Harvested cropland ..... farms | 122 | 851 | 327 | 525 | 365 | 965 | 461 | 156 |
| acres | 2,903 | 13,340 | 1,913 | 51,234 | 80,898 | 45,858 | 383,304 | 3,847 |
| Irrigated land ..... farms | 65 | 482 | 248 | 741 | 259 | 240 | 131 | 75 |
| acres | 1,179 | 4,122 | 495 | 66,908 | 21,748 | 8,235 | 34,655 | 777 |
| Market value of agricultural products sold (see text) ..... $1,000 | 7,657 | 120,749 | 5,304 | 68,911 | 72,387 | 132,328 | 183,244 | 40,809 |
| Average per farm ..... dollars | 34,648 | 65,732 | 7,513 | 68,500 | 95,247 | 80,345 | 204,286 | 108,247 |
| Crops, including nursery and greenhouse crops ..... $1,000 | 1,740 | 44,012 | 3,714 | 47,157 | 58,114 | 29,075 | 173,610 | 2,513 |
| Livestock, poultry, and their products ..... $1,000 | 5,917 | 76,737 | 1,590 | 21,754 | 14,274 | 103,253 | 9,634 | 38,296 |
| Farms by value of sales: | | | | | | | | |
| Less than $2,500 ..... | 84 | 977 | 410 | 420 | 364 | 834 | 425 | 198 |
| $2,500 to $4,999 ..... | 26 | 248 | 114 | 124 | 59 | 237 | 27 | 47 |
| $5,000 to $9,999 ..... | 38 | 194 | 81 | 105 | 97 | 181 | 28 | 39 |
| $10,000 to $24,999 ..... | 36 | 195 | 54 | 119 | 72 | 167 | 42 | 38 |
| $25,000 to $49,999 ..... | 15 | 93 | 26 | 76 | 47 | 71 | 28 | 12 |
| $50,000 to $99,999 ..... | 6 | 46 | 11 | 39 | 34 | 53 | 44 | 10 |
| $100,000 or more ..... | 16 | 84 | 10 | 123 | 87 | 104 | 303 | 33 |
| Government payments ..... farms | 20 | 74 | 18 | 104 | 287 | 112 | 696 | 8 |
| $1,000 | 94 | 791 | 30 | 875 | 4,275 | 879 | 20,307 | 57 |
| Total income from farm-related sources, gross before taxes and expenses (see text) ..... farms | 50 | 514 | 153 | 343 | 290 | 372 | 509 | 66 |
| $1,000 | 764 | 13,095 | 1,943 | 2,760 | 8,132 | 9,686 | 13,439 | 1,212 |
| Total farm production expenses ..... $1,000 | 8,761 | 125,807 | 12,077 | 67,406 | 68,069 | 116,098 | 128,006 | 34,240 |
| Average per farm ..... dollars | 39,644 | 68,485 | 17,107 | 67,004 | 89,564 | 70,491 | 142,704 | 90,823 |
| Net cash farm income of operation (see text) ..... farms | 221 | 1,837 | 706 | 1,006 | 760 | 1,647 | 897 | 377 |
| $1,000 | -246 | 8,829 | -4,800 | 5,140 | 16,726 | 26,795 | 88,984 | 7,838 |
| Average per farm ..... dollars | -1,114 | 4,806 | -6,799 | 5,110 | 22,008 | 16,269 | 99,202 | 20,790 |
| Principal operator by primary occupation: | | | | | | | | |
| Farming ..... number | 109 | 814 | 315 | 492 | 393 | 676 | 487 | 153 |
| Other ..... number | 112 | 1,023 | 391 | 514 | 367 | 971 | 410 | 224 |
| Principal operator by days worked off farm: | | | | | | | | |
| Any ..... number | 119 | 1,225 | 410 | 663 | 400 | 1,046 | 486 | 220 |
| 200 days or more ..... number | 69 | 761 | 299 | 492 | 231 | 560 | 341 | 132 |
| Livestock and poultry: | | | | | | | | |
| Cattle and calves inventory ..... farms | 87 | 513 | 176 | 362 | 247 | 814 | 182 | 90 |
| number | 2,415 | 22,274 | 1,323 | 21,126 | 18,733 | 26,669 | 14,933 | 2,218 |
| Beef cows ..... farms | 70 | 384 | 137 | 289 | 198 | 680 | 159 | 65 |
| number | 976 | 3,247 | 575 | (D) | 10,903 | 8,065 | (D) | 791 |
| Milk cows ..... farms | 9 | 46 | 11 | 5 | 13 | 56 | 2 | 11 |
| number | 160 | 8,048 | 56 | (D) | 925 | 6,215 | (D) | 21 |
| Cattle and calves sold ..... farms | 67 | 320 | 97 | 273 | 203 | 574 | 151 | 48 |
| number | 1,216 | 7,817 | 539 | 18,372 | 10,246 | 11,799 | 10,247 | 1,043 |
| Hogs and pigs inventory ..... farms | 5 | 41 | 34 | 34 | 21 | 47 | 10 | 17 |
| number | 55 | 658 | 281 | 355 | 111 | (D) | 442 | 62 |
| Hogs and pigs sold ..... farms | 9 | 70 | 45 | 43 | 40 | 72 | 8 | 17 |
| number | 76 | 837 | 381 | 934 | 390 | (D) | 557 | 108 |
| Sheep and lambs inventory ..... farms | 24 | 107 | 72 | 53 | 49 | 114 | 46 | 37 |
| number | 363 | 1,571 | 591 | 1,765 | 1,462 | 1,784 | 1,131 | 315 |
| Layers inventory (see text) ..... farms | 39 | 439 | 269 | 142 | 108 | 334 | 54 | 96 |
| number | 2,229 | 9,778 | 5,175 | 2,533 | 2,747 | 11,740 | 1,007 | 2,326 |
| Broilers and other meat-type chickens sold ..... farms | 7 | 35 | 19 | 8 | 11 | 60 | 4 | 5 |
| number | 2,826 | 3,051 | 2,838 | (D) | 1,755 | 23,080,000 | (D) | (D) |
| Selected crops harvested: | | | | | | | | |
| Corn for grain ..... farms | - | - | - | 2 | - | - | 2 | - |
| acres | - | - | - | (D) | - | - | (D) | - |
| bushels | - | - | - | (D) | - | - | (D) | - |
| Corn for silage or greenchop ..... farms | - | 21 | - | 3 | 1 | 8 | 1 | - |
| acres | - | 1,945 | - | (D) | (D) | 915 | (D) | - |
| tons | - | 40,719 | - | (D) | (D) | 16,855 | (D) | - |
| Wheat for grain, all ..... farms | - | 3 | - | 28 | 78 | 20 | 327 | - |
| acres | - | 3 | - | 3,299 | 38,349 | 1,864 | 326,071 | - |
| bushels | - | 234 | - | 216,535 | 1,214,327 | 142,336 | 19,744,297 | - |
| Winter wheat for grain ..... farms | - | - | - | 9 | 65 | 12 | 303 | - |
| acres | - | - | - | 593 | 20,250 | 1,263 | 226,703 | - |
| bushels | - | - | - | 42,628 | 750,906 | 87,891 | 15,097,187 | - |
| Spring wheat for grain ..... farms | - | 3 | - | 22 | 34 | 10 | 181 | - |
| acres | - | 3 | - | 2,706 | 18,099 | 601 | 99,368 | - |
| bushels | - | 234 | - | 173,907 | 463,421 | 54,445 | 4,647,110 | - |

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Table 1. **County Summary Highlights: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Farms ....number | 1,449 | 330 | 288 | 1,478 | 274 | 1,074 | 144 | 1,438 |
| Land in farms ....acres | 1,205,285 | 52,157 | 43,619 | 49,483 | 15,669 | 106,538 | 6,473 | 70,863 |
| Average size of farm ....acres | 832 | 158 | 151 | 33 | 57 | 99 | 45 | 49 |
| Median size of farm ....acres | 42 | 30 | 54 | 10 | 26 | 20 | 21 | 10 |
| Estimated market value of land and buildings: | | | | | | | | |
| Average per farm ....dollars | 1,103,226 | 546,279 | 462,512 | 476,152 | 756,469 | 752,365 | 456,963 | 791,114 |
| Average per acre ....dollars | 1,326 | 3,456 | 3,054 | 14,222 | 13,228 | 7,585 | 10,166 | 16,054 |
| Estimated market value of all machinery and equipment ....$1,000 | 106,600 | 19,989 | 13,110 | 52,540 | 7,789 | 127,804 | 5,272 | 57,695 |
| Average per farm ....dollars | 73,568 | 60,572 | 45,520 | 35,548 | 28,428 | 118,998 | 36,611 | 40,122 |
| Farms by size: | | | | | | | | |
| 1 to 9 acres .... | 244 | 70 | 18 | 657 | 49 | 328 | 41 | 610 |
| 10 to 49 acres .... | 514 | 134 | 113 | 603 | 151 | 456 | 67 | 574 |
| 50 to 179 acres .... | 383 | 80 | 115 | 186 | 59 | 181 | 31 | 189 |
| 180 to 499 acres .... | 142 | 26 | 30 | 28 | 11 | 62 | 5 | 48 |
| 500 to 999 acres .... | 75 | 7 | 5 | - | 3 | 25 | - | 9 |
| 1,000 acres or more .... | 91 | 13 | 7 | 4 | 1 | 22 | - | 8 |
| Total cropland ....farms | 1,041 | 252 | 203 | 672 | 194 | 698 | 83 | 715 |
| acres | 129,232 | 12,962 | 15,315 | 11,524 | 5,522 | 66,765 | 1,312 | 29,082 |
| Harvested cropland ....farms | 941 | 226 | 173 | 603 | 180 | 612 | 81 | 609 |
| acres | 78,819 | 6,529 | 12,433 | 9,643 | 4,332 | 57,055 | 972 | 23,425 |
| Irrigated land ....farms | 952 | 103 | 45 | 330 | 99 | 303 | 50 | 285 |
| acres | 51,723 | 2,487 | 903 | 2,834 | 343 | 19,239 | 352 | 5,331 |
| Market value of agricultural products sold (see text) ....$1,000 | 287,120 | 36,782 | 3,954 | 90,933 | 4,245 | 272,275 | 5,538 | 139,486 |
| Average per farm ....dollars | 198,150 | 111,460 | 13,730 | 61,524 | 15,492 | 253,515 | 38,456 | 97,000 |
| Crops, including nursery and greenhouse crops ....$1,000 | 249,837 | 7,437 | 2,315 | 23,896 | 2,582 | 201,007 | 1,535 | 63,216 |
| Livestock, poultry, and their products ....$1,000 | 37,283 | 29,345 | 1,640 | 67,037 | 1,663 | 71,268 | 4,003 | 76,270 |
| Farms by value of sales: | | | | | | | | |
| Less than $2,500 .... | 542 | 123 | 146 | 864 | 104 | 486 | 75 | 800 |
| $2,500 to $4,999 .... | 156 | 31 | 45 | 182 | 46 | 159 | 13 | 193 |
| $5,000 to $9,999 .... | 141 | 33 | 53 | 168 | 31 | 116 | 20 | 132 |
| $10,000 to $24,999 .... | 128 | 45 | 23 | 151 | 54 | 93 | 17 | 130 |
| $25,000 to $49,999 .... | 104 | 18 | 8 | 42 | 22 | 45 | 5 | 53 |
| $50,000 to $99,999 .... | 73 | 27 | 6 | 26 | 9 | 44 | 4 | 36 |
| $100,000 or more .... | 305 | 53 | 7 | 45 | 8 | 131 | 10 | 94 |
| Government payments ....farms | 137 | 31 | 8 | 19 | 10 | 119 | - | 71 |
| $1,000 | 2,383 | 305 | 27 | 96 | 41 | 1,442 | - | 620 |
| Total income from farm-related sources, gross before taxes and expenses (see text) ....farms | 482 | 93 | 42 | 328 | 94 | 406 | 18 | 506 |
| $1,000 | 13,297 | 2,572 | 201 | 5,398 | 643 | 6,755 | 372 | 7,076 |
| Total farm production expenses ....$1,000 | 285,383 | 26,307 | 3,716 | 87,562 | 5,418 | 252,540 | 6,040 | 141,079 |
| Average per farm ....dollars | 196,952 | 79,719 | 12,902 | 59,244 | 19,774 | 235,139 | 41,944 | 98,108 |
| Net cash farm income of operation (see text) ....farms | 1,449 | 330 | 288 | 1,478 | 274 | 1,074 | 144 | 1,438 |
| $1,000 | 17,417 | 13,352 | 466 | 8,865 | -489 | 27,933 | -130 | 6,103 |
| Average per farm ....dollars | 12,020 | 40,461 | 1,619 | 5,998 | -1,785 | 26,008 | -905 | 4,244 |
| Principal operator by primary occupation: | | | | | | | | |
| Farming ....number | 703 | 151 | 109 | 694 | 145 | 515 | 66 | 511 |
| Other ....number | 746 | 179 | 179 | 784 | 129 | 559 | 78 | 927 |
| Principal operator by days worked off farm: | | | | | | | | |
| Any ....number | 834 | 196 | 182 | 884 | 169 | 671 | 93 | 954 |
| 200 days or more ....number | 457 | 125 | 117 | 558 | 91 | 402 | 57 | 677 |
| Livestock and poultry: | | | | | | | | |
| Cattle and calves inventory ....farms | 466 | 119 | 90 | 612 | 66 | 407 | 47 | 517 |
| number | 35,471 | 5,837 | 2,752 | 11,555 | 1,795 | 30,783 | 558 | 23,888 |
| Beef cows ....farms | 376 | 93 | 68 | 508 | 47 | 298 | 38 | 416 |
| number | 19,316 | 1,806 | (D) | 3,621 | 999 | 4,073 | (D) | 3,357 |
| Milk cows ....farms | 16 | 10 | 2 | 23 | 13 | 47 | 2 | 50 |
| number | 48 | 1,424 | (D) | 1,161 | 48 | 13,284 | (D) | 11,181 |
| Cattle and calves sold ....farms | 330 | 81 | 65 | 373 | 49 | 320 | 27 | 328 |
| number | (D) | 2,667 | 1,375 | 10,492 | 924 | 11,685 | 194 | 9,006 |
| Hogs and pigs inventory ....farms | 33 | 1 | 10 | 70 | 18 | 33 | 10 | 50 |
| number | 248 | (D) | (D) | 435 | 134 | 198 | 40 | 463 |
| Hogs and pigs sold ....farms | 30 | - | 24 | 71 | 36 | 67 | 4 | 51 |
| number | 291 | - | 474 | 867 | 217 | 403 | 47 | (D) |
| Sheep and lambs inventory ....farms | 75 | 7 | 8 | 116 | 52 | 63 | 10 | 83 |
| number | 1,527 | 151 | 147 | 1,863 | 1,026 | 1,251 | 172 | 1,431 |
| Layers inventory (see text) ....farms | 218 | 38 | 63 | 406 | 67 | 230 | 48 | 327 |
| number | 3,929 | 721 | 1,284 | (D) | 1,625 | (D) | 840 | 759,220 |
| Broilers and other meat-type chickens sold ....farms | 12 | 5 | 9 | 28 | 10 | 24 | 1 | 14 |
| number | (D) | 56 | 200 | 2,716 | 596 | 2,819 | (D) | 690 |
| Selected crops harvested: | | | | | | | | |
| Corn for grain ....farms | 2 | 1 | - | 3 | - | - | - | 1 |
| acres | (D) | (D) | - | 3 | - | - | - | (D) |
| bushels | (D) | (D) | - | 213 | - | - | - | (D) |
| Corn for silage or greenchop ....farms | 8 | - | - | 6 | - | 29 | - | 33 |
| acres | 1,090 | - | - | 96 | - | 7,117 | - | 4,192 |
| tons | 23,292 | - | - | 1,084 | - | 158,592 | - | 93,478 |
| Wheat for grain, all ....farms | 19 | 1 | - | 3 | 5 | 30 | - | 9 |
| acres | 13,958 | (D) | - | (D) | 45 | 7,851 | - | 1,355 |
| bushels | 553,194 | (D) | - | (D) | 1,035 | 498,776 | - | 87,794 |
| Winter wheat for grain ....farms | 15 | - | - | 3 | - | 28 | - | 8 |
| acres | 8,927 | - | - | (D) | - | 6,471 | - | 1,131 |
| bushels | 378,542 | - | - | (D) | - | 432,999 | - | 78,852 |
| Spring wheat for grain ....farms | 14 | 1 | - | - | 5 | 9 | - | 4 |
| acres | 5,031 | (D) | - | - | 45 | 1,380 | - | 224 |
| bushels | 174,652 | (D) | - | - | 1,035 | 65,777 | - | 8,942 |

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Table 1. **County Summary Highlights: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Farms ..... number | 2,501 | 1,148 | 1,336 | 109 | 943 | 1,702 | 1,195 | 3,143 |
| Land in farms ..... acres | 537,406 | 527,123 | 76,638 | 9,557 | 645,121 | 115,831 | 1,275,110 | 1,780,498 |
| Average size of farm ..... acres | 215 | 459 | 57 | 88 | 684 | 68 | 1,067 | 566 |
| Median size of farm ..... acres | 30 | 60 | 10 | 49 | 42 | 16 | 400 | 16 |
| Estimated market value of land and buildings: | | | | | | | | |
| Average per farm ..... dollars | 611,087 | 722,020 | 498,438 | 411,379 | 1,426,922 | 786,342 | 1,490,631 | 1,021,211 |
| Average per acre ..... dollars | 2,844 | 1,572 | 8,689 | 4,692 | 2,086 | 11,554 | 1,397 | 1,803 |
| Estimated market value of all machinery and equipment ..... $1,000 | 181,650 | 56,983 | 54,065 | 4,232 | 165,623 | 136,904 | 255,945 | 373,621 |
| Average per farm ..... dollars | 72,631 | 49,637 | 40,468 | 38,829 | 175,634 | 80,437 | 214,180 | 118,874 |
| Farms by size: | | | | | | | | |
| 1 to 9 acres ..... | 432 | 96 | 590 | 13 | 215 | 578 | 86 | 1,168 |
| 10 to 49 acres ..... | 1,061 | 412 | 470 | 42 | 285 | 693 | 171 | 1,154 |
| 50 to 179 acres ..... | 537 | 356 | 195 | 41 | 136 | 287 | 165 | 467 |
| 180 to 499 acres ..... | 240 | 157 | 54 | 11 | 81 | 101 | 230 | 181 |
| 500 to 999 acres ..... | 105 | 74 | 18 | 1 | 46 | 33 | 168 | 67 |
| 1,000 acres or more ..... | 126 | 53 | 9 | 1 | 180 | 10 | 375 | 106 |
| Total cropland ..... farms | 1,756 | 805 | 728 | 79 | 735 | 1,229 | 1,074 | 2,223 |
| acres | 369,641 | 88,785 | 23,071 | 2,701 | 565,792 | 78,744 | 1,019,951 | 306,851 |
| Harvested cropland ..... farms | 1,402 | 687 | 647 | 68 | 532 | 1,110 | 709 | 2,048 |
| acres | 289,301 | 57,638 | 18,357 | 2,201 | 280,934 | 69,731 | 659,460 | 218,054 |
| Irrigated land ..... farms | 494 | 221 | 331 | 16 | 494 | 570 | 55 | 2,552 |
| acres | 10,286 | 6,690 | 5,309 | 48 | 91,108 | 35,484 | 4,293 | 224,386 |
| Market value of agricultural products sold (see text) ..... $1,000 | 149,760 | 36,346 | 122,423 | 3,487 | 437,359 | 357,312 | 370,801 | 1,645,510 |
| Average per farm ..... dollars | 59,880 | 31,660 | 91,634 | 31,993 | 463,796 | 209,937 | 310,294 | 523,548 |
| Crops, including nursery and greenhouse crops ..... $1,000 | 132,862 | 17,401 | 48,843 | 288 | (D) | 119,816 | 352,378 | 1,069,497 |
| Livestock, poultry, and their products ..... $1,000 | 16,898 | 18,945 | 73,581 | 3,199 | (D) | 237,496 | 18,424 | 576,013 |
| Farms by value of sales: | | | | | | | | |
| Less than $2,500 ..... | 1,242 | 531 | 746 | 42 | 408 | 759 | 497 | 1,075 |
| $2,500 to $4,999 ..... | 338 | 107 | 153 | 18 | 76 | 247 | 54 | 308 |
| $5,000 to $9,999 ..... | 280 | 139 | 177 | 15 | 61 | 165 | 40 | 324 |
| $10,000 to $24,999 ..... | 210 | 151 | 117 | 14 | 95 | 144 | 35 | 332 |
| $25,000 to $49,999 ..... | 117 | 86 | 44 | 7 | 42 | 78 | 35 | 219 |
| $50,000 to $99,999 ..... | 82 | 50 | 30 | 5 | 39 | 46 | 51 | 180 |
| $100,000 or more ..... | 232 | 84 | 69 | 8 | 222 | 263 | 483 | 705 |
| Government payments ..... farms | 618 | 145 | 32 | 13 | 426 | 299 | 931 | 360 |
| $1,000 | 7,355 | 926 | 267 | 92 | 12,372 | 3,425 | 28,405 | 5,804 |
| Total income from farm-related sources, gross before taxes and expenses (see text) ..... farms | 803 | 298 | 294 | 31 | 381 | 582 | 663 | 928 |
| $1,000 | 11,422 | 1,995 | 4,511 | 258 | 15,621 | 5,704 | 10,365 | 28,869 |
| Total farm production expenses ..... $1,000 | 126,855 | 33,240 | 111,653 | 3,016 | 341,151 | 314,860 | 237,688 | 1,358,478 |
| Average per farm ..... dollars | 50,722 | 28,955 | 83,572 | 27,668 | 361,772 | 184,994 | 198,902 | 432,223 |
| Net cash farm income of operation (see text) ..... farms | 2,501 | 1,148 | 1,336 | 109 | 943 | 1,702 | 1,195 | 3,143 |
| $1,000 | 41,683 | 6,026 | 15,548 | 822 | 124,201 | 51,582 | 171,883 | 321,705 |
| Average per farm ..... dollars | 16,667 | 5,250 | 11,638 | 7,539 | 131,708 | 30,306 | 143,835 | 102,356 |
| Principal operator by primary occupation: | | | | | | | | |
| Farming ..... number | 1,039 | 536 | 410 | 55 | 456 | 773 | 711 | 1,632 |
| Other ..... number | 1,462 | 612 | 926 | 54 | 487 | 929 | 484 | 1,511 |
| Principal operator by days worked off farm: | | | | | | | | |
| Any ..... number | 1,662 | 663 | 934 | 56 | 580 | 1,032 | 550 | 1,945 |
| 200 days or more ..... number | 1,064 | 413 | 566 | 37 | 351 | 592 | 339 | 1,199 |
| Livestock and poultry: | | | | | | | | |
| Cattle and calves inventory ..... farms | 713 | 473 | 504 | 65 | 187 | 688 | 219 | 978 |
| number | 19,218 | 19,291 | 16,631 | 2,369 | 57,400 | 87,756 | 20,212 | 258,663 |
| Beef cows ..... farms | 553 | 382 | 411 | 57 | 141 | 451 | 193 | 675 |
| number | 9,286 | 10,521 | 5,269 | 955 | 2,842 | 4,301 | 10,931 | 15,414 |
| Milk cows ..... farms | 24 | 33 | 20 | 10 | 7 | 120 | 16 | 97 |
| number | 918 | 545 | 5,274 | 482 | 7 | 45,562 | 337 | 99,532 |
| Cattle and calves sold ..... farms | 560 | 374 | 311 | 48 | 137 | 520 | 185 | 689 |
| number | 10,616 | 12,327 | 10,007 | 1,000 | (D) | 40,960 | 15,715 | 148,839 |
| Hogs and pigs inventory ..... farms | 47 | 42 | 48 | - | 7 | 56 | 19 | 65 |
| number | 371 | (D) | 644 | - | 68 | 327 | 4,681 | 449 |
| Hogs and pigs sold ..... farms | 71 | 43 | 62 | 8 | 18 | 95 | 25 | 78 |
| number | 575 | 1,848 | 831 | 46 | 103 | 697 | 6,122 | 715 |
| Sheep and lambs inventory ..... farms | 121 | 74 | 87 | 10 | 26 | 87 | 46 | 139 |
| number | 2,522 | 3,839 | 1,797 | (D) | 569 | 1,194 | 2,464 | 6,525 |
| Layers inventory (see text) ..... farms | 443 | 244 | 307 | 27 | 112 | 340 | 99 | 353 |
| number | 7,964 | 3,972 | 1,402,243 | 658 | 2,259 | 8,148 | 1,368 | (D) |
| Broilers and other meat-type chickens sold ..... farms | 29 | 20 | 33 | 2 | 8 | 45 | 5 | 35 |
| number | 1,860 | 1,066 | 2,433 | (D) | 600 | 804,022 | 1,630 | 2,276 |
| Selected crops harvested: | | | | | | | | |
| Corn for grain ..... farms | 1 | - | - | - | 37 | 1 | 1 | 91 |
| acres | (D) | - | - | - | 2,924 | (D) | (D) | 14,303 |
| bushels | (D) | - | - | - | 547,670 | (D) | (D) | 2,918,853 |
| Corn for silage or greenchop ..... farms | 4 | 1 | 4 | - | - | 134 | - | 138 |
| acres | (D) | (D) | (D) | - | - | 15,304 | - | 31,879 |
| tons | (D) | (D) | (D) | - | - | 339,373 | - | 889,519 |
| Wheat for grain, all ..... farms | 276 | 65 | - | - | 238 | 15 | 523 | 77 |
| acres | 159,047 | 9,348 | - | - | 192,570 | 1,183 | 441,417 | 16,337 |
| bushels | 9,860,319 | 417,649 | - | - | 15,461,867 | 58,388 | 32,943,471 | 1,400,003 |
| Winter wheat for grain ..... farms | 219 | 52 | - | - | 197 | 15 | 497 | 46 |
| acres | 99,074 | 7,380 | - | - | 166,843 | (D) | 307,462 | 9,359 |
| bushels | 6,622,418 | 330,675 | - | - | 13,891,655 | (D) | 25,067,031 | 923,338 |
| Spring wheat for grain ..... farms | 176 | 20 | - | - | 89 | 1 | 305 | 45 |
| acres | 59,973 | 1,968 | - | - | (D) | (D) | 133,955 | 6,978 |
| bushels | 3,237,901 | 86,974 | - | - | (D) | (D) | 7,876,440 | 476,665 |

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Table 1. **County Summary Highlights: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Selected crops harvested: - Con. | | | | | | | | |
| Wheat for grain, all - Con. | | | | | | | | |
| Durum wheat for grain ....farms | 3 | - | - | - | - | - | - | 1 |
| acres | 3,264 | - | - | - | - | - | - | (D) |
| bushels | (D) | - | - | - | - | - | - | (D) |
| Oats for grain ....farms | 139 | 7 | 5 | - | - | 2 | 10 | 2 |
| acres | 6,129 | (D) | 434 | - | - | (D) | 302 | (D) |
| bushels | 466,810 | (D) | 14,804 | - | - | (D) | 33,552 | (D) |
| Barley for grain ....farms | 817 | 11 | 12 | 2 | - | 4 | - | 30 |
| acres | 175,074 | 3,238 | 1,568 | (D) | - | 428 | - | 4,866 |
| bushels | 12,073,493 | 173,084 | 97,673 | (D) | - | 33,298 | - | 357,635 |
| Sorghum for grain ....farms | 2 | - | - | - | - | - | - | - |
| acres | (D) | - | - | - | - | - | - | - |
| bushels | (D) | - | - | - | - | - | - | - |
| Sorghum for silage or greenchop ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| tons | - | - | - | - | - | - | - | - |
| Soybeans for beans ....farms | 2 | - | - | - | - | - | - | - |
| acres | (D) | - | - | - | - | - | - | - |
| bushels | (D) | - | - | - | - | - | - | - |
| Dry edible beans, excluding limas ....farms | 420 | 33 | 3 | 2 | 1 | 1 | - | 13 |
| acres | 114,506 | 7,882 | 1,165 | (D) | (D) | (D) | - | 2,922 |
| cwt | 2,275,125 | 195,817 | 16,978 | (D) | (D) | (D) | - | 49,608 |
| Cotton, all ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| pounds | - | - | - | - | - | - | - | - |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) ....farms | 10,396 | 101 | 40 | 249 | 69 | 161 | 592 | 57 |
| acres | 748,909 | 19,947 | 5,447 | 15,844 | 1,514 | 5,147 | 17,541 | 3,420 |
| tons, dry | 2,873,198 | 114,000 | 5,938 | 84,966 | 2,932 | 14,064 | 33,320 | 8,235 |
| Rice ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| cwt | - | - | - | - | - | - | - | - |
| Sunflower seed, all ....farms | 15 | 2 | - | - | - | - | - | - |
| acres | 1,603 | (D) | - | - | - | - | - | - |
| pounds | 2,144,124 | (D) | - | - | - | - | - | - |
| Sugarbeets for sugar ....farms | 4 | - | - | 2 | - | - | - | - |
| acres | (D) | - | - | (D) | - | - | - | - |
| tons | (D) | - | - | (D) | - | - | - | - |
| Sugarcane for sugar ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| pounds | - | - | - | - | - | - | - | - |
| Vegetables harvested for sale (see text) ....farms | 2,836 | 49 | 5 | 61 | 40 | 41 | 177 | 5 |
| acres | 351,639 | 28,642 | 59 | 83,081 | 40 | 133 | 418 | 4 |
| Potatoes ....farms | 1,205 | 40 | - | 30 | 12 | 21 | 64 | - |
| acres | 163,925 | 25,766 | - | 33,697 | 2 | 8 | 11 | - |
| Sweet potatoes ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Land in orchards ....farms | 4,846 | 38 | 8 | 353 | 631 | 49 | 149 | 4 |
| acres | 315,456 | 5,850 | 68 | 49,233 | 20,599 | 80 | 434 | 185 |

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Table 1. **County Summary Highlights: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|---|
| Selected crops harvested: - Con. | | | | | | | | | |
| Wheat for grain, all - Con. | | | | | | | | | |
| Durum wheat for grain | farms | - | - | - | - | - | 1 | - | - |
| | acres | - | - | - | - | - | (D) | - | - |
| | bushels | - | - | - | - | - | (D) | - | - |
| Oats for grain | farms | 1 | 2 | 1 | 1 | - | - | - | - |
| | acres | (D) | (D) | (D) | (D) | - | - | - | - |
| | bushels | (D) | (D) | (D) | (D) | - | - | - | - |
| Barley for grain | farms | 5 | 10 | 2 | 8 | 33 | 10 | 1 | 5 |
| | acres | 802 | 3,894 | (D) | 925 | 5,070 | 1,672 | (D) | 640 |
| | bushels | 76,890 | 128,643 | (D) | 99,398 | 342,190 | 46,949 | (D) | 60,464 |
| Sorghum for grain | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | bushels | - | - | - | - | - | - | - | - |
| Sorghum for silage or greenchop | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | tons | - | - | - | - | - | - | - | - |
| Soybeans for beans | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | bushels | - | - | - | - | - | - | - | - |
| Dry edible beans, excluding limas | farms | - | - | - | 28 | 2 | 102 | - | 1 |
| | acres | - | - | - | 3,233 | (D) | 20,467 | - | (D) |
| | cwt | - | - | - | 81,988 | (D) | 555,524 | - | (D) |
| Cotton, all | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | pounds | - | - | - | - | - | - | - | - |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) | farms | 121 | 54 | 120 | 206 | 36 | 485 | 195 | 128 |
| | acres | 3,851 | 6,735 | 8,137 | 69,541 | 1,816 | 117,492 | 10,130 | 4,967 |
| | tons, dry | 7,638 | 17,167 | 17,935 | 479,494 | 4,992 | 694,181 | 21,098 | 13,094 |
| Rice | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | cwt | - | - | - | - | - | - | - | - |
| Sunflower seed, all | farms | - | 1 | - | - | - | 11 | - | - |
| | acres | - | (D) | - | - | - | 1,303 | - | - |
| | pounds | - | (D) | - | - | - | 1,752,445 | - | - |
| Sugarbeets for sugar | farms | - | - | - | 2 | - | - | - | - |
| | acres | - | - | - | (D) | - | - | - | - |
| | tons | - | - | - | (D) | - | - | - | - |
| Sugarcane for sugar | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | pounds | - | - | - | - | - | - | - | - |
| Vegetables harvested for sale (see text) | farms | 42 | 15 | 7 | 141 | 3 | 199 | 43 | 60 |
| | acres | 6,273 | 11 | 32 | 63,696 | (D) | 97,142 | 6,678 | (D) |
| Potatoes | farms | 2 | 5 | 2 | 70 | - | 85 | 21 | 35 |
| | acres | (D) | 1 | (D) | 30,853 | - | 45,494 | 13 | 30 |
| Sweet potatoes | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| Land in orchards | farms | 33 | 327 | 10 | 202 | 4 | 339 | 17 | 26 |
| | acres | 64 | 13,930 | 167 | 19,472 | 8 | 64,664 | 45 | 34 |

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Table 1. **County Summary Highlights: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Selected crops harvested: - Con. | | | | | | | | |
| Wheat for grain, all - Con. | | | | | | | | |
| Durum wheat for grain ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| bushels | - | - | - | - | - | - | - | - |
| Oats for grain ....farms | - | 3 | - | 10 | 6 | 6 | - | - |
| acres | - | 18 | - | 544 | 90 | 515 | - | - |
| bushels | - | 2,133 | - | 56,218 | 3,920 | 41,811 | - | - |
| Barley for grain ....farms | - | 3 | - | 2 | 11 | 18 | 104 | - |
| acres | - | 3 | - | (D) | 797 | 693 | 32,799 | - |
| bushels | - | 15 | - | (D) | 53,083 | 48,478 | 2,163,476 | - |
| Sorghum for grain ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| bushels | - | - | - | - | - | - | - | - |
| Sorghum for silage or greenchop ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| tons | - | - | - | - | - | - | - | - |
| Soybeans for beans ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| bushels | - | - | - | - | - | - | - | - |
| Dry edible beans, excluding limas ....farms | - | 2 | - | 2 | 1 | 2 | 7 | - |
| acres | - | (D) | - | (D) | (D) | (D) | 1,558 | - |
| cwt | - | (D) | - | (D) | (D) | (D) | 28,807 | - |
| Cotton, all ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| pounds | - | - | - | - | - | - | - | - |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) ....farms | 85 | 305 | 54 | 439 | 223 | 755 | 190 | 65 |
| acres | 2,701 | 7,627 | 867 | 44,062 | 32,540 | 33,358 | 23,392 | 2,474 |
| tons, dry | 4,110 | 17,030 | 1,190 | 201,863 | 44,022 | 69,557 | 63,127 | 3,941 |
| Rice ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| cwt | - | - | - | - | - | - | - | - |
| Sunflower seed, all ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| pounds | - | - | - | - | - | - | - | - |
| Sugarbeets for sugar ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| tons | - | - | - | - | - | - | - | - |
| Sugarcane for sugar ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| pounds | - | - | - | - | - | - | - | - |
| Vegetables harvested for sale (see text) ....farms | 25 | 245 | 144 | 51 | 49 | 77 | 14 | 28 |
| acres | 53 | 1,021 | (D) | 2,635 | (D) | 3,925 | 2,967 | (D) |
| Potatoes ....farms | 17 | 81 | 59 | 26 | 18 | 27 | 2 | 10 |
| acres | 6 | 23 | (D) | 424 | 6 | 19 | (D) | 2 |
| Sweet potatoes ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Land in orchards ....farms | 23 | 94 | 76 | 47 | 77 | 48 | 11 | 21 |
| acres | 64 | 295 | 72 | 455 | 7,432 | 174 | 29 | 19 |

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Table 1. **County Summary Highlights: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|---|
| Selected crops harvested: - Con. | | | | | | | | | |
| Wheat for grain, all - Con. | | | | | | | | | |
| Durum wheat for grain | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | bushels | - | - | - | - | - | - | - | - |
| Oats for grain | farms | 6 | - | - | 2 | - | 4 | - | 3 |
| | acres | 323 | - | - | (D) | - | 17 | - | 11 |
| | bushels | 25,340 | - | - | (D) | - | 1,314 | - | 550 |
| Barley for grain | farms | 9 | - | 1 | - | 2 | 29 | - | 9 |
| | acres | 1,873 | - | (D) | - | (D) | 3,307 | - | 386 |
| | bushels | 65,740 | - | (D) | - | (D) | 221,689 | - | 22,558 |
| Sorghum for grain | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | bushels | - | - | - | - | - | - | - | - |
| Sorghum for silage or greenchop | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | tons | - | - | - | - | - | - | - | - |
| Soybeans for beans | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | bushels | - | - | - | - | - | - | - | - |
| Dry edible beans, excluding limas | farms | 2 | - | - | 3 | - | - | - | 3 |
| | acres | (D) | - | - | 3 | - | - | - | 3 |
| | cwt | (D) | - | - | 45 | - | - | - | 45 |
| Cotton, all | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | pounds | - | - | - | - | - | - | - | - |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) | farms | 523 | 108 | 155 | 288 | 102 | 333 | 31 | 300 |
| | acres | 31,869 | 4,791 | 12,274 | 6,339 | 3,922 | 16,272 | 560 | 11,960 |
| | tons, dry | 75,750 | 13,801 | 19,742 | 10,917 | 8,363 | 60,050 | 970 | 38,896 |
| Rice | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | cwt | - | - | - | - | - | - | - | - |
| Sunflower seed, all | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | pounds | - | - | - | - | - | - | - | - |
| Sugarbeets for sugar | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | tons | - | - | - | - | - | - | - | - |
| Sugarcane for sugar | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| | pounds | - | - | - | - | - | - | - | - |
| Vegetables harvested for sale (see text) | farms | 90 | 9 | 13 | 167 | 44 | 134 | 22 | 117 |
| | acres | (D) | 7 | 11 | 1,324 | (D) | 17,880 | 9 | 1,846 |
| Potatoes | farms | 55 | 5 | 11 | 58 | 25 | 64 | 3 | 53 |
| | acres | 16 | 1 | 2 | 13 | 18 | 12,807 | 1 | (D) |
| Sweet potatoes | farms | - | - | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - | - | - |
| Land in orchards | farms | 396 | 3 | 5 | 93 | 58 | 88 | 19 | 68 |
| | acres | 29,804 | (D) | 2 | 139 | 101 | 562 | 274 | 184 |

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Table 1. **County Summary Highlights: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Selected crops harvested: - Con. | | | | | | | | |
| Wheat for grain, all - Con. | | | | | | | | |
| Durum wheat for grain ....farms | - | - | - | - | 1 | - | - | - |
| acres | - | - | - | - | (D) | - | - | - |
| bushels | - | - | - | - | (D) | - | - | - |
| Oats for grain ....farms | 31 | 26 | 2 | - | 1 | 4 | 2 | 2 |
| acres | 1,252 | 1,027 | (D) | - | (D) | 4 | (D) | (D) |
| bushels | 70,828 | 57,649 | (D) | - | (D) | 349 | (D) | (D) |
| Barley for grain ....farms | 122 | 58 | 1 | - | 14 | 3 | 293 | 5 |
| acres | 20,499 | 5,400 | (D) | - | 1,670 | (D) | 83,709 | 268 |
| bushels | 1,307,888 | 317,310 | (D) | - | 123,125 | (D) | 6,267,724 | 28,953 |
| Sorghum for grain ....farms | 1 | - | - | - | - | 1 | - | - |
| acres | (D) | - | - | - | - | (D) | - | - |
| bushels | (D) | - | - | - | - | (D) | - | - |
| Sorghum for silage or greenchop ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| tons | - | - | - | - | - | - | - | - |
| Soybeans for beans ....farms | - | - | - | - | 2 | - | - | - |
| acres | - | - | - | - | (D) | - | - | - |
| bushels | - | - | - | - | (D) | - | - | - |
| Dry edible beans, excluding limas ....farms | 11 | - | 1 | - | 38 | 3 | 153 | 6 |
| acres | 715 | - | (D) | - | 10,270 | 3 | 65,037 | 218 |
| cwt | 10,518 | - | (D) | - | 174,083 | 63 | 1,128,052 | 3,950 |
| Cotton, all ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| pounds | - | - | - | - | - | - | - | - |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) ....farms | 971 | 544 | 364 | 55 | 166 | 726 | 205 | 795 |
| acres | 58,922 | 41,522 | 15,850 | 2,176 | 13,188 | 35,858 | 18,007 | 36,849 |
| tons, dry | 114,183 | 85,953 | 42,663 | 3,963 | 71,565 | 165,065 | 44,723 | 192,700 |
| Rice ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| cwt | - | - | - | - | - | - | - | - |
| Sunflower seed, all ....farms | - | 1 | - | - | - | - | - | - |
| acres | - | (D) | - | - | - | - | - | - |
| pounds | - | (D) | - | - | - | - | - | - |
| Sugarbeets for sugar ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| tons | - | - | - | - | - | - | - | - |
| Sugarcane for sugar ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| pounds | - | - | - | - | - | - | - | - |
| Vegetables harvested for sale (see text) ....farms | 131 | 81 | 119 | 5 | 68 | 103 | 13 | 199 |
| acres | 1,613 | 129 | 233 | 5 | 19,619 | 3,152 | 11 | 7,305 |
| Potatoes ....farms | 67 | 37 | 60 | 5 | 14 | 62 | 2 | 57 |
| acres | (D) | 35 | 18 | 1 | 8,452 | 2,953 | (D) | 1,691 |
| Sweet potatoes ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Land in orchards ....farms | 104 | 47 | 58 | 7 | 106 | 98 | 8 | 1,101 |
| acres | 434 | 164 | 79 | (D) | 12,200 | 479 | 52 | 87,607 |

## Table 2. **Market Value of Agricultural Products Sold Including Direct Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|---|
| Total sales (see text) | farms, 2012 | 37,249 | 713 | 185 | 1,509 | 890 | 536 | 1,929 | 308 |
| | 2007 | 39,284 | 782 | 192 | 1,630 | 979 | 512 | 2,101 | 283 |
| | $1,000, 2012 | 9,120,749 | 430,155 | 20,508 | 923,163 | 206,479 | 10,648 | 50,861 | 57,732 |
| | 2007 | 6,792,856 | 344,130 | 13,376 | 525,918 | 208,800 | 10,767 | 52,691 | 39,819 |
| Average per farm | dollars, 2012 | 244,859 | 603,302 | 110,857 | 611,772 | 231,999 | 19,865 | 26,367 | 187,443 |
| | 2007 | 172,917 | 440,064 | 69,668 | 322,649 | 213,278 | 21,030 | 25,079 | 140,702 |
| 2012 value of sales: | | | | | | | | | |
| Less than $1,000 (see text) | farms | 12,513 | 290 | 80 | 480 | 119 | 221 | 718 | 133 |
| | $1,000 | 1,587 | 6 | (D) | 63 | 16 | 42 | 118 | 6 |
| $1,000 to $2,499 | farms | 4,387 | 24 | 6 | 160 | 61 | 85 | 373 | 17 |
| | $1,000 | 7,364 | 38 | 11 | 267 | 98 | 142 | 631 | 31 |
| $2,500 to $4,999 | farms | 4,084 | 19 | 16 | 197 | 74 | 79 | 306 | 17 |
| | $1,000 | 14,710 | 65 | 58 | 694 | 252 | 297 | 1,098 | 62 |
| $5,000 to $9,999 | farms | 3,542 | 20 | 8 | 152 | 52 | 62 | 216 | 20 |
| | $1,000 | 24,770 | 144 | 60 | 1,090 | 348 | 430 | 1,528 | 154 |
| $10,000 to $19,999 | farms | 2,658 | 18 | 10 | 118 | 85 | 34 | 112 | 17 |
| | $1,000 | 37,074 | 283 | 154 | 1,652 | 1,268 | 466 | 1,541 | 241 |
| $20,000 to $24,999 | farms | 740 | 10 | 2 | 43 | 48 | 8 | 55 | - |
| | $1,000 | 16,377 | 216 | (D) | 955 | 1,043 | 177 | 1,221 | - |
| $25,000 to $39,999 | farms | 1,220 | 14 | 6 | 50 | 51 | 12 | 47 | 14 |
| | $1,000 | 38,505 | 446 | 212 | 1,609 | 1,601 | 337 | 1,521 | 448 |
| $40,000 to $49,999 | farms | 623 | 6 | 3 | 23 | 24 | 8 | 15 | 5 |
| | $1,000 | 27,652 | 272 | 130 | 1,013 | 1,046 | 348 | 690 | 220 |
| $50,000 to $99,999 | farms | 1,380 | 31 | 7 | 60 | 76 | 6 | 37 | 11 |
| | $1,000 | 98,071 | 2,447 | 527 | 4,026 | 5,307 | 457 | 2,608 | 835 |
| $100,000 to $249,999 | farms | 2,081 | 66 | 24 | 62 | 141 | 12 | 22 | 16 |
| | $1,000 | 343,351 | 11,358 | 3,875 | 10,573 | 23,399 | 2,062 | 3,205 | 2,669 |
| $250,000 to $499,999 | farms | 1,286 | 64 | 10 | 72 | 65 | 3 | 3 | 26 |
| | $1,000 | 462,745 | 22,664 | 3,612 | 26,341 | 23,722 | 876 | 1,081 | 9,867 |
| $500,000 or more | farms | 2,735 | 151 | 13 | 92 | 94 | 6 | 25 | 32 |
| | $1,000 | 8,048,544 | 392,215 | 11,822 | 874,881 | 148,380 | 5,013 | 35,620 | 43,200 |
| 2007 value of sales: | | | | | | | | | |
| Less than $1,000 (see text) | farms | 13,826 | 332 | 83 | 543 | 127 | 178 | 874 | 125 |
| | $1,000 | 1,852 | 8 | 12 | 42 | 10 | 28 | 146 | 3 |
| $1,000 to $2,499 | farms | 4,617 | 24 | 13 | 204 | 36 | 70 | 428 | 7 |
| | $1,000 | 7,694 | 40 | 23 | 327 | 63 | 116 | 717 | 11 |
| $2,500 to $4,999 | farms | 3,817 | 33 | 14 | 160 | 58 | 75 | 254 | 19 |
| | $1,000 | 13,456 | 119 | 52 | 552 | 213 | 255 | 901 | 65 |
| $5,000 to $9,999 | farms | 3,717 | 31 | 10 | 185 | 78 | 67 | 237 | 24 |
| | $1,000 | 26,073 | 219 | 62 | 1,329 | 588 | 431 | 1,686 | 177 |
| $10,000 to $19,999 | farms | 2,582 | 19 | 12 | 120 | 74 | 51 | 125 | 21 |
| | $1,000 | 36,135 | 290 | 162 | 1,659 | 1,096 | 794 | 1,726 | 281 |
| $20,000 to $24,999 | farms | 841 | 11 | 3 | 29 | 39 | 17 | 25 | 4 |
| | $1,000 | 18,438 | 252 | 63 | 630 | 828 | 368 | 538 | 84 |
| $25,000 to $39,999 | farms | 1,507 | 17 | 8 | 44 | 70 | 14 | 47 | 5 |
| | $1,000 | 47,606 | 549 | 247 | 1,360 | 2,230 | 409 | 1,413 | 168 |
| $40,000 to $49,999 | farms | 683 | 13 | 5 | 31 | 39 | 5 | 20 | 3 |
| | $1,000 | 30,190 | 590 | 232 | 1,413 | 1,698 | 223 | 872 | 140 |
| $50,000 to $99,999 | farms | 1,729 | 45 | 9 | 77 | 132 | 16 | 38 | 12 |
| | $1,000 | 121,344 | 3,301 | 721 | 5,225 | 9,233 | 1,041 | 2,725 | 813 |
| $100,000 to $249,999 | farms | 1,950 | 66 | 19 | 71 | 131 | 9 | 15 | 17 |
| | $1,000 | 321,930 | 11,235 | 3,151 | 11,303 | 20,856 | 1,443 | 2,573 | 2,325 |
| $250,000 to $499,999 | farms | 1,579 | 77 | 11 | 53 | 108 | 7 | 13 | 19 |
| | $1,000 | 563,523 | 28,247 | 3,969 | 18,261 | 36,435 | 2,353 | 4,439 | 6,935 |
| $500,000 or more | farms | 2,436 | 114 | 5 | 113 | 87 | 3 | 25 | 27 |
| | $1,000 | 5,604,614 | 299,280 | 4,682 | 483,816 | 135,551 | 3,306 | 34,954 | 28,816 |
| Value of sales by commodity or commodity group: | | | | | | | | | |
| Crops, including nursery and greenhouse crops | farms, 2012 | 17,331 | 357 | 67 | 556 | 703 | 206 | 794 | 138 |
| | 2007 | 16,374 | 355 | 55 | 618 | 799 | 202 | 760 | 108 |
| | $1,000, 2012 | 6,492,042 | 339,990 | 16,376 | (D) | 202,854 | 4,136 | 18,856 | 53,936 |
| | 2007 | 4,754,898 | 246,608 | (D) | 470,024 | 205,033 | (D) | 22,354 | 36,224 |
| Grains, oilseeds, dry beans, and dry peas | farms, 2012 | 3,722 | 267 | 43 | 65 | 10 | 6 | 25 | 100 |
| | 2007 | 3,378 | 260 | 28 | 58 | 7 | 6 | 15 | 82 |
| | $1,000, 2012 | 1,473,574 | 144,269 | 14,610 | (D) | 182 | 556 | 489 | 51,125 |
| | 2007 | 958,931 | 87,390 | 6,202 | 44,982 | 121 | 288 | 450 | 34,083 |
| Corn | farms, 2012 | 849 | 68 | - | 21 | 3 | 1 | 12 | 2 |
| | 2007 | 849 | 60 | - | 11 | 3 | 2 | 10 | 2 |
| | $1,000, 2012 | 200,366 | 15,833 | - | 25,542 | (D) | (D) | 160 | (D) |
| | 2007 | 134,673 | 10,498 | - | 13,810 | (D) | (D) | 287 | (D) |
| Wheat | farms, 2012 | 2,870 | 224 | 38 | 48 | 6 | 2 | 10 | 94 |
| | 2007 | 2,591 | 221 | 28 | 46 | 3 | 1 | - | 77 |
| | $1,000, 2012 | 1,056,341 | 116,898 | 13,083 | 50,897 | 174 | (D) | 237 | 41,335 |
| | 2007 | 696,309 | 69,382 | 5,230 | 30,895 | (D) | (D) | - | 27,512 |
| Soybeans | farms, 2012 | 2 | - | - | - | - | - | - | - |
| | 2007 | 11 | - | - | - | - | - | - | - |
| | $1,000, 2012 | (D) | - | - | - | - | - | - | - |
| | 2007 | 642 | - | - | - | - | - | - | - |
| Sorghum | farms, 2012 | 2 | - | - | - | - | - | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| | $1,000, 2012 | (D) | - | - | - | - | - | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| Barley | farms, 2012 | 813 | 11 | 12 | 2 | - | 4 | - | 30 |
| | 2007 | 827 | 19 | 14 | 3 | - | 5 | 1 | 28 |
| | $1,000, 2012 | 61,677 | 791 | 495 | (D) | - | 234 | - | (D) |
| | 2007 | 58,084 | 492 | (D) | 42 | - | 141 | (D) | 3,710 |
| Rice | farms, 2012 | - | - | - | - | - | - | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| | $1,000, 2012 | - | - | - | - | - | - | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| Other grains, oilseeds, dry beans, and dry peas | farms, 2012 | 979 | 56 | 10 | 4 | 1 | 4 | 10 | 39 |
| | 2007 | 816 | 40 | 4 | 6 | 2 | - | 9 | 28 |
| | $1,000, 2012 | 155,009 | 10,747 | 1,031 | (D) | (D) | 12 | 92 | 7,775 |
| | 2007 | 69,223 | 7,018 | (D) | 235 | (D) | - | (D) | (D) |

--continued

Table 2. **Market Value of Agricultural Products Sold Including Direct Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| Total sales (see text) ....farms, 2012 | 492 | 849 | 255 | 883 | 211 | 1,552 | 557 | 377 |
| 2007 | 481 | 955 | 232 | 891 | 239 | 1,858 | 628 | 458 |
| $1,000, 2012 | 28,773 | 199,041 | 5,331 | 740,014 | 48,208 | 1,762,295 | 31,353 | 11,467 |
| 2007 | 26,458 | 193,367 | 2,913 | 467,014 | 26,440 | 1,190,191 | 32,821 | 14,344 |
| Average per farm .... dollars, 2012 | 58,481 | 234,442 | 20,905 | 838,068 | 228,475 | 1,135,499 | 56,289 | 30,416 |
| 2007 | 55,007 | 202,479 | 12,555 | 524,145 | 110,629 | 640,576 | 52,263 | 31,319 |
| 2012 value of sales: | | | | | | | | |
| Less than $1,000 (see text) ....farms | 187 | 275 | 96 | 219 | 82 | 357 | 203 | 132 |
| $1,000 | 37 | 12 | (D) | 13 | (D) | 23 | 37 | 23 |
| $1,000 to $2,499 ....farms | 99 | 34 | 21 | 39 | 8 | 68 | 92 | 69 |
| $1,000 | 164 | 57 | 34 | 70 | 13 | 113 | 150 | 114 |
| $2,500 to $4,999 ....farms | 55 | 46 | 32 | 30 | 5 | 82 | 73 | 45 |
| $1,000 | 209 | 169 | 119 | 106 | 19 | 302 | 275 | 169 |
| $5,000 to $9,999 ....farms | 55 | 25 | 34 | 60 | 9 | 68 | 63 | 40 |
| $1,000 | 401 | 164 | 230 | 393 | 56 | 500 | 467 | 276 |
| $10,000 to $19,999 ....farms | 29 | 33 | 30 | 24 | 10 | 72 | 47 | 51 |
| $1,000 | 385 | 487 | 422 | 371 | 126 | 1,039 | 663 | 700 |
| $20,000 to $24,999 ....farms | 7 | 12 | 7 | 17 | 2 | 19 | 10 | 6 |
| $1,000 | 158 | 255 | 164 | 394 | (D) | 432 | 233 | 129 |
| $25,000 to $39,999 ....farms | 16 | 39 | 8 | 31 | 5 | 46 | 12 | 10 |
| $1,000 | 491 | 1,184 | 244 | 1,001 | 159 | 1,403 | 394 | 306 |
| $40,000 to $49,999 ....farms | 3 | 31 | 6 | 17 | 6 | 33 | 4 | 5 |
| $1,000 | 138 | 1,363 | 272 | 775 | 282 | 1,434 | 185 | 231 |
| $50,000 to $99,999 ....farms | 7 | 51 | 2 | 38 | 6 | 76 | 15 | 6 |
| $1,000 | 527 | 3,639 | (D) | 2,848 | 461 | 5,367 | 1,003 | 450 |
| $100,000 to $249,999 ....farms | 6 | 134 | 15 | 70 | 22 | 155 | 9 | 5 |
| $1,000 | 1,148 | 21,300 | 2,312 | 12,599 | 3,630 | 26,016 | 1,416 | 801 |
| $250,000 to $499,999 ....farms | 7 | 88 | 4 | 75 | 22 | 136 | 14 | 3 |
| $1,000 | 2,742 | 31,389 | 1,415 | 27,314 | 8,248 | 49,202 | 5,056 | 947 |
| $500,000 or more ....farms | 21 | 81 | - | 263 | 34 | 440 | 15 | 5 |
| $1,000 | 22,373 | 139,022 | - | 694,131 | 35,173 | 1,676,465 | 21,473 | 7,320 |
| 2007 value of sales: | | | | | | | | |
| Less than $1,000 (see text) ....farms | 208 | 333 | 100 | 192 | 113 | 475 | 226 | 160 |
| $1,000 | (D) | 15 | 12 | 17 | 7 | 32 | 41 | 16 |
| $1,000 to $2,499 ....farms | 85 | 19 | 23 | 48 | 13 | 108 | 100 | 81 |
| $1,000 | 142 | 35 | 35 | 82 | 24 | 198 | 170 | 129 |
| $2,500 to $4,999 ....farms | 44 | 39 | 34 | 45 | 14 | 81 | 94 | 65 |
| $1,000 | 152 | 135 | 119 | 161 | 47 | 277 | 327 | 235 |
| $5,000 to $9,999 ....farms | 56 | 56 | 19 | 51 | 8 | 112 | 64 | 68 |
| $1,000 | 372 | 395 | 130 | 349 | 65 | 844 | 453 | 482 |
| $10,000 to $19,999 ....farms | 29 | 55 | 22 | 32 | 6 | 82 | 54 | 27 |
| $1,000 | 416 | 807 | 323 | 397 | 95 | 1,176 | 722 | 357 |
| $20,000 to $24,999 ....farms | 7 | 25 | 4 | 15 | 4 | 35 | 10 | 12 |
| $1,000 | 150 | 560 | 92 | 331 | 84 | 760 | 222 | 254 |
| $25,000 to $39,999 ....farms | 15 | 32 | 10 | 23 | 3 | 74 | 21 | 20 |
| $1,000 | 473 | 1,063 | 307 | 727 | 104 | 2,288 | 640 | 617 |
| $40,000 to $49,999 ....farms | 2 | 33 | 3 | 11 | - | 35 | 4 | 1 |
| $1,000 | (D) | 1,475 | 139 | 490 | - | 1,561 | 178 | (D) |
| $50,000 to $99,999 ....farms | 8 | 86 | 8 | 52 | 16 | 85 | 23 | 11 |
| $1,000 | 594 | 6,149 | 537 | 3,762 | 1,239 | 6,121 | 1,678 | 831 |
| $100,000 to $249,999 ....farms | 7 | 119 | 9 | 110 | 22 | 194 | 12 | 3 |
| $1,000 | 1,264 | 19,816 | 1,219 | 18,333 | 3,751 | 33,141 | 2,019 | (D) |
| $250,000 to $499,999 ....farms | 5 | 80 | - | 101 | 26 | 174 | 7 | 1 |
| $1,000 | 1,941 | 28,534 | - | 36,410 | 9,781 | 64,796 | 2,496 | (D) |
| $500,000 or more ....farms | 15 | 78 | - | 211 | 14 | 403 | 13 | 9 |
| $1,000 | 20,828 | 134,384 | - | 405,954 | 11,243 | 1,078,995 | 23,875 | 10,386 |
| Value of sales by commodity or commodity group: | | | | | | | | |
| Crops, including nursery and greenhouse crops ....farms, 2012 | 168 | 530 | 127 | 533 | 107 | 965 | 208 | 167 |
| 2007 | 123 | 563 | 63 | 574 | 90 | 1,089 | 206 | 177 |
| $1,000, 2012 | (D) | 195,912 | 2,880 | 503,196 | 44,328 | 1,333,149 | 16,697 | 3,281 |
| 2007 | 10,635 | 186,924 | 649 | 383,198 | 23,227 | 846,945 | 17,521 | 3,659 |
| Grains, oilseeds, dry beans, and dry peas ....farms, 2012 | 18 | 167 | 9 | 259 | 94 | 413 | 15 | 8 |
| 2007 | 2 | 132 | 6 | 246 | 81 | 462 | 12 | 19 |
| $1,000, 2012 | 1,511 | 52,437 | (D) | (D) | 43,611 | 183,443 | (D) | 719 |
| 2007 | (D) | 39,369 | 128 | (D) | 22,717 | 124,991 | 1,365 | 593 |
| Corn ....farms, 2012 | 7 | 3 | 1 | 141 | - | 228 | 6 | 4 |
| 2007 | - | 2 | - | 147 | - | 274 | 5 | 8 |
| $1,000, 2012 | (D) | (D) | (D) | 32,737 | - | 68,611 | (D) | (D) |
| 2007 | - | (D) | - | 15,615 | - | 49,354 | 1,346 | 170 |
| Wheat ....farms, 2012 | 15 | 159 | 8 | 161 | 94 | 280 | 13 | 1 |
| 2007 | 2 | 131 | 2 | 142 | 78 | 291 | - | 6 |
| $1,000, 2012 | 953 | 49,949 | (D) | 36,580 | 41,482 | 82,765 | (D) | (D) |
| 2007 | (D) | 38,088 | (D) | 26,953 | 19,970 | 62,810 | - | 122 |
| Soybeans ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Sorghum ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Barley ....farms, 2012 | 5 | 10 | 2 | 8 | 33 | 8 | 1 | 5 |
| 2007 | - | 17 | 3 | 3 | 42 | 11 | 6 | 9 |
| $1,000, 2012 | 426 | (D) | (D) | (D) | 1,729 | 246 | (D) | 347 |
| 2007 | - | (D) | (D) | (D) | (D) | 452 | 17 | 301 |
| Rice ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Other grains, oilseeds, dry beans, and dry peas ....farms, 2012 | 1 | 12 | 1 | 53 | 6 | 143 | 1 | 1 |
| 2007 | - | 16 | 3 | 46 | 3 | 113 | 3 | - |
| $1,000, 2012 | (D) | 1,032 | (D) | 6,322 | 399 | 31,821 | (D) | (D) |
| 2007 | - | 553 | (D) | (D) | (D) | 12,374 | 3 | - |

--continued

Table 2. **Market Value of Agricultural Products Sold Including Direct Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Total sales (see text) ..... farms, 2012 | 221 | 1,837 | 706 | 1,006 | 760 | 1,647 | 897 | 377 |
| 2007 | 211 | 1,790 | 664 | 1,038 | 893 | 1,717 | 798 | 471 |
| $1,000, 2012 | 7,657 | 120,749 | 5,304 | 68,911 | 72,387 | 132,328 | 183,244 | 40,809 |
| 2007 | 8,689 | 127,269 | 6,985 | 60,949 | 57,298 | 109,996 | 126,216 | 36,963 |
| Average per farm ..... dollars, 2012 | 34,648 | 65,732 | 7,513 | 68,500 | 95,247 | 80,345 | 204,286 | 108,247 |
| 2007 | 41,179 | 71,100 | 10,520 | 58,717 | 64,163 | 64,063 | 158,165 | 78,478 |
| 2012 value of sales: | | | | | | | | |
| Less than $1,000 (see text) ..... farms | 50 | 727 | 292 | 326 | 290 | 555 | 391 | 144 |
| $1,000 | 6 | 97 | 44 | 35 | 36 | 91 | 30 | 27 |
| $1,000 to $2,499 ..... farms | 34 | 250 | 118 | 94 | 74 | 279 | 34 | 54 |
| $1,000 | 62 | 421 | (D) | 158 | 123 | 460 | 53 | 89 |
| $2,500 to $4,999 ..... farms | 26 | 248 | 114 | 124 | 59 | 237 | 27 | 47 |
| $1,000 | 93 | 868 | 410 | 428 | 210 | 873 | 101 | 169 |
| $5,000 to $9,999 ..... farms | 38 | 194 | 81 | 105 | 97 | 181 | 28 | 39 |
| $1,000 | 255 | 1,342 | 544 | 707 | 687 | 1,285 | 198 | 264 |
| $10,000 to $19,999 ..... farms | 30 | 170 | 48 | 97 | 62 | 137 | 33 | 26 |
| $1,000 | 399 | 2,267 | 631 | 1,406 | 844 | 1,886 | 499 | 337 |
| $20,000 to $24,999 ..... farms | 6 | 25 | 6 | 22 | 10 | 30 | 9 | 12 |
| $1,000 | 132 | 541 | 132 | 478 | 232 | 666 | 209 | 264 |
| $25,000 to $39,999 ..... farms | 11 | 67 | 17 | 41 | 29 | 49 | 19 | 9 |
| $1,000 | 351 | 2,090 | 538 | 1,245 | 903 | 1,580 | 627 | 280 |
| $40,000 to $49,999 ..... farms | 4 | 26 | 9 | 35 | 18 | 22 | 9 | 3 |
| $1,000 | 180 | 1,146 | 415 | 1,549 | 766 | 956 | 393 | 138 |
| $50,000 to $99,999 ..... farms | 6 | 46 | 11 | 39 | 34 | 53 | 44 | 10 |
| $1,000 | 427 | 2,993 | 654 | 2,916 | 2,322 | 3,806 | 3,060 | 693 |
| $100,000 to $249,999 ..... farms | 12 | 41 | 8 | 57 | 33 | 32 | 78 | 17 |
| $1,000 | 2,330 | 6,803 | 1,178 | 9,612 | 6,009 | 4,783 | 13,010 | 2,803 |
| $250,000 to $499,999 ..... farms | 2 | 6 | 2 | 28 | 28 | 25 | 90 | 3 |
| $1,000 | (D) | 2,067 | (D) | 9,605 | 9,702 | 9,475 | 32,666 | 1,081 |
| $500,000 or more ..... farms | 2 | 37 | - | 38 | 26 | 47 | 135 | 13 |
| $1,000 | (D) | 100,114 | - | 40,771 | 50,555 | 106,466 | 132,398 | 34,665 |
| 2007 value of sales: | | | | | | | | |
| Less than $1,000 (see text) ..... farms | 68 | 708 | 259 | 327 | 355 | 672 | 328 | 177 |
| $1,000 | (D) | 112 | 29 | 43 | 52 | 117 | 21 | 28 |
| $1,000 to $2,499 ..... farms | 30 | 265 | 91 | 124 | 128 | 240 | 24 | 70 |
| $1,000 | 49 | 454 | 158 | 199 | 206 | 401 | 34 | 115 |
| $2,500 to $4,999 ..... farms | 26 | 169 | 109 | 90 | 100 | 271 | 24 | 55 |
| $1,000 | 97 | 590 | 381 | 296 | 344 | 986 | 87 | 196 |
| $5,000 to $9,999 ..... farms | 30 | 199 | 91 | 135 | 56 | 185 | 29 | 52 |
| $1,000 | 208 | 1,379 | 598 | 974 | 380 | 1,311 | 216 | 356 |
| $10,000 to $19,999 ..... farms | 28 | 137 | 40 | 85 | 59 | 115 | 27 | 34 |
| $1,000 | 372 | 1,900 | 529 | 1,119 | 822 | 1,646 | 399 | 462 |
| $20,000 to $24,999 ..... farms | 6 | 37 | 13 | 22 | 21 | 29 | 15 | 8 |
| $1,000 | 130 | 797 | 292 | 475 | 460 | 642 | 333 | 176 |
| $25,000 to $39,999 ..... farms | 6 | 104 | 26 | 56 | 32 | 50 | 22 | 13 |
| $1,000 | 198 | 3,349 | 790 | 1,776 | 971 | 1,617 | 735 | 406 |
| $40,000 to $49,999 ..... farms | - | 27 | 9 | 25 | 18 | 26 | 13 | 12 |
| $1,000 | - | 1,218 | 395 | 1,097 | 771 | 1,147 | 560 | 525 |
| $50,000 to $99,999 ..... farms | 7 | 46 | 18 | 57 | 43 | 36 | 38 | 15 |
| $1,000 | 487 | 3,076 | 1,110 | 3,850 | 3,040 | 2,563 | 2,870 | 944 |
| $100,000 to $249,999 ..... farms | 4 | 38 | 3 | 57 | 40 | 28 | 87 | 15 |
| $1,000 | 485 | 5,711 | (D) | 9,627 | 6,457 | 4,471 | 14,896 | 2,144 |
| $250,000 to $499,999 ..... farms | 5 | 20 | 4 | 28 | 21 | 20 | 101 | 9 |
| $1,000 | (D) | 6,897 | 1,418 | 10,260 | 7,166 | 7,436 | 35,041 | 3,369 |
| $500,000 or more ..... farms | 1 | 40 | 1 | 32 | 20 | 45 | 90 | 11 |
| $1,000 | (D) | 101,785 | (D) | 31,233 | 36,628 | 87,657 | 71,025 | 28,243 |
| Value of sales by commodity or commodity group: | | | | | | | | |
| Crops, including nursery and greenhouse crops ..... farms, 2012 | 88 | 652 | 289 | 425 | 343 | 647 | 439 | 121 |
| 2007 | 78 | 497 | 243 | 426 | 304 | 541 | 385 | 113 |
| $1,000, 2012 | 1,740 | 44,012 | 3,714 | 47,157 | 58,114 | 29,075 | 173,610 | 2,513 |
| 2007 | 1,119 | 45,696 | 5,271 | 38,735 | 43,868 | 28,774 | 117,744 | 1,606 |
| Grains, oilseeds, dry beans, and dry peas ..... farms, 2012 | - | 23 | - | 41 | 87 | 33 | 345 | - |
| 2007 | 1 | 15 | 9 | 28 | 79 | 13 | 321 | 3 |
| $1,000, 2012 | - | 708 | - | (D) | 10,100 | 1,851 | 159,305 | - |
| 2007 | (D) | 444 | (D) | 829 | 8,650 | 329 | 106,123 | (Z) |
| Corn ..... farms, 2012 | - | 10 | - | 3 | - | 4 | 3 | - |
| 2007 | - | 12 | - | 5 | 5 | 2 | 4 | 3 |
| $1,000, 2012 | - | 684 | - | (D) | - | 323 | 337 | - |
| 2007 | - | (D) | - | (D) | 514 | (D) | (D) | (Z) |
| Wheat ..... farms, 2012 | - | 3 | - | 28 | 78 | 20 | 327 | - |
| 2007 | - | 3 | 1 | 12 | 74 | 2 | 307 | - |
| $1,000, 2012 | - | 2 | - | 1,890 | 9,164 | 1,192 | 144,337 | - |
| 2007 | - | (D) | (D) | 476 | 7,411 | (D) | 95,316 | - |
| Soybeans ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | 1 | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | (D) | - |
| Sorghum ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Barley ..... farms, 2012 | - | 3 | - | 2 | 11 | 18 | 104 | - |
| 2007 | - | - | 2 | 1 | 15 | 7 | 114 | - |
| $1,000, 2012 | - | (Z) | - | (D) | (D) | 175 | 11,143 | - |
| 2007 | - | - | (D) | (D) | (D) | 108 | 8,957 | - |
| Rice ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Other grains, oilseeds, dry beans, and dry peas ..... farms, 2012 | - | 10 | - | 12 | 9 | 9 | 32 | - |
| 2007 | 1 | - | 6 | 15 | 3 | 6 | 35 | - |
| $1,000, 2012 | - | 22 | - | (D) | (D) | 161 | 3,488 | - |
| 2007 | (D) | - | 2 | 219 | (D) | 47 | 966 | - |

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Table 2. **Market Value of Agricultural Products Sold Including Direct Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Total sales (see text) ....farms, 2012 | 1,449 | 330 | 288 | 1,478 | 274 | 1,074 | 144 | 1,438 |
| 2007 | 1,662 | 390 | 316 | 1,448 | 291 | 1,215 | 123 | 1,670 |
| $1,000, 2012 | 287,120 | 36,782 | 3,954 | 90,933 | 4,245 | 272,275 | 5,538 | 139,486 |
| 2007 | 208,758 | 34,996 | 2,818 | 83,402 | 3,617 | 256,248 | 2,661 | 125,619 |
| Average per farm .... dollars, 2012 | 198,150 | 111,460 | 13,730 | 61,524 | 15,492 | 253,515 | 38,456 | 97,000 |
| 2007 | 125,606 | 89,734 | 8,917 | 57,598 | 12,431 | 210,904 | 21,635 | 75,221 |
| 2012 value of sales: | | | | | | | | |
| Less than $1,000 (see text) ....farms | 382 | 95 | 98 | 627 | 62 | 309 | 50 | 589 |
| $1,000 | 44 | 22 | 18 | 80 | 12 | 38 | 12 | 68 |
| $1,000 to $2,499 ....farms | 160 | 28 | 48 | 237 | 42 | 177 | 25 | 211 |
| $1,000 | 279 | 47 | 82 | 387 | (D) | 308 | (D) | 347 |
| $2,500 to $4,999 ....farms | 156 | 31 | 45 | 182 | 46 | 159 | 13 | 193 |
| $1,000 | 572 | 112 | 162 | 661 | 168 | 571 | 42 | 707 |
| $5,000 to $9,999 ....farms | 141 | 33 | 53 | 168 | 31 | 116 | 20 | 132 |
| $1,000 | 991 | 228 | 391 | 1,151 | 227 | 795 | 136 | 918 |
| $10,000 to $19,999 ....farms | 96 | 36 | 18 | 135 | 46 | 61 | 17 | 94 |
| $1,000 | 1,286 | 544 | 275 | 1,867 | 645 | 892 | 262 | 1,325 |
| $20,000 to $24,999 ....farms | 32 | 9 | 5 | 16 | 8 | 32 | - | 36 |
| $1,000 | 692 | 194 | 110 | 350 | 171 | 698 | - | 798 |
| $25,000 to $39,999 ....farms | 72 | 15 | 7 | 35 | 11 | 28 | 3 | 33 |
| $1,000 | 2,231 | 437 | 218 | 1,110 | 360 | 882 | 99 | 1,044 |
| $40,000 to $49,999 ....farms | 32 | 3 | 1 | 7 | 11 | 17 | 2 | 20 |
| $1,000 | 1,379 | 139 | (D) | 313 | 515 | 771 | (D) | 911 |
| $50,000 to $99,999 ....farms | 73 | 27 | 6 | 26 | 9 | 44 | 4 | 36 |
| $1,000 | 5,266 | 1,950 | 383 | 2,038 | 668 | 2,964 | (D) | 2,556 |
| $100,000 to $249,999 ....farms | 145 | 26 | 4 | 14 | 6 | 41 | 4 | 33 |
| $1,000 | 24,290 | 4,397 | 684 | 2,042 | 775 | 6,306 | 675 | 4,872 |
| $250,000 to $499,999 ....farms | 71 | 13 | 2 | 14 | 2 | 16 | 2 | 19 |
| $1,000 | 24,378 | 4,414 | (D) | 5,492 | (D) | 5,871 | (D) | 6,743 |
| $500,000 or more ....farms | 89 | 14 | 1 | 17 | - | 74 | 4 | 42 |
| $1,000 | 225,713 | 24,299 | (D) | 75,441 | - | 252,181 | 3,045 | 119,197 |
| 2007 value of sales: | | | | | | | | |
| Less than $1,000 (see text) ....farms | 575 | 121 | 159 | 662 | 76 | 418 | 58 | 690 |
| $1,000 | 72 | 28 | 27 | 128 | 12 | 74 | 21 | 108 |
| $1,000 to $2,499 ....farms | 163 | 45 | 69 | 210 | 34 | 199 | 14 | 296 |
| $1,000 | 277 | 78 | 114 | 348 | 53 | 336 | 26 | 501 |
| $2,500 to $4,999 ....farms | 145 | 38 | 27 | 182 | 49 | 143 | 12 | 171 |
| $1,000 | 521 | 144 | 89 | 650 | 186 | 501 | 45 | 584 |
| $5,000 to $9,999 ....farms | 148 | 38 | 22 | 161 | 54 | 133 | 10 | 135 |
| $1,000 | 1,020 | 265 | 147 | 1,107 | 372 | 946 | 65 | 967 |
| $10,000 to $19,999 ....farms | 129 | 33 | 17 | 74 | 37 | 83 | 8 | 103 |
| $1,000 | 1,774 | 431 | 227 | 1,015 | 570 | 1,131 | 116 | 1,357 |
| $20,000 to $24,999 ....farms | 41 | 5 | 2 | 22 | 2 | 22 | 5 | 43 |
| $1,000 | 918 | 115 | (D) | 476 | (D) | 496 | 105 | 937 |
| $25,000 to $39,999 ....farms | 97 | 21 | 7 | 28 | 16 | 19 | 4 | 55 |
| $1,000 | 3,019 | 652 | 219 | 830 | 502 | 602 | 118 | 1,726 |
| $40,000 to $49,999 ....farms | 39 | 10 | 1 | 11 | 6 | 19 | 1 | 28 |
| $1,000 | 1,748 | 428 | (D) | 497 | 260 | 865 | (D) | 1,208 |
| $50,000 to $99,999 ....farms | 71 | 23 | 8 | 33 | 15 | 48 | 5 | 38 |
| $1,000 | 5,252 | 1,626 | 508 | 2,210 | 1,015 | 3,323 | 342 | 2,813 |
| $100,000 to $249,999 ....farms | 104 | 31 | 2 | 22 | 1 | 33 | 3 | 35 |
| $1,000 | 16,369 | 4,630 | (D) | 3,411 | (D) | 5,514 | 449 | 5,827 |
| $250,000 to $499,999 ....farms | 77 | 9 | - | 14 | 1 | 27 | 2 | 22 |
| $1,000 | 25,482 | 3,091 | - | 5,068 | (D) | 9,326 | (D) | 7,679 |
| $500,000 or more ....farms | 73 | 16 | 2 | 29 | - | 71 | 1 | 54 |
| $1,000 | 152,307 | 23,510 | (D) | 67,663 | - | 233,133 | (D) | 101,914 |
| Value of sales by commodity or commodity group: | | | | | | | | |
| Crops, including nursery and greenhouse crops ....farms, 2012 | 845 | 166 | 148 | 463 | 160 | 470 | 66 | 476 |
| 2007 | 747 | 167 | 91 | 365 | 154 | 467 | 33 | 477 |
| $1,000, 2012 | 249,837 | 7,437 | 2,315 | 23,896 | 2,582 | 201,007 | 1,535 | 63,216 |
| 2007 | 184,192 | 7,215 | 1,264 | 32,323 | 1,688 | 174,169 | 1,014 | 58,876 |
| Grains, oilseeds, dry beans, and dry peas ....farms, 2012 | 40 | 1 | 1 | 9 | 7 | 58 | - | 31 |
| 2007 | 39 | 3 | 2 | - | 2 | 61 | - | 21 |
| $1,000, 2012 | 5,049 | (D) | (D) | 106 | (D) | 7,462 | - | 2,439 |
| 2007 | 3,807 | (D) | (D) | - | (D) | 4,204 | - | 1,811 |
| Corn ....farms, 2012 | 9 | 1 | - | 5 | - | 17 | - | 20 |
| 2007 | 4 | - | - | - | - | 28 | - | 15 |
| $1,000, 2012 | 356 | (D) | - | (D) | - | 2,371 | - | 1,556 |
| 2007 | (D) | - | - | - | - | 1,282 | - | 1,504 |
| Wheat ....farms, 2012 | 19 | 1 | - | 3 | 5 | 30 | - | 9 |
| 2007 | 21 | 1 | - | - | - | 28 | - | 5 |
| $1,000, 2012 | 4,119 | (D) | - | (D) | (D) | 3,864 | - | 655 |
| 2007 | 3,148 | (D) | - | - | - | 2,489 | - | 106 |
| Soybeans ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Sorghum ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Barley ....farms, 2012 | 9 | - | 1 | - | 2 | 29 | - | 9 |
| 2007 | 7 | - | 1 | - | 1 | 20 | - | 7 |
| $1,000, 2012 | 416 | - | (D) | - | (D) | 1,205 | - | 151 |
| 2007 | (D) | - | (D) | - | (D) | 406 | - | 171 |
| Rice ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Other grains, oilseeds, dry beans, and dry peas ....farms, 2012 | 14 | - | - | 5 | - | 6 | - | 11 |
| 2007 | 19 | 2 | 1 | - | 1 | 9 | - | 3 |
| $1,000, 2012 | 158 | - | - | 3 | - | 22 | - | 77 |
| 2007 | 429 | (D) | (D) | - | (D) | 27 | - | 31 |

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Table 2. **Market Value of Agricultural Products Sold Including Direct Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|---|
| Total sales (see text) | farms, 2012 | 2,501 | 1,148 | 1,336 | 109 | 943 | 1,702 | 1,195 | 3,143 |
| | 2007 | 2,502 | 1,258 | 1,288 | 119 | 929 | 1,483 | 1,247 | 3,540 |
| | $1,000, 2012 | 149,760 | 36,346 | 122,423 | 3,487 | 437,359 | 357,312 | 370,801 | 1,645,510 |
| | 2007 | 117,065 | 24,530 | 117,885 | 3,067 | 344,489 | 326,450 | 254,031 | 1,203,806 |
| Average per farm | dollars, 2012 | 59,880 | 31,660 | 91,634 | 31,993 | 463,796 | 209,937 | 310,294 | 523,548 |
| | 2007 | 46,789 | 19,499 | 91,525 | 25,773 | 370,818 | 220,128 | 203,714 | 340,058 |
| 2012 value of sales: | | | | | | | | | |
| Less than $1,000 (see text) | farms | 938 | 376 | 512 | 29 | 336 | 482 | 440 | 821 |
| | $1,000 | 121 | 70 | 69 | (D) | 16 | 72 | 18 | 140 |
| $1,000 to $2,499 | farms | 304 | 155 | 234 | 13 | 72 | 277 | 57 | 254 |
| | $1,000 | 511 | 259 | 391 | 25 | 121 | 474 | 92 | 435 |
| $2,500 to $4,999 | farms | 338 | 107 | 153 | 18 | 76 | 247 | 54 | 308 |
| | $1,000 | 1,222 | 374 | 551 | 70 | 260 | 859 | 205 | 1,128 |
| $5,000 to $9,999 | farms | 280 | 139 | 177 | 15 | 61 | 165 | 40 | 324 |
| | $1,000 | 2,004 | 964 | 1,210 | 112 | 428 | 1,153 | 299 | 2,243 |
| $10,000 to $19,999 | farms | 148 | 121 | 98 | 13 | 75 | 118 | 28 | 261 |
| | $1,000 | 2,050 | 1,652 | 1,325 | 170 | 1,055 | 1,653 | 417 | 3,592 |
| $20,000 to $24,999 | farms | 62 | 30 | 19 | 1 | 20 | 26 | 7 | 71 |
| | $1,000 | 1,394 | 686 | 409 | (D) | 447 | 561 | 151 | 1,579 |
| $25,000 to $39,999 | farms | 90 | 59 | 31 | 5 | 27 | 53 | 19 | 129 |
| | $1,000 | 2,895 | 1,852 | 969 | 150 | 877 | 1,683 | 671 | 4,058 |
| $40,000 to $49,999 | farms | 27 | 27 | 13 | 2 | 15 | 25 | 16 | 90 |
| | $1,000 | 1,194 | 1,211 | 569 | (D) | 652 | 1,107 | 722 | 3,997 |
| $50,000 to $99,999 | farms | 82 | 50 | 30 | 5 | 39 | 46 | 51 | 180 |
| | $1,000 | 5,791 | 3,549 | 2,057 | 387 | 2,618 | 3,494 | 3,920 | 12,681 |
| $100,000 to $249,999 | farms | 111 | 63 | 32 | 5 | 84 | 88 | 133 | 255 |
| | $1,000 | 17,936 | 10,203 | 5,252 | 818 | 13,522 | 14,526 | 23,064 | 41,100 |
| $250,000 to $499,999 | farms | 38 | 10 | 8 | 1 | 32 | 49 | 106 | 127 |
| | $1,000 | 13,316 | 3,569 | 2,794 | (D) | 11,109 | 17,553 | 39,704 | 44,846 |
| $500,000 or more | farms | 83 | 11 | 29 | 2 | 106 | 126 | 244 | 323 |
| | $1,000 | 101,327 | 11,957 | 106,827 | (D) | 406,254 | 314,178 | 301,540 | 1,529,711 |
| 2007 value of sales: | | | | | | | | | |
| Less than $1,000 (see text) | farms | 1,087 | 484 | 516 | 36 | 327 | 489 | 495 | 670 |
| | $1,000 | 150 | 66 | 69 | 4 | 21 | 99 | 25 | 107 |
| $1,000 to $2,499 | farms | 322 | 156 | 200 | 18 | 95 | 183 | 63 | 319 |
| | $1,000 | 519 | 266 | 324 | 32 | 155 | 304 | 101 | 532 |
| $2,500 to $4,999 | farms | 261 | 133 | 167 | 22 | 93 | 136 | 29 | 336 |
| | $1,000 | 893 | 471 | 578 | 81 | 335 | 476 | 102 | 1,213 |
| $5,000 to $9,999 | farms | 242 | 151 | 161 | 11 | 80 | 138 | 38 | 352 |
| | $1,000 | 1,716 | 1,075 | 1,105 | 86 | 557 | 962 | 257 | 2,423 |
| $10,000 to $19,999 | farms | 160 | 108 | 71 | 11 | 35 | 110 | 35 | 314 |
| | $1,000 | 2,253 | 1,543 | 1,000 | 175 | 507 | 1,569 | 472 | 4,446 |
| $20,000 to $24,999 | farms | 49 | 31 | 29 | 4 | 12 | 28 | 14 | 141 |
| | $1,000 | 1,087 | 686 | 638 | 86 | 272 | 609 | 314 | 3,087 |
| $25,000 to $39,999 | farms | 74 | 87 | 29 | 7 | 26 | 69 | 39 | 217 |
| | $1,000 | 2,410 | 2,770 | 922 | 226 | 845 | 2,203 | 1,245 | 6,878 |
| $40,000 to $49,999 | farms | 26 | 14 | 25 | 1 | 16 | 25 | 13 | 113 |
| | $1,000 | 1,129 | 622 | 1,106 | (D) | 721 | 1,099 | 589 | 4,933 |
| $50,000 to $99,999 | farms | 74 | 48 | 29 | 4 | 32 | 56 | 60 | 307 |
| | $1,000 | 5,051 | 3,378 | 2,029 | 263 | 2,229 | 3,831 | 4,582 | 20,982 |
| $100,000 to $249,999 | farms | 74 | 32 | 25 | 1 | 58 | 54 | 131 | 268 |
| | $1,000 | 12,457 | 4,928 | 4,645 | (D) | 10,044 | 9,619 | 22,769 | 43,162 |
| $250,000 to $499,999 | farms | 76 | 8 | 9 | 2 | 67 | 55 | 161 | 159 |
| | $1,000 | 27,147 | 3,134 | 3,499 | (D) | 24,885 | 20,186 | 57,958 | 55,956 |
| $500,000 or more | farms | 57 | 6 | 27 | 2 | 88 | 140 | 169 | 344 |
| | $1,000 | 62,254 | 5,591 | 101,971 | (D) | 303,919 | 285,494 | 165,615 | 1,060,088 |
| Value of sales by commodity or commodity group: | | | | | | | | | |
| Crops, including nursery and greenhouse crops | farms, 2012 | 1,173 | 580 | 457 | 39 | 479 | 751 | 659 | 1,769 |
| | 2007 | 1,011 | 448 | 321 | 25 | 418 | 539 | 650 | 2,092 |
| | $1,000, 2012 | 132,862 | 17,401 | 48,843 | 288 | (D) | 119,816 | 352,378 | 1,069,497 |
| | 2007 | 98,523 | 11,676 | 42,984 | 220 | (D) | 99,897 | 243,659 | 787,459 |
| Grains, oilseeds, dry beans, and dry peas | farms, 2012 | 327 | 100 | 7 | - | 265 | 71 | 563 | 214 |
| | 2007 | 276 | 61 | 9 | - | 229 | 53 | 548 | 189 |
| | $1,000, 2012 | 97,709 | 4,931 | 3 | - | 128,721 | 4,687 | 346,691 | 52,796 |
| | 2007 | 63,873 | 1,947 | 7 | - | 82,068 | 2,662 | 236,885 | 38,571 |
| Corn | farms, 2012 | 4 | 1 | 2 | - | 37 | 63 | 1 | 172 |
| | 2007 | 6 | 3 | 8 | - | 20 | 51 | 9 | 150 |
| | $1,000, 2012 | (D) | (D) | (D) | - | (D) | 4,217 | (D) | 41,609 |
| | 2007 | (D) | 54 | (D) | - | 5,244 | 2,432 | 544 | 29,122 |
| Wheat | farms, 2012 | 276 | 65 | - | - | 238 | 15 | 523 | 77 |
| | 2007 | 231 | 31 | - | - | 213 | 8 | 534 | 92 |
| | $1,000, 2012 | 75,326 | 3,048 | - | - | 112,689 | 432 | 252,450 | 10,863 |
| | 2007 | 46,523 | 1,368 | - | - | 71,664 | (D) | 177,192 | 8,934 |
| Soybeans | farms, 2012 | - | - | - | - | 2 | - | - | - |
| | 2007 | 1 | - | - | - | 8 | - | - | 1 |
| | $1,000, 2012 | - | - | - | - | (D) | - | - | - |
| | 2007 | (D) | - | - | - | (D) | - | - | (D) |
| Sorghum | farms, 2012 | 1 | - | - | - | - | 1 | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| | $1,000, 2012 | (D) | - | - | - | - | (D) | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| Barley | farms, 2012 | 122 | 58 | - | - | 14 | 3 | 293 | 4 |
| | 2007 | 122 | 37 | 1 | - | 23 | 2 | 304 | 2 |
| | $1,000, 2012 | (D) | 1,641 | - | - | (D) | (D) | (D) | (D) |
| | 2007 | (D) | 480 | (D) | - | (D) | (D) | 30,909 | (D) |
| Rice | farms, 2012 | - | - | - | - | - | - | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| | $1,000, 2012 | - | - | - | - | - | - | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| Other grains, oilseeds, dry beans, and dry peas | farms, 2012 | 129 | 29 | 6 | - | 65 | 4 | 286 | 10 |
| | 2007 | 112 | 24 | - | - | 38 | - | 250 | 18 |
| | $1,000, 2012 | 15,086 | (D) | (D) | - | 11,810 | (D) | 62,418 | (D) |
| | 2007 | 9,716 | 45 | - | - | 3,481 | - | 28,241 | 484 |

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Table 2. **Market Value of Agricultural Products Sold Including Direct Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Total sales (see text) - Con. | | | | | | | | |
| Value of sales by commodity or commodity group - Con. | | | | | | | | |
| Crops, including nursery and greenhouse crops - Con. | | | | | | | | |
| Tobacco ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Cotton and cottonseed ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Vegetables, melons, potatoes, and sweet potatoes ....farms, 2012 | 2,928 | 53 | 5 | 61 | 40 | 43 | 176 | 6 |
| 2007 | 2,082 | 47 | 3 | 47 | 14 | 47 | 104 | 6 |
| $1,000, 2012 | 1,064,081 | 101,230 | (D) | 257,939 | 215 | 1,421 | (D) | (D) |
| 2007 | 809,963 | 91,259 | (D) | 168,673 | 237 | (D) | 716 | (D) |
| Fruits, tree nuts, and berries ....farms, 2012 | 5,495 | 39 | 9 | 358 | 632 | 60 | 217 | 2 |
| 2007 | 5,988 | 41 | 13 | 421 | 753 | 62 | 215 | 4 |
| $1,000, 2012 | 2,931,370 | 64,295 | (D) | 324,159 | 201,840 | (D) | 6,838 | (D) |
| 2007 | 2,081,031 | 40,955 | (D) | 204,764 | 203,744 | (D) | 9,858 | (D) |
| Fruits and tree nut....farms, 2012 | 4,391 | 38 | 6 | 342 | 619 | 39 | 95 | 2 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 2,779,675 | (D) | (D) | (D) | 201,388 | (D) | 1,263 | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Berries ....farms, 2012 | 1,480 | 2 | 3 | 32 | 32 | 32 | 148 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 151,695 | (D) | 6 | (D) | 452 | 361 | 5,574 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Nursery, greenhouse, floriculture, and sod (see text) ....farms, 2012 | 1,631 | 4 | 7 | 20 | 15 | 46 | 107 | - |
| 2007 | 1,472 | 3 | 3 | 34 | 19 | 39 | 98 | 2 |
| $1,000, 2012 | 333,252 | 112 | (D) | 1,290 | 166 | 867 | 5,691 | - |
| 2007 | 327,046 | (D) | (D) | (D) | 565 | 1,206 | 6,556 | (D) |
| Cut Christmas trees and short-rotation woody crops ....farms, 2012 | 518 | - | 1 | 3 | 6 | 5 | 58 | - |
| 2007 | 534 | 1 | - | 2 | 6 | 8 | 69 | - |
| $1,000, 2012 | 18,925 | - | (D) | (Z) | 18 | (D) | (D) | - |
| 2007 | 23,225 | (D) | - | (D) | 43 | 100 | 2,976 | - |
| Cut Christmas trees....farms, 2012 | 480 | - | - | 3 | 4 | 5 | 56 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | - | - | (Z) | (D) | (D) | (D) | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Short rotation woody crops....farms, 2012 | 48 | - | 1 | - | 2 | - | 2 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | - | (D) | - | (D) | - | (D) | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Other crops and hay (see text) ....farms, 2012 | 7,202 | 99 | 33 | 144 | 47 | 100 | 368 | 48 |
| 2007 | 6,900 | 121 | 15 | 172 | 38 | 97 | 429 | 34 |
| $1,000, 2012 | 670,840 | 30,084 | 669 | (D) | 432 | 649 | 2,735 | 1,119 |
| 2007 | 554,702 | (D) | (D) | (D) | 322 | 977 | 1,798 | 595 |
| Maple syrup (see text) ....farms, 2012 | 4 | - | - | - | - | - | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (Z) | - | - | - | - | - | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Livestock, poultry, and their products ....farms, 2012 | 14,488 | 129 | 77 | 647 | 137 | 257 | 856 | 91 |
| 2007 | 17,178 | 180 | 105 | 648 | 128 | 293 | 1,033 | 85 |
| $1,000, 2012 | 2,628,708 | 90,164 | 4,133 | (D) | 3,625 | 6,511 | 32,005 | 3,797 |
| 2007 | 2,037,958 | 97,522 | (D) | 55,894 | 3,767 | (D) | 30,337 | 3,595 |
| Poultry and eggs ....farms, 2012 | 3,282 | 14 | 5 | 64 | 40 | 70 | 260 | 7 |
| 2007 | 3,810 | 25 | 17 | 85 | 41 | 78 | 309 | 8 |
| $1,000, 2012 | 261,992 | (D) | 3 | 361 | 20 | 75 | 7,774 | 3 |
| 2007 | 228,825 | (D) | 23 | 422 | 29 | 57 | 10,640 | 4 |
| Cattle and calves ....farms, 2012 | 8,420 | 104 | 58 | 421 | 45 | 119 | 476 | 64 |
| 2007 | 9,521 | 133 | 66 | 391 | 39 | 123 | 547 | 60 |
| $1,000, 2012 | 994,835 | (D) | 3,881 | (D) | 338 | (D) | 8,002 | 2,511 |
| 2007 | 716,720 | 32,270 | (D) | 48,151 | 1,365 | 1,504 | 5,439 | 2,414 |
| Milk from cows (see text) ....farms, 2012 | 427 | 6 | - | 2 | - | 2 | 9 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 1,136,856 | (D) | - | (D) | - | (D) | 14,525 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Hogs and pigs ....farms, 2012 | 1,303 | 5 | 7 | 39 | 21 | 27 | 68 | 9 |
| 2007 | 1,596 | 21 | 11 | 68 | 15 | 30 | 62 | 7 |
| $1,000, 2012 | 4,542 | (D) | 4 | 345 | 38 | 73 | (D) | 9 |
| 2007 | 5,921 | 132 | 8 | 378 | 122 | 25 | 37 | 58 |
| Sheep, goats, wool, mohair, and milk (see text) ....farms, 2012 | 1,941 | 8 | 7 | 91 | 27 | 45 | 108 | 6 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 9,605 | 96 | 10 | 209 | 84 | 73 | 309 | 83 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Horses, ponies, mules, burros, and donkeys ....farms, 2012 | 1,977 | 10 | 19 | 119 | 23 | 24 | 112 | 9 |
| 2007 | 2,938 | 20 | 23 | 123 | 26 | 49 | 167 | 13 |
| $1,000, 2012 | 17,899 | 19 | (D) | 1,052 | 115 | 115 | 749 | 143 |
| 2007 | 26,134 | 54 | 126 | (D) | 238 | 236 | 917 | (D) |
| Aquaculture (see text) .... farms, 2012 | 381 | - | 1 | 1 | 11 | 16 | 2 | 3 |
| 2007 | 355 | - | - | 1 | 11 | 16 | 7 | 2 |
| $1,000, 2012 | 187,222 | - | (D) | (D) | 3,000 | 2,331 | (D) | 888 |
| 2007 | 162,867 | - | - | (D) | 1,988 | (D) | (D) | (D) |
| Other animals and other animal products (see text) ....farms, 2012 | 1,029 | 11 | 4 | 41 | 13 | 17 | 72 | 8 |
| 2007 | 1,398 | 4 | 10 | 31 | 6 | 48 | 83 | 6 |
| $1,000, 2012 | 15,758 | 86 | (D) | 225 | 30 | 75 | 361 | 159 |
| 2007 | 17,388 | (Z) | (D) | 158 | (D) | 209 | (D) | 116 |
| Value of agricultural products sold directly to individuals for human consumption (see text) ....farms, 2012 | 5,640 | 27 | 16 | 188 | 135 | 112 | 410 | 20 |
| 2007 | 5,418 | 35 | 20 | 170 | 85 | 131 | 413 | 13 |
| $1,000, 2012 | 45,124 | 115 | 278 | 862 | 1,269 | 412 | 2,093 | 58 |
| 2007 | 43,537 | 1,174 | 59 | 783 | 1,326 | 454 | 1,586 | 53 |

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Table 2. **Market Value of Agricultural Products Sold Including Direct Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|---|
| Total sales (see text) - Con. | | | | | | | | | |
| Value of sales by commodity or commodity group - Con. | | | | | | | | | |
| Crops, including nursery and greenhouse crops - Con. | | | | | | | | | |
| Tobacco | farms, 2012 | - | - | - | - | - | - | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| | $1,000, 2012 | - | - | - | - | - | - | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| Cotton and cottonseed | farms, 2012 | - | - | - | - | - | - | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| | $1,000, 2012 | - | - | - | - | - | - | - | - |
| | 2007 | - | - | - | - | - | - | - | - |
| Vegetables, melons, potatoes, and sweet potatoes | farms, 2012 | 42 | 15 | 7 | 146 | 3 | 227 | 47 | 64 |
| | 2007 | 23 | 11 | 7 | 133 | - | 224 | 30 | 40 |
| | $1,000, 2012 | (D) | (D) | (D) | 160,613 | (D) | 293,074 | 4,238 | 1,011 |
| | 2007 | 1,202 | 68 | (D) | 130,558 | - | 205,070 | 2,086 | 1,130 |
| Fruits, tree nuts, and berries | farms, 2012 | 41 | 317 | 16 | 202 | 4 | 318 | 39 | 46 |
| | 2007 | 33 | 391 | 8 | 194 | 1 | 338 | 63 | 65 |
| | $1,000, 2012 | 2,720 | 137,960 | 731 | 169,334 | (D) | 674,521 | (D) | (D) |
| | 2007 | 3,153 | 145,217 | 166 | 109,936 | (D) | 358,487 | (D) | 374 |
| Fruits and tree nut | farms, 2012 | 25 | 314 | 8 | 197 | 2 | 314 | 9 | 21 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| | $1,000, 2012 | 137 | 137,953 | 717 | 169,069 | (D) | (D) | (D) | (D) |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Berries | farms, 2012 | 24 | 3 | 9 | 12 | 2 | 10 | 32 | 34 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| | $1,000, 2012 | 2,582 | 7 | 13 | 266 | (D) | (D) | (D) | 236 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Nursery, greenhouse, floriculture, and sod (see text) | farms, 2012 | 29 | 9 | 5 | 16 | 2 | 19 | 31 | 34 |
| | 2007 | 33 | 10 | 2 | 15 | - | 21 | 24 | 46 |
| | $1,000, 2012 | 4,124 | 3,532 | 41 | (D) | (D) | (D) | (D) | (D) |
| | 2007 | 3,971 | 1,599 | (D) | (D) | - | (D) | (D) | 842 |
| Cut Christmas trees and short-rotation woody crops | farms, 2012 | 10 | 1 | - | 2 | - | 3 | 15 | 3 |
| | 2007 | 6 | - | - | 1 | 1 | 4 | 9 | 6 |
| | $1,000, 2012 | 122 | (D) | - | (D) | - | 5 | 26 | (D) |
| | 2007 | (D) | - | - | (D) | (D) | 4 | 295 | 169 |
| Cut Christmas trees | farms, 2012 | 9 | 1 | - | 2 | - | 2 | 13 | 3 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| | $1,000, 2012 | (D) | (D) | - | (D) | - | (D) | 23 | (D) |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Short rotation woody crops | farms, 2012 | 1 | - | - | - | - | 1 | 3 | - |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| | $1,000, 2012 | (D) | - | - | - | - | (D) | 3 | - |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Other crops and hay (see text) | farms, 2012 | 84 | 46 | 107 | 189 | 29 | 444 | 118 | 73 |
| | 2007 | 61 | 48 | 48 | 296 | 16 | 582 | 126 | 79 |
| | $1,000, 2012 | 4,571 | 1,871 | (D) | 91,975 | (D) | (D) | 1,223 | 649 |
| | 2007 | 2,074 | 671 | 327 | 95,656 | (D) | (D) | 940 | 550 |
| Maple syrup (see text) | farms, 2012 | - | - | - | - | - | - | - | - |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| | $1,000, 2012 | - | - | - | - | - | - | - | - |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Livestock, poultry, and their products | farms, 2012 | 233 | 109 | 112 | 212 | 58 | 396 | 270 | 191 |
| | 2007 | 284 | 132 | 117 | 270 | 81 | 570 | 357 | 229 |
| | $1,000, 2012 | (D) | 3,129 | 2,451 | 236,818 | 3,880 | 429,145 | 14,656 | 8,185 |
| | 2007 | 15,824 | 6,443 | 2,264 | 83,816 | 3,214 | 343,246 | 15,301 | 10,685 |
| Poultry and eggs | farms, 2012 | 53 | 18 | 28 | 31 | 5 | 36 | 51 | 62 |
| | 2007 | 62 | 30 | 20 | 37 | 1 | 93 | 88 | 78 |
| | $1,000, 2012 | (D) | (D) | 17 | (D) | 7 | (D) | 22 | 63 |
| | 2007 | 9,381 | 8 | (D) | (D) | (D) | (D) | 38 | 28 |
| Cattle and calves | farms, 2012 | 134 | 62 | 75 | 158 | 49 | 280 | 162 | 83 |
| | 2007 | 167 | 78 | 71 | 174 | 67 | 403 | 224 | 101 |
| | $1,000, 2012 | 1,204 | 2,959 | 1,914 | (D) | 3,748 | 294,086 | 2,073 | 2,948 |
| | 2007 | 883 | 5,898 | 1,649 | 32,676 | (D) | 251,337 | 3,179 | (D) |
| Milk from cows (see text) | farms, 2012 | 2 | - | - | 14 | - | 20 | 7 | 1 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| | $1,000, 2012 | (D) | - | - | 113,341 | - | (D) | 4,504 | (D) |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Hogs and pigs | farms, 2012 | 14 | 14 | 9 | 21 | - | 32 | 29 | 21 |
| | 2007 | 25 | 20 | 11 | 30 | 3 | 81 | 47 | 13 |
| | $1,000, 2012 | 19 | 14 | 30 | 48 | - | 42 | 29 | 51 |
| | 2007 | 23 | 15 | 8 | 74 | 2 | 1,143 | 33 | 12 |
| Sheep, goats, wool, mohair, and milk (see text) | farms, 2012 | 30 | 13 | 17 | 26 | 6 | 46 | 26 | 37 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| | $1,000, 2012 | 64 | 20 | 65 | 138 | (D) | 267 | 94 | 67 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Horses, ponies, mules, burros, and donkeys | farms, 2012 | 28 | 11 | 27 | 16 | 3 | 55 | 37 | 23 |
| | 2007 | 36 | 13 | 26 | 31 | 9 | 74 | 44 | 35 |
| | $1,000, 2012 | 79 | 109 | (D) | 162 | 6 | 398 | 100 | 252 |
| | 2007 | 508 | (D) | 201 | 113 | 14 | 709 | 174 | 335 |
| Aquaculture (see text) | farms, 2012 | 11 | - | 2 | 2 | - | 6 | 19 | 1 |
| | 2007 | 9 | 2 | 4 | 3 | 1 | 5 | 15 | 1 |
| | $1,000, 2012 | 2,205 | - | (D) | (D) | - | 1,028 | 7,756 | (D) |
| | 2007 | 2,592 | (D) | 368 | (D) | (D) | 1,026 | 6,698 | (D) |
| Other animals and other animal products (see text) | farms, 2012 | 12 | 4 | 5 | 11 | 1 | 22 | 13 | 17 |
| | 2007 | 24 | 11 | 11 | 19 | 4 | 24 | 16 | 35 |
| | $1,000, 2012 | 32 | (D) | 9 | 169 | (D) | 403 | 78 | (D) |
| | 2007 | 85 | 62 | (D) | (D) | 17 | 132 | 82 | (D) |
| Value of agricultural products sold directly to individuals for human consumption (see text) | farms, 2012 | 124 | 71 | 33 | 72 | 9 | 118 | 100 | 113 |
| | 2007 | 111 | 83 | 37 | 81 | 9 | 128 | 121 | 88 |
| | $1,000, 2012 | 824 | 1,005 | 410 | 1,280 | 36 | 2,111 | 810 | 1,081 |
| | 2007 | 356 | 1,729 | 114 | 4,086 | 23 | 769 | 506 | 262 |

--continued

Table 2. **Market Value of Agricultural Products Sold Including Direct Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Total sales (see text) - Con. | | | | | | | | |
| Value of sales by commodity or commodity group - Con. | | | | | | | | |
| Crops, including nursery and greenhouse crops - Con. | | | | | | | | |
| Tobacco ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Cotton and cottonseed ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Vegetables, melons, potatoes, and sweet potatoes ....farms, 2012 | 28 | 246 | 143 | 51 | 50 | 77 | 16 | 29 |
| 2007 | 26 | 166 | 84 | 44 | 27 | 48 | 11 | 28 |
| $1,000, 2012 | 628 | 4,711 | 895 | 4,366 | (D) | 6,046 | 5,123 | 301 |
| 2007 | 190 | (D) | 560 | (D) | (D) | 2,204 | 3,629 | 169 |
| Fruits, tree nuts, and berries ....farms, 2012 | 36 | 148 | 106 | 43 | 69 | 54 | 7 | 29 |
| 2007 | 31 | 105 | 110 | 60 | 77 | 57 | 7 | 34 |
| $1,000, 2012 | 247 | (D) | 239 | 4,144 | 41,736 | 1,947 | 118 | 162 |
| 2007 | 260 | 1,293 | 638 | (D) | 29,555 | (D) | 136 | 117 |
| Fruits and tree nut....farms, 2012 | 20 | 66 | 46 | 35 | 66 | 35 | 5 | 19 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 122 | 2,149 | 93 | 4,113 | 41,719 | 504 | (D) | 118 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Berries ....farms, 2012 | 24 | 105 | 87 | 10 | 5 | 28 | 2 | 16 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 125 | (D) | 146 | 31 | 17 | 1,443 | (D) | 44 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Nursery, greenhouse, floriculture, and sod (see text) ....farms, 2012 | 28 | 257 | 88 | 10 | 23 | 67 | 7 | 23 |
| 2007 | 24 | 211 | 80 | 15 | 16 | 49 | 3 | 35 |
| $1,000, 2012 | 705 | 27,938 | 1,750 | (D) | (D) | 9,134 | 107 | 505 |
| 2007 | 601 | 33,686 | 3,452 | 437 | 555 | 12,489 | 54 | 600 |
| Cut Christmas trees and short-rotation woody crops ....farms, 2012 | 3 | 55 | 24 | 2 | 3 | 84 | - | 32 |
| 2007 | 6 | 57 | 32 | 3 | 2 | 94 | - | 29 |
| $1,000, 2012 | 9 | (D) | 768 | (D) | (D) | 6,132 | - | 1,396 |
| 2007 | (D) | (D) | (D) | 12 | (D) | (D) | - | 490 |
| Cut Christmas trees....farms, 2012 | 3 | 48 | 20 | 2 | 2 | 84 | - | 29 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 9 | (D) | 754 | (D) | (D) | 6,114 | - | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Short rotation woody crops....farms, 2012 | - | 8 | 4 | - | 1 | 4 | - | 3 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | - | 9 | 14 | - | (D) | 18 | - | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Other crops and hay (see text) ....farms, 2012 | 48 | 126 | 34 | 347 | 197 | 438 | 167 | 39 |
| 2007 | 29 | 108 | 39 | 366 | 173 | 344 | 119 | 30 |
| $1,000, 2012 | 152 | (D) | 62 | 35,684 | 4,039 | 3,964 | 8,958 | 149 |
| 2007 | (D) | 604 | (D) | 29,634 | (D) | 2,294 | 7,802 | 229 |
| Maple syrup (see text) ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Livestock, poultry, and their products ....farms, 2012 | 124 | 792 | 298 | 440 | 324 | 833 | 220 | 196 |
| 2007 | 113 | 972 | 328 | 481 | 455 | 947 | 218 | 289 |
| $1,000, 2012 | 5,917 | 76,737 | 1,590 | 21,754 | 14,274 | 103,253 | 9,634 | 38,296 |
| 2007 | 7,570 | 81,573 | 1,715 | 22,214 | 13,429 | 81,222 | 8,472 | 35,357 |
| Poultry and eggs ....farms, 2012 | 27 | 245 | 140 | 70 | 55 | 164 | 16 | 57 |
| 2007 | 24 | 280 | 157 | 71 | 89 | 189 | 27 | 83 |
| $1,000, 2012 | (D) | 204 | 131 | 147 | 57 | 61,115 | (D) | 119 |
| 2007 | 18 | 211 | (D) | 32 | 67 | 47,509 | 146 | 113 |
| Cattle and calves ....farms, 2012 | 67 | 320 | 97 | 273 | 203 | 574 | 151 | 48 |
| 2007 | 55 | 409 | 100 | 285 | 245 | 562 | 148 | 90 |
| $1,000, 2012 | 1,188 | (D) | 555 | 18,971 | 9,076 | 10,135 | 8,701 | 899 |
| 2007 | 420 | (D) | 381 | 18,921 | 8,976 | (D) | 7,567 | 848 |
| Milk from cows (see text) ....farms, 2012 | 1 | 30 | 6 | 1 | 5 | 35 | 1 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | 32,100 | 178 | (D) | (D) | 25,772 | (D) | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Hogs and pigs ....farms, 2012 | 9 | 70 | 45 | 43 | 40 | 72 | 8 | 17 |
| 2007 | - | 65 | 70 | 68 | 62 | 94 | 15 | 26 |
| $1,000, 2012 | 46 | 136 | 149 | (D) | 37 | 92 | 76 | 16 |
| 2007 | - | 99 | 131 | 167 | 137 | 117 | 34 | 22 |
| Sheep, goats, wool, mohair, and milk (see text) ....farms, 2012 | 25 | 101 | 60 | 64 | 48 | 93 | 42 | 21 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | 184 | 65 | 406 | 150 | 290 | 82 | 43 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Horses, ponies, mules, burros, and donkeys ....farms, 2012 | 2 | 148 | 46 | 89 | 28 | 86 | 30 | 15 |
| 2007 | 12 | 251 | 63 | 124 | 91 | 180 | 35 | 42 |
| $1,000, 2012 | (D) | (D) | 253 | 1,027 | 194 | 729 | 241 | 119 |
| 2007 | (D) | (D) | 435 | (D) | 632 | (D) | 291 | 247 |
| Aquaculture (see text) .... farms, 2012 | 29 | 11 | 6 | 1 | 2 | 16 | - | 86 |
| 2007 | 18 | 10 | 4 | 2 | 1 | 12 | - | 87 |
| $1,000, 2012 | 3,902 | (D) | 168 | (D) | (D) | 4,277 | - | 37,093 |
| 2007 | 6,368 | (D) | (D) | (D) | (D) | 2,838 | - | 33,846 |
| Other animals and other animal products (see text) ....farms, 2012 | 5 | 133 | 28 | 22 | 11 | 60 | 8 | 4 |
| 2007 | 10 | 170 | 48 | 20 | 17 | 67 | 8 | 21 |
| $1,000, 2012 | 7 | 1,410 | 90 | 540 | 87 | 844 | 15 | 7 |
| 2007 | 2 | 2,011 | 204 | 109 | (D) | 588 | (D) | 81 |
| Value of agricultural products sold directly to individuals for human consumption (see text) ....farms, 2012 | 69 | 382 | 163 | 108 | 129 | 254 | 22 | 69 |
| 2007 | 51 | 352 | 159 | 90 | 135 | 212 | 29 | 85 |
| $1,000, 2012 | 1,013 | 2,635 | 1,055 | 638 | 795 | 1,022 | 151 | 1,056 |
| 2007 | 293 | 3,313 | 850 | 738 | 525 | 934 | 159 | 551 |

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Table 2. **Market Value of Agricultural Products Sold Including Direct Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Total sales (see text) - Con. | | | | | | | | |
| Value of sales by commodity or commodity group - Con. | | | | | | | | |
| Crops, including nursery and greenhouse crops - Con. | | | | | | | | |
| Tobacco ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Cotton and cottonseed ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Vegetables, melons, potatoes, and sweet potatoes ..... farms, 2012 | 90 | 9 | 13 | 170 | 46 | 157 | 22 | 121 |
| 2007 | 75 | 2 | 2 | 84 | 55 | 116 | - | 98 |
| $1,000, 2012 | (D) | (D) | 48 | 5,522 | 835 | 81,726 | 131 | 6,096 |
| 2007 | 607 | (D) | (D) | 9,007 | 408 | 75,494 | - | 4,859 |
| Fruits, tree nuts, and berries ..... farms, 2012 | 408 | 85 | 8 | 131 | 61 | 127 | 32 | 99 |
| 2007 | 414 | 90 | 8 | 95 | 76 | 140 | 16 | 111 |
| $1,000, 2012 | 235,838 | 6,932 | 27 | 2,143 | 452 | 20,227 | 1,258 | 1,642 |
| 2007 | 174,040 | 6,426 | 107 | (D) | 895 | 17,222 | 894 | 1,634 |
| Fruits and tree nut ..... farms, 2012 | 387 | 3 | 2 | 65 | 49 | 77 | 18 | 38 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 235,755 | 3 | (D) | 745 | 372 | 4,309 | 1,235 | 929 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Berries ..... farms, 2012 | 31 | 85 | 8 | 79 | 32 | 73 | 16 | 79 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 83 | 6,929 | (D) | 1,398 | 80 | 15,918 | 23 | 714 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Nursery, greenhouse, floriculture, and sod (see text) ..... farms, 2012 | 27 | 7 | 3 | 107 | 38 | 84 | 6 | 142 |
| 2007 | 24 | 6 | 4 | 95 | 25 | 85 | 7 | 144 |
| $1,000, 2012 | (D) | 122 | (D) | 14,733 | 569 | 87,388 | (D) | 50,360 |
| 2007 | 1,233 | 394 | 51 | 18,646 | 182 | 74,286 | 78 | 47,869 |
| Cut Christmas trees and short-rotation woody crops ..... farms, 2012 | 2 | 16 | 2 | 23 | 4 | 13 | 6 | 46 |
| 2007 | 5 | 14 | 1 | 39 | 2 | 13 | 4 | 49 |
| $1,000, 2012 | (D) | 69 | (D) | 748 | (D) | 97 | (D) | 251 |
| 2007 | 23 | 173 | (D) | (D) | (D) | 199 | 6 | 500 |
| Cut Christmas trees..... farms, 2012 | 2 | 16 | 2 | 23 | 3 | 11 | 6 | 43 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | 69 | (D) | 748 | 1 | 91 | (D) | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Short rotation woody crops..... farms, 2012 | - | - | - | - | 1 | 4 | - | 3 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | - | - | - | - | (D) | 6 | - | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Other crops and hay (see text) ..... farms, 2012 | 423 | 57 | 131 | 166 | 89 | 199 | 20 | 178 |
| 2007 | 320 | 61 | 78 | 125 | 75 | 213 | 11 | 197 |
| $1,000, 2012 | 7,872 | 283 | 2,165 | 644 | 669 | 4,108 | 89 | 2,428 |
| 2007 | 4,482 | 125 | 1,033 | 513 | (D) | 2,763 | 36 | 2,203 |
| Maple syrup (see text)..... farms, 2012 | - | - | - | - | - | 4 | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | - | - | - | - | - | (Z) | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Livestock, poultry, and their products ..... farms, 2012 | 514 | 137 | 132 | 717 | 145 | 505 | 68 | 645 |
| 2007 | 661 | 178 | 156 | 838 | 169 | 627 | 76 | 879 |
| $1,000, 2012 | 37,283 | 29,345 | 1,640 | 67,037 | 1,663 | 71,268 | 4,003 | 76,270 |
| 2007 | 24,565 | 27,781 | 1,554 | 51,079 | 1,929 | 82,079 | 1,647 | 66,743 |
| Poultry and eggs ..... farms, 2012 | 100 | 19 | 44 | 199 | 54 | 121 | 30 | 178 |
| 2007 | 140 | 34 | 37 | 238 | 65 | 125 | 24 | 246 |
| $1,000, 2012 | (D) | (D) | 20 | (D) | 31 | (D) | (D) | 13,414 |
| 2007 | 140 | 20 | (D) | (D) | 60 | 12,172 | 11 | 9,708 |
| Cattle and calves ..... farms, 2012 | 330 | 81 | 65 | 373 | 49 | 320 | 27 | 328 |
| 2007 | 383 | 112 | 102 | 397 | 56 | 357 | 32 | 402 |
| $1,000, 2012 | 20,136 | 2,130 | 1,262 | (D) | 739 | 9,342 | 187 | 7,568 |
| 2007 | 20,560 | 2,387 | 1,332 | 3,989 | 845 | 10,969 | 153 | 9,972 |
| Milk from cows (see text) ..... farms, 2012 | 1 | 8 | - | 7 | 8 | 26 | 2 | 26 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | 4,782 | - | 3,788 | 160 | 52,550 | (D) | 46,182 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Hogs and pigs ..... farms, 2012 | 30 | - | 24 | 71 | 36 | 67 | 4 | 51 |
| 2007 | 41 | 14 | 14 | 93 | 23 | 42 | 7 | 67 |
| $1,000, 2012 | 94 | - | 75 | 99 | 75 | (D) | 7 | 91 |
| 2007 | 34 | 30 | 20 | 113 | 41 | 69 | 5 | 91 |
| Sheep, goats, wool, mohair, and milk (see text) ..... farms, 2012 | 80 | 7 | 17 | 87 | 42 | 63 | 14 | 70 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 349 | 14 | 39 | 255 | 147 | 209 | 30 | 374 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Horses, ponies, mules, burros, and donkeys ..... farms, 2012 | 82 | 10 | 25 | 114 | 11 | 66 | 3 | 96 |
| 2007 | 124 | 10 | 18 | 181 | 8 | 83 | 5 | 156 |
| $1,000, 2012 | 564 | 43 | 64 | 1,303 | 180 | 528 | 8 | 969 |
| 2007 | 786 | 80 | 40 | 1,727 | 52 | 603 | 52 | 2,193 |
| Aquaculture (see text) ..... farms, 2012 | 13 | 32 | 2 | 22 | 7 | 11 | 6 | 14 |
| 2007 | 10 | 27 | 3 | 16 | 5 | 12 | 6 | 13 |
| $1,000, 2012 | 15,885 | 22,360 | (D) | (D) | 285 | 4,966 | 3,665 | 4,138 |
| 2007 | 2,512 | 19,209 | 14 | 10,684 | 468 | 10,522 | 1,364 | 4,832 |
| Other animals and other animal products (see text) ..... farms, 2012 | 28 | 3 | 9 | 55 | 11 | 25 | 3 | 62 |
| 2007 | 40 | 10 | 12 | 68 | 19 | 46 | 7 | 106 |
| $1,000, 2012 | 97 | (D) | (D) | 1,147 | 45 | 526 | (D) | 3,534 |
| 2007 | 183 | 6 | (D) | 762 | 116 | 410 | 30 | 2,280 |
| Value of agricultural products sold directly to individuals for human consumption (see text) ..... farms, 2012 | 216 | 33 | 48 | 295 | 90 | 244 | 44 | 267 |
| 2007 | 210 | 33 | 40 | 285 | 97 | 241 | 28 | 311 |
| $1,000, 2012 | 1,680 | 171 | 71 | 1,891 | 1,170 | 2,564 | 102 | 1,976 |
| 2007 | 2,513 | 288 | 55 | 2,144 | 739 | 2,843 | 68 | 1,933 |

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Table 2. **Market Value of Agricultural Products Sold Including Direct Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Total sales (see text) - Con. | | | | | | | | |
| Value of sales by commodity or commodity group - Con. | | | | | | | | |
| Crops, including nursery and greenhouse crops - Con. | | | | | | | | |
| Tobacco ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Cotton and cottonseed ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Vegetables, melons, potatoes, and sweet potatoes ....farms, 2012 | 131 | 82 | 120 | 5 | 75 | 101 | 13 | 198 |
| 2007 | 80 | 29 | 64 | 5 | 69 | 82 | 15 | 136 |
| $1,000, 2012 | 4,902 | (D) | 1,392 | 48 | 62,757 | 11,693 | (D) | (D) |
| 2007 | 5,528 | 350 | 2,527 | 16 | 43,263 | 10,815 | (D) | (D) |
| Fruits, tree nuts, and berries ....farms, 2012 | 115 | 59 | 107 | 5 | 101 | 252 | 12 | 1,101 |
| 2007 | 85 | 46 | 73 | 4 | 70 | 211 | 20 | 1,446 |
| $1,000, 2012 | 2,049 | (D) | 1,641 | 5 | 128,703 | 79,978 | (D) | 810,881 |
| 2007 | 1,561 | 651 | 2,113 | (D) | 109,928 | 66,788 | (D) | 577,526 |
| Fruits and tree nut....farms, 2012 | 84 | 36 | 52 | 5 | 92 | 78 | 4 | 1,078 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 1,683 | 1,111 | 540 | 4 | (D) | 2,795 | (D) | 809,900 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Berries ....farms, 2012 | 45 | 32 | 76 | 4 | 17 | 197 | 10 | 44 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 366 | (D) | 1,100 | 1 | (D) | 77,183 | 5 | 981 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Nursery, greenhouse, floriculture, and sod (see text) ....farms, 2012 | 87 | 27 | 104 | 8 | 16 | 82 | 8 | 38 |
| 2007 | 61 | 19 | 73 | 5 | 17 | 73 | 11 | 41 |
| $1,000, 2012 | 12,915 | 1,846 | 43,377 | 121 | 455 | 18,697 | 122 | (D) |
| 2007 | 10,963 | 3,652 | 37,225 | 111 | (D) | 16,736 | 301 | (D) |
| Cut Christmas trees and short-rotation woody crops ....farms, 2012 | 20 | 3 | 35 | - | 6 | 29 | 2 | 1 |
| 2007 | 16 | - | 26 | 1 | 2 | 21 | 2 | 3 |
| $1,000, 2012 | 102 | (D) | 521 | - | (D) | 405 | (D) | (D) |
| 2007 | 125 | - | 361 | (D) | (D) | 876 | (D) | (D) |
| Cut Christmas trees....farms, 2012 | 20 | 3 | 30 | - | 5 | 27 | 2 | 1 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | (D) | 514 | - | (D) | (D) | (D) | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Short rotation woody crops....farms, 2012 | 1 | - | 6 | - | 1 | 2 | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | - | 7 | - | (D) | (D) | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Other crops and hay (see text) ....farms, 2012 | 768 | 443 | 190 | 28 | 117 | 361 | 142 | 565 |
| 2007 | 714 | 361 | 161 | 16 | 139 | 257 | 169 | 633 |
| $1,000, 2012 | 15,185 | 8,861 | 1,910 | 114 | (D) | 4,355 | 5,370 | 160,693 |
| 2007 | 16,473 | 5,076 | 751 | (D) | (D) | 2,020 | 4,279 | 129,987 |
| Maple syrup (see text) ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Livestock, poultry, and their products ....farms, 2012 | 1,021 | 596 | 622 | 68 | 225 | 805 | 269 | 1,017 |
| 2007 | 1,049 | 704 | 733 | 83 | 291 | 827 | 295 | 1,297 |
| $1,000, 2012 | 16,898 | 18,945 | 73,581 | 3,199 | (D) | 237,496 | 18,424 | 576,013 |
| 2007 | 18,542 | 12,854 | 74,901 | 2,846 | (D) | 226,553 | 10,372 | 416,347 |
| Poultry and eggs ....farms, 2012 | 262 | 118 | 163 | 14 | 52 | 201 | 49 | 160 |
| 2007 | 235 | 131 | 191 | 20 | 63 | 132 | 62 | 175 |
| $1,000, 2012 | 122 | 51 | 22,043 | 10 | 34 | 14,641 | (D) | (D) |
| 2007 | (D) | 60 | 33,283 | 8 | 712 | 11,461 | (D) | (D) |
| Cattle and calves ....farms, 2012 | 560 | 374 | 311 | 48 | 137 | 520 | 185 | 689 |
| 2007 | 533 | 427 | 373 | 59 | 143 | 562 | 192 | 853 |
| $1,000, 2012 | 10,384 | 11,774 | 8,494 | 855 | (D) | 26,535 | 15,287 | 128,577 |
| 2007 | 9,076 | 7,685 | 5,659 | 678 | (D) | 24,135 | 7,078 | 81,962 |
| Milk from cows (see text) ....farms, 2012 | 13 | 6 | 14 | 7 | - | 114 | 4 | 49 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 3,249 | 1,639 | 21,762 | 2,179 | - | 193,042 | 1,154 | 436,745 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Hogs and pigs ....farms, 2012 | 71 | 43 | 62 | 8 | 18 | 95 | 25 | 78 |
| 2007 | 101 | 41 | 88 | - | 27 | 76 | 34 | 84 |
| $1,000, 2012 | (D) | (D) | 136 | (D) | 24 | 117 | 977 | 93 |
| 2007 | 201 | 193 | 132 | - | 48 | 57 | 1,566 | 545 |
| Sheep, goats, wool, mohair, and milk (see text) ....farms, 2012 | 112 | 81 | 77 | 5 | 39 | 100 | 48 | 152 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 661 | 464 | 567 | 33 | 262 | 297 | 380 | 2,554 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Horses, ponies, mules, burros, and donkeys ....farms, 2012 | 187 | 84 | 95 | 1 | 38 | 45 | 26 | 134 |
| 2007 | 212 | 114 | 142 | 1 | 59 | 76 | 31 | 231 |
| $1,000, 2012 | 1,246 | 675 | 1,132 | (D) | 459 | 386 | (D) | 1,826 |
| 2007 | 1,705 | 714 | 1,314 | (D) | 303 | 885 | 185 | 1,334 |
| Aquaculture (see text) .... farms, 2012 | 2 | 9 | 23 | 2 | 1 | 9 | - | 2 |
| 2007 | 3 | 5 | 32 | 1 | - | 6 | - | 5 |
| $1,000, 2012 | (D) | (D) | 18,326 | (D) | (D) | 1,850 | - | (D) |
| 2007 | (D) | 806 | 13,244 | (D) | - | 1,509 | - | 39 |
| Other animals and other animal products (see text) ....farms, 2012 | 105 | 35 | 63 | 1 | 5 | 41 | 23 | 38 |
| 2007 | 107 | 57 | 72 | 7 | 17 | 70 | 14 | 53 |
| $1,000, 2012 | 824 | 517 | 1,120 | (D) | (D) | 628 | 17 | (D) |
| 2007 | 1,871 | 648 | 1,294 | 3 | 262 | 1,847 | 45 | (D) |
| Value of agricultural products sold directly to individuals for human consumption (see text) ....farms, 2012 | 406 | 172 | 238 | 21 | 98 | 302 | 57 | 365 |
| 2007 | 315 | 178 | 217 | 14 | 104 | 273 | 54 | 380 |
| $1,000, 2012 | 2,293 | 866 | 3,484 | 40 | 846 | 2,576 | 245 | 4,138 |
| 2007 | 1,636 | 922 | 1,639 | 36 | 779 | 3,999 | 308 | 2,991 |

## Table 3. **Farm Production Expenses: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|---|
| Total farm production expenses | farms, 2012 | 37,249 | 713 | 185 | 1,509 | 890 | 536 | 1,929 | 308 |
| | 2007 | 39,284 | 782 | 192 | 1,630 | 979 | 512 | 2,101 | 283 |
| | $1,000, 2012 | 7,839,554 | 338,575 | 18,915 | 784,532 | 183,961 | 16,534 | 54,736 | 37,522 |
| | 2007 | 5,390,313 | 262,417 | 14,476 | 367,143 | 161,263 | 15,365 | 58,327 | 33,756 |
| Average per farm | dollars, 2012 | 210,463 | 474,860 | 102,243 | 519,902 | 206,697 | 30,846 | 28,375 | 121,825 |
| | 2007 | 137,214 | 335,572 | 75,395 | 225,241 | 164,722 | 30,011 | 27,762 | 119,281 |
| Fertilizer, lime, and soil conditioners purchased | farms, 2012 | 14,658 | 369 | 77 | 627 | 567 | 161 | 668 | 149 |
| | 2007 | 17,083 | 399 | 60 | 767 | 798 | 153 | 773 | 145 |
| | $1,000, 2012 | 519,041 | 46,118 | 2,217 | 51,705 | 4,176 | 494 | 1,380 | 6,468 |
| | 2007 | 380,358 | 37,204 | 1,234 | 29,898 | 3,613 | 383 | 1,201 | 5,591 |
| Chemicals purchased | farms, 2012 | 16,822 | 450 | 120 | 762 | 674 | 132 | 789 | 183 |
| | 2007 | 16,386 | 407 | 87 | 749 | 764 | 90 | 875 | 158 |
| | $1,000, 2012 | 498,212 | 36,135 | 1,624 | 61,501 | 15,113 | 128 | 1,134 | 4,938 |
| | 2007 | 317,784 | 22,620 | 992 | 34,478 | 14,004 | 277 | 877 | 3,234 |
| Seeds, plants, vines, and trees purchased | farms, 2012 | 11,669 | 349 | 67 | 362 | 317 | 141 | 481 | 128 |
| | 2007 | 11,005 | 284 | 58 | 352 | 370 | 101 | 499 | 116 |
| | $1,000, 2012 | 273,805 | 15,609 | 1,037 | 28,169 | 1,169 | 375 | 679 | 2,776 |
| | 2007 | 200,704 | 11,458 | 814 | 22,155 | 1,301 | 603 | 1,331 | 2,078 |
| Livestock and poultry purchased or leased | farms, 2012 | 9,641 | 80 | 40 | 453 | 108 | 128 | 617 | 59 |
| | 2007 | 8,589 | 93 | 56 | 318 | 122 | 106 | 535 | 28 |
| | $1,000, 2012 | 424,941 | 10,914 | 929 | (D) | 430 | 435 | 3,318 | 468 |
| | 2007 | 326,256 | 12,717 | 589 | 6,161 | 333 | 315 | 3,229 | 635 |
| Breeding livestock purchased or leased | farms, 2012 | 4,250 | 45 | 19 | 179 | 28 | 54 | 252 | 35 |
| | 2007 | 4,247 | 44 | 35 | 154 | 17 | 55 | 237 | 19 |
| | $1,000, 2012 | 36,085 | 1,550 | 468 | 766 | 90 | 138 | 516 | 347 |
| | 2007 | 37,873 | 1,098 | 301 | 853 | 78 | 154 | 557 | (D) |
| Other livestock and poultry purchased or leased | farms, 2012 | 6,686 | 46 | 26 | 324 | 87 | 92 | 447 | 33 |
| | 2007 | 5,553 | 58 | 29 | 192 | 110 | 72 | 376 | 17 |
| | $1,000, 2012 | 388,856 | 9,364 | 461 | (D) | 340 | 297 | 2,802 | 121 |
| | 2007 | 288,383 | 11,619 | 288 | 5,308 | 255 | 162 | 2,672 | (D) |
| Feed purchased | farms, 2012 | 20,375 | 144 | 129 | 903 | 202 | 372 | 1,295 | 118 |
| | 2007 | 19,927 | 185 | 109 | 839 | 173 | 324 | 1,281 | 82 |
| | $1,000, 2012 | 1,106,416 | 42,616 | 1,726 | 82,274 | 1,760 | 3,367 | 14,972 | 1,161 |
| | 2007 | 663,387 | 25,991 | 1,529 | 12,183 | 890 | 2,458 | 14,621 | 887 |
| Gasoline, fuels, and oils purchased | farms, 2012 | 34,021 | 604 | 163 | 1,398 | 863 | 491 | 1,754 | 256 |
| | 2007 | 38,350 | 755 | 189 | 1,596 | 972 | 504 | 2,029 | 277 |
| | $1,000, 2012 | 353,923 | 20,426 | 1,582 | 35,675 | 7,621 | 913 | 2,679 | 3,301 |
| | 2007 | 265,061 | 13,983 | 1,535 | 17,338 | 4,961 | 1,016 | 2,646 | 2,713 |
| Utilities | farms, 2012 | 23,406 | 479 | 115 | 1,166 | 722 | 296 | 931 | 167 |
| | 2007 | 21,707 | 426 | 99 | 1,105 | 781 | 274 | 793 | 142 |
| | $1,000, 2012 | 249,395 | 17,659 | 355 | 35,448 | 3,831 | 708 | 1,313 | 785 |
| | 2007 | 186,322 | 12,079 | 242 | 23,203 | 3,742 | 642 | 1,460 | 462 |
| Repairs, supplies, and maintenance costs | farms, 2012 | 27,614 | 531 | 139 | 1,225 | 779 | 376 | 1,307 | 209 |
| | 2007 | 35,609 | 697 | 170 | 1,519 | 932 | 453 | 1,882 | 258 |
| | $1,000, 2012 | 507,072 | 25,628 | 1,716 | (D) | 8,032 | 1,116 | 3,423 | 3,297 |
| | 2007 | 439,705 | 20,332 | 1,530 | 28,858 | 8,675 | 1,535 | 5,636 | 3,233 |
| Hired farm labor | farms, 2012 | 11,746 | 317 | 44 | 449 | 572 | 116 | 371 | 86 |
| | 2007 | 11,063 | 251 | 42 | 466 | 647 | 106 | 368 | 71 |
| | $1,000, 2012 | 1,713,124 | 47,513 | 2,247 | 187,357 | 66,194 | 4,809 | 9,032 | 5,461 |
| | 2007 | 1,151,383 | 35,016 | 1,624 | 104,726 | 57,253 | 3,243 | 10,477 | 4,223 |
| Contract labor | farms, 2012 | 3,669 | 72 | 11 | 190 | 167 | 37 | 178 | 32 |
| | 2007 | 3,293 | 74 | 16 | 138 | 170 | 36 | 220 | 25 |
| | $1,000, 2012 | 129,368 | 3,893 | 92 | 17,088 | 3,953 | 178 | 998 | 558 |
| | 2007 | 58,442 | 1,373 | 151 | 5,047 | 2,955 | 295 | 1,255 | 230 |
| Customwork and custom hauling | farms, 2012 | 5,890 | 207 | 40 | 241 | 158 | 42 | 175 | 66 |
| | 2007 | 5,149 | 141 | 17 | 195 | 133 | 30 | 170 | 53 |
| | $1,000, 2012 | 182,475 | 10,040 | 287 | 28,887 | 1,587 | 143 | 455 | 1,864 |
| | 2007 | 108,062 | 7,204 | 56 | 8,050 | 978 | 118 | 201 | 3,953 |
| Cash rent for land, buildings, and grazing fees | farms, 2012 | 6,269 | 211 | 55 | 219 | 133 | 66 | 153 | 66 |
| | 2007 | 5,807 | 138 | 48 | 171 | 94 | 54 | 173 | 34 |
| | $1,000, 2012 | 366,979 | 22,542 | 1,453 | 32,202 | 4,624 | 363 | 1,299 | 915 |
| | 2007 | 260,112 | 21,576 | 1,552 | 15,827 | 1,588 | 588 | 935 | 975 |
| Rent and lease expenses for machinery, equipment, and farm share of vehicles | farms, 2012 | 2,922 | 113 | 23 | 157 | 121 | 14 | 64 | 40 |
| | 2007 | 2,633 | 90 | 15 | 127 | 109 | 8 | 84 | 27 |
| | $1,000, 2012 | 60,164 | 2,417 | 388 | 9,597 | 1,059 | 25 | 201 | 632 |
| | 2007 | 42,158 | 2,077 | 59 | 4,673 | 779 | 3 | 207 | 561 |
| Interest expense | farms, 2012 | 11,556 | 279 | 76 | 464 | 406 | 125 | 393 | 88 |
| | 2007 | 10,448 | 267 | 63 | 425 | 368 | 82 | 369 | 90 |
| | $1,000, 2012 | 244,078 | 8,314 | 1,069 | 23,761 | 5,373 | 1,189 | 4,070 | 1,295 |
| | 2007 | 219,629 | 10,268 | 838 | 15,102 | 6,245 | 852 | 4,502 | 1,686 |
| Secured by real estate | farms, 2012 | 8,565 | 170 | 53 | 351 | 309 | 98 | 317 | 59 |
| | 2007 | 8,139 | 161 | 52 | 335 | 294 | 70 | 303 | 68 |
| | $1,000, 2012 | 178,824 | 4,557 | 685 | 19,646 | 4,245 | 978 | 3,411 | 977 |
| | 2007 | 136,486 | 3,631 | 538 | 8,168 | 4,967 | 734 | 3,737 | 1,003 |
| Not secured by real estate | farms, 2012 | 6,178 | 207 | 39 | 234 | 215 | 56 | 167 | 50 |
| | 2007 | 6,206 | 191 | 25 | 236 | 206 | 39 | 212 | 59 |
| | $1,000, 2012 | 65,254 | 3,756 | 384 | 4,115 | 1,129 | 211 | 660 | 319 |
| | 2007 | 83,143 | 6,637 | 300 | 6,934 | 1,278 | 118 | 765 | 683 |
| Property taxes paid | farms, 2012 | 35,359 | 661 | 177 | 1,437 | 840 | 509 | 1,869 | 291 |
| | 2007 | 35,748 | 689 | 174 | 1,494 | 907 | 460 | 1,911 | 261 |
| | $1,000, 2012 | 175,113 | 5,713 | 589 | 10,604 | 5,522 | 1,216 | 5,709 | 1,205 |
| | 2007 | 161,799 | 4,641 | 554 | 9,644 | 5,095 | 1,208 | 4,925 | 1,400 |
| All other production expenses (see text) | farms, 2012 | 19,177 | 434 | 114 | 842 | 543 | 217 | 816 | 152 |
| | 2007 | 20,135 | 417 | 114 | 791 | 646 | 240 | 876 | 137 |
| | $1,000, 2012 | 1,035,447 | 23,037 | 1,604 | 48,179 | 53,517 | 1,076 | 4,076 | 2,397 |
| | 2007 | 609,150 | 23,877 | 1,179 | 29,799 | 48,851 | 1,828 | 4,823 | 1,895 |
| Depreciation expenses claimed (see text) | farms, 2012 | 14,823 | 368 | 73 | 566 | 513 | 150 | 486 | 156 |
| | 2007 | 16,262 | 405 | 75 | 572 | 572 | 166 | 653 | 150 |
| | $1,000, 2012 | 549,241 | 25,909 | 1,917 | 51,631 | 11,534 | 1,379 | 3,181 | 3,680 |
| | 2007 | 430,311 | 20,758 | 1,212 | 31,491 | 12,561 | 1,343 | 6,089 | 3,423 |

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Table 3. **Farm Production Expenses: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|---|
| Total farm production expenses | farms, 2012 | 492 | 849 | 255 | 883 | 211 | 1,552 | 557 | 377 |
| | 2007 | 481 | 955 | 232 | 891 | 239 | 1,858 | 628 | 458 |
| | $1,000, 2012 | 31,573 | 181,943 | 5,897 | 657,161 | 38,879 | 1,546,504 | 33,561 | 13,813 |
| | 2007 | 27,547 | 147,764 | 5,079 | 384,404 | 26,815 | 973,877 | 27,589 | 16,392 |
| Average per farm | dollars, 2012 | 64,173 | 214,303 | 23,124 | 744,237 | 184,261 | 996,459 | 60,253 | 36,638 |
| | 2007 | 57,271 | 154,727 | 21,893 | 431,430 | 112,198 | 524,153 | 43,932 | 35,790 |
| Fertilizer, lime, and soil conditioners purchased | farms, 2012 | 145 | 468 | 61 | 546 | 103 | 969 | 147 | 146 |
| | 2007 | 139 | 568 | 63 | 610 | 114 | 1,153 | 216 | 177 |
| | $1,000, 2012 | 2,086 | 10,059 | 97 | 57,234 | 6,906 | 110,847 | 2,062 | 481 |
| | 2007 | 700 | 7,316 | 244 | 39,499 | 4,852 | 89,626 | 1,364 | 465 |
| Chemicals purchased | farms, 2012 | 199 | 554 | 86 | 610 | 130 | 1,033 | 174 | 127 |
| | 2007 | 169 | 581 | 66 | 596 | 118 | 1,120 | 194 | 121 |
| | $1,000, 2012 | 1,615 | 13,618 | 172 | 41,823 | 5,246 | 97,634 | 887 | 168 |
| | 2007 | 712 | 9,655 | 86 | 29,950 | 2,638 | 60,373 | 471 | 63 |
| Seeds, plants, vines, and trees purchased | farms, 2012 | 102 | 319 | 61 | 435 | 100 | 726 | 103 | 125 |
| | 2007 | 82 | 289 | 61 | 414 | 92 | 744 | 137 | 129 |
| | $1,000, 2012 | 2,049 | 5,332 | 44 | 25,534 | 2,537 | 51,029 | 862 | 252 |
| | 2007 | 1,312 | 2,517 | 142 | 20,509 | 1,448 | 34,193 | 488 | 546 |
| Livestock and poultry purchased or leased | farms, 2012 | 167 | 120 | 70 | 178 | 40 | 292 | 172 | 128 |
| | 2007 | 128 | 106 | 48 | 163 | 24 | 353 | 160 | 116 |
| | $1,000, 2012 | 857 | 515 | (D) | 35,813 | 305 | 138,151 | 591 | 1,171 |
| | 2007 | 1,107 | 1,122 | 83 | 13,369 | (D) | 134,287 | 1,085 | 2,225 |
| Breeding livestock purchased or leased | farms, 2012 | 69 | 43 | 36 | 79 | 30 | 155 | 86 | 53 |
| | 2007 | 64 | 35 | 21 | 66 | 18 | 163 | 85 | 66 |
| | $1,000, 2012 | 92 | 239 | 299 | 1,587 | 280 | 4,498 | 207 | 641 |
| | 2007 | 128 | 260 | 57 | 1,437 | 101 | 2,451 | 477 | 270 |
| Other livestock and poultry purchased or leased | farms, 2012 | 117 | 84 | 43 | 124 | 10 | 198 | 113 | 85 |
| | 2007 | 76 | 78 | 31 | 116 | 8 | 241 | 116 | 63 |
| | $1,000, 2012 | 764 | 276 | (D) | 34,226 | 25 | 133,653 | 384 | 530 |
| | 2007 | 980 | 862 | 27 | 11,932 | (D) | 131,836 | 608 | 1,955 |
| Feed purchased | farms, 2012 | 347 | 156 | 158 | 297 | 71 | 513 | 372 | 278 |
| | 2007 | 347 | 163 | 132 | 304 | 71 | 623 | 383 | 293 |
| | $1,000, 2012 | 5,304 | 1,258 | 921 | 81,861 | 1,034 | 187,028 | 4,603 | 3,407 |
| | 2007 | 7,017 | 1,714 | 530 | 27,189 | 614 | 91,544 | 3,670 | 3,296 |
| Gasoline, fuels, and oils purchased | farms, 2012 | 453 | 774 | 243 | 786 | 185 | 1,437 | 521 | 349 |
| | 2007 | 470 | 923 | 225 | 869 | 231 | 1,809 | 617 | 444 |
| | $1,000, 2012 | 2,012 | 9,401 | 504 | 26,267 | 3,901 | 58,495 | 2,208 | 770 |
| | 2007 | 1,634 | 7,329 | 499 | 17,934 | 2,283 | 38,606 | 1,974 | 794 |
| Utilities | farms, 2012 | 229 | 569 | 122 | 692 | 136 | 1,322 | 273 | 210 |
| | 2007 | 200 | 552 | 107 | 698 | 84 | 1,413 | 305 | 207 |
| | $1,000, 2012 | 1,581 | 2,920 | 321 | 26,622 | 690 | 49,008 | 1,064 | 431 |
| | 2007 | 587 | 2,765 | 173 | 19,639 | 315 | 36,564 | 956 | 512 |
| Repairs, supplies, and maintenance costs | farms, 2012 | 303 | 697 | 175 | 715 | 153 | 1,331 | 409 | 282 |
| | 2007 | 433 | 877 | 220 | 833 | 201 | 1,718 | 546 | 401 |
| | $1,000, 2012 | 1,869 | 11,309 | 579 | 43,263 | 3,254 | 94,553 | 2,340 | 1,294 |
| | 2007 | 1,904 | 9,862 | 530 | 28,664 | 2,457 | 63,013 | 3,423 | 1,871 |
| Hired farm labor | farms, 2012 | 97 | 442 | 61 | 479 | 87 | 814 | 143 | 112 |
| | 2007 | 118 | 397 | 37 | 427 | 71 | 745 | 145 | 108 |
| | $1,000, 2012 | 6,426 | 67,906 | 615 | 117,447 | 3,632 | 317,235 | 10,307 | 2,209 |
| | 2007 | 8,208 | 48,085 | 454 | 73,394 | 1,931 | 184,640 | 5,197 | 2,187 |
| Contract labor | farms, 2012 | 31 | 78 | 29 | 153 | 18 | 295 | 41 | 50 |
| | 2007 | 41 | 86 | 12 | 116 | 10 | 238 | 35 | 38 |
| | $1,000, 2012 | 350 | 2,346 | 139 | 16,288 | 182 | 23,898 | 345 | 441 |
| | 2007 | 159 | 1,665 | 25 | 4,253 | (D) | 9,944 | (D) | 141 |
| Customwork and custom hauling | farms, 2012 | 46 | 125 | 18 | 324 | 73 | 577 | 75 | 37 |
| | 2007 | 39 | 98 | 17 | 338 | 46 | 505 | 60 | 36 |
| | $1,000, 2012 | 279 | 1,274 | 35 | 25,786 | 1,543 | 32,231 | 331 | 247 |
| | 2007 | 125 | 437 | 36 | 14,667 | 365 | 23,881 | (D) | 256 |
| Cash rent for land, buildings, and grazing fees | farms, 2012 | 52 | 149 | 40 | 303 | 51 | 586 | 74 | 50 |
| | 2007 | 44 | 131 | 38 | 275 | 51 | 545 | 75 | 47 |
| | $1,000, 2012 | 2,115 | 6,228 | 717 | 62,052 | 2,964 | 88,114 | 1,264 | 445 |
| | 2007 | 373 | 4,242 | 807 | 33,603 | 4,883 | 55,725 | 570 | 357 |
| Rent and lease expenses for machinery, equipment, and farm share of vehicles | farms, 2012 | 36 | 97 | 10 | 154 | 46 | 247 | 27 | 18 |
| | 2007 | 13 | 111 | 7 | 144 | 30 | 258 | 19 | 24 |
| | $1,000, 2012 | 70 | 905 | (D) | 5,055 | 518 | 11,456 | 276 | 26 |
| | 2007 | 190 | 729 | 23 | 3,659 | 278 | 12,704 | 196 | 105 |
| Interest expense | farms, 2012 | 124 | 368 | 62 | 369 | 115 | 735 | 176 | 67 |
| | 2007 | 101 | 313 | 52 | 358 | 81 | 763 | 164 | 81 |
| | $1,000, 2012 | 1,735 | 6,091 | 426 | 18,446 | 1,801 | 36,541 | 2,122 | 726 |
| | 2007 | 1,004 | 7,640 | 669 | 16,212 | 1,703 | 29,299 | 1,877 | 867 |
| Secured by real estate | farms, 2012 | 100 | 228 | 41 | 230 | 71 | 528 | 150 | 53 |
| | 2007 | 85 | 249 | 43 | 228 | 51 | 543 | 139 | 63 |
| | $1,000, 2012 | 1,294 | 4,831 | 301 | 10,912 | 1,323 | 26,173 | 1,369 | 616 |
| | 2007 | 892 | 5,529 | 482 | 7,646 | 1,047 | 17,562 | 1,439 | 634 |
| Not secured by real estate | farms, 2012 | 54 | 237 | 41 | 270 | 71 | 475 | 99 | 25 |
| | 2007 | 60 | 178 | 37 | 263 | 61 | 513 | 95 | 43 |
| | $1,000, 2012 | 440 | 1,260 | 125 | 7,534 | 478 | 10,367 | 753 | 111 |
| | 2007 | 112 | 2,111 | 187 | 8,566 | 655 | 11,737 | 437 | 232 |
| Property taxes paid | farms, 2012 | 467 | 821 | 245 | 810 | 196 | 1,421 | 533 | 348 |
| | 2007 | 437 | 866 | 205 | 806 | 211 | 1,696 | 572 | 411 |
| | $1,000, 2012 | 1,492 | 4,515 | 483 | 9,558 | 965 | 17,727 | 1,807 | 854 |
| | 2007 | 1,123 | 4,453 | 343 | 7,315 | 1,065 | 17,526 | 1,472 | 1,093 |
| All other production expenses (see text) | farms, 2012 | 231 | 474 | 131 | 594 | 130 | 1,079 | 241 | 219 |
| | 2007 | 238 | 475 | 91 | 606 | 109 | 1,171 | 286 | 239 |
| | $1,000, 2012 | 1,733 | 38,264 | 330 | 64,112 | 3,403 | 232,555 | 2,490 | 892 |
| | 2007 | 1,395 | 38,232 | 435 | 34,547 | 1,797 | 91,953 | 3,494 | 1,613 |
| Depreciation expenses claimed (see text) | farms, 2012 | 146 | 445 | 87 | 510 | 116 | 1,008 | 168 | 139 |
| | 2007 | 242 | 452 | 82 | 532 | 106 | 1,036 | 241 | 144 |
| | $1,000, 2012 | 2,634 | 12,579 | 705 | 43,992 | 2,809 | 98,740 | 2,209 | 904 |
| | 2007 | 4,941 | 11,955 | 920 | 28,211 | 2,217 | 61,538 | 3,087 | 1,111 |

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Table 3. **Farm Production Expenses: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|---|
| Total farm production expenses | farms, 2012 | 221 | 1,837 | 706 | 1,006 | 760 | 1,647 | 897 | 377 |
| | 2007 | 211 | 1,790 | 664 | 1,038 | 893 | 1,717 | 798 | 471 |
| | $1,000, 2012 | 8,761 | 125,807 | 12,077 | 67,406 | 68,069 | 116,098 | 128,006 | 34,240 |
| | 2007 | 8,300 | 115,748 | 14,071 | 59,218 | 58,147 | 101,712 | 86,668 | 29,185 |
| Average per farm | dollars, 2012 | 39,644 | 68,485 | 17,107 | 67,004 | 89,564 | 70,491 | 142,704 | 90,823 |
| | 2007 | 39,338 | 64,664 | 21,191 | 57,050 | 65,114 | 59,238 | 108,607 | 61,963 |
| Fertilizer, lime, and soil conditioners purchased | farms, 2012 | 58 | 556 | 247 | 452 | 251 | 456 | 414 | 102 |
| | 2007 | 79 | 638 | 248 | 454 | 275 | 549 | 415 | 172 |
| | $1,000, 2012 | 106 | 1,309 | 240 | 9,866 | 3,779 | 1,834 | 24,616 | 116 |
| | 2007 | 95 | 1,048 | 195 | 7,115 | 2,898 | 1,770 | 14,869 | 179 |
| Chemicals purchased | farms, 2012 | 49 | 574 | 182 | 457 | 270 | 499 | 525 | 90 |
| | 2007 | 41 | 425 | 145 | 501 | 224 | 502 | 447 | 116 |
| | $1,000, 2012 | 32 | 1,033 | 51 | 2,152 | 4,891 | 939 | 12,793 | 94 |
| | 2007 | 14 | 455 | 40 | 1,707 | 2,713 | 956 | 7,032 | 57 |
| Seeds, plants, vines, and trees purchased | farms, 2012 | 72 | 493 | 224 | 268 | 257 | 299 | 415 | 107 |
| | 2007 | 65 | 494 | 196 | 215 | 218 | 284 | 348 | 115 |
| | $1,000, 2012 | 150 | 6,305 | 292 | 1,696 | 1,292 | 3,435 | 8,567 | 486 |
| | 2007 | 73 | 4,270 | 332 | 701 | 1,240 | 4,295 | 4,657 | 225 |
| Livestock and poultry purchased or leased | farms, 2012 | 72 | 502 | 210 | 321 | 213 | 526 | 127 | 99 |
| | 2007 | 36 | 475 | 167 | 218 | 229 | 444 | 118 | 119 |
| | $1,000, 2012 | (D) | 2,244 | 371 | (D) | 1,158 | (D) | 1,088 | 1,366 |
| | 2007 | 74 | (D) | 237 | 4,316 | 1,225 | (D) | 1,850 | 1,290 |
| Breeding livestock purchased or leased | farms, 2012 | 32 | 230 | 66 | 159 | 102 | 247 | 80 | 33 |
| | 2007 | 25 | 262 | 67 | 101 | 110 | 247 | 84 | 47 |
| | $1,000, 2012 | 80 | 1,374 | 138 | 1,032 | 851 | 1,163 | 803 | 77 |
| | 2007 | 40 | 1,818 | 129 | 1,174 | 359 | 1,058 | 549 | 188 |
| Other livestock and poultry purchased or leased | farms, 2012 | 47 | 357 | 177 | 213 | 131 | 367 | 61 | 81 |
| | 2007 | 18 | 289 | 129 | 145 | 162 | 286 | 50 | 94 |
| | $1,000, 2012 | (D) | 870 | 233 | (D) | 308 | (D) | 286 | 1,290 |
| | 2007 | 35 | (D) | 108 | 3,142 | 866 | (D) | 1,300 | 1,103 |
| Feed purchased | farms, 2012 | 128 | 1,255 | 506 | 628 | 393 | 1,131 | 252 | 202 |
| | 2007 | 135 | 1,274 | 483 | 560 | 463 | 1,063 | 220 | 287 |
| | $1,000, 2012 | 704 | 24,032 | (D) | (D) | 4,770 | 49,881 | (D) | 3,512 |
| | 2007 | 744 | 37,865 | 2,849 | 9,736 | 4,260 | 38,524 | 1,643 | 1,652 |
| Gasoline, fuels, and oils purchased | farms, 2012 | 208 | 1,665 | 605 | 922 | 703 | 1,534 | 777 | 341 |
| | 2007 | 204 | 1,728 | 649 | 1,011 | 866 | 1,670 | 780 | 462 |
| | $1,000, 2012 | 478 | 4,992 | 526 | 3,992 | 4,078 | 5,442 | 11,856 | 1,771 |
| | 2007 | 410 | 4,063 | 1,019 | 3,942 | 4,498 | 5,529 | 8,407 | 1,420 |
| Utilities | farms, 2012 | 145 | 1,030 | 335 | 705 | 482 | 945 | 619 | 202 |
| | 2007 | 126 | 874 | 319 | 698 | 407 | 797 | 402 | 233 |
| | $1,000, 2012 | 369 | 3,621 | 350 | 2,873 | 2,251 | 2,049 | 5,849 | 965 |
| | 2007 | 264 | 3,544 | 380 | 2,655 | 1,660 | 1,946 | 3,251 | 890 |
| Repairs, supplies, and maintenance costs | farms, 2012 | 164 | 1,276 | 422 | 781 | 575 | 1,214 | 664 | 253 |
| | 2007 | 185 | 1,576 | 605 | 946 | 796 | 1,564 | 720 | 400 |
| | $1,000, 2012 | 874 | 8,295 | (D) | 5,900 | 4,520 | (D) | 13,999 | 1,125 |
| | 2007 | 627 | 10,460 | 1,539 | 6,210 | 4,859 | 8,293 | 9,185 | 2,214 |
| Hired farm labor | farms, 2012 | 63 | 455 | 132 | 232 | 212 | 412 | 342 | 104 |
| | 2007 | 48 | 402 | 173 | 222 | 185 | 372 | 260 | 114 |
| | $1,000, 2012 | 2,802 | 30,206 | 1,991 | 8,435 | 18,519 | 16,837 | 11,256 | 18,511 |
| | 2007 | 3,466 | 21,822 | 2,016 | 6,650 | 12,829 | 13,188 | 6,092 | 14,085 |
| Contract labor | farms, 2012 | 22 | 197 | 68 | 69 | 91 | 123 | 82 | 50 |
| | 2007 | 19 | 148 | 47 | 67 | 58 | 129 | 37 | 36 |
| | $1,000, 2012 | 70 | 1,880 | 497 | 1,131 | 1,267 | 2,441 | 661 | 650 |
| | 2007 | 92 | 791 | 326 | 530 | 301 | 1,675 | 421 | 572 |
| Customwork and custom hauling | farms, 2012 | 35 | 168 | 25 | 186 | 112 | 186 | 125 | 17 |
| | 2007 | 21 | 140 | 30 | 185 | 81 | 152 | 103 | 20 |
| | $1,000, 2012 | 100 | 1,618 | 43 | 1,405 | 1,574 | 1,754 | 2,100 | 332 |
| | 2007 | 37 | (D) | 71 | 696 | 520 | (D) | 880 | 352 |
| Cash rent for land, buildings, and grazing fees | farms, 2012 | 33 | 212 | 30 | 191 | 157 | 262 | 221 | 21 |
| | 2007 | 15 | 222 | 32 | 172 | 133 | 197 | 164 | 51 |
| | $1,000, 2012 | 313 | 3,103 | 193 | 4,644 | 5,740 | 2,166 | 9,806 | 412 |
| | 2007 | 241 | 2,249 | 78 | 3,248 | 3,769 | 1,322 | 13,603 | 993 |
| Rent and lease expenses for machinery, equipment, and farm share of vehicles | farms, 2012 | 9 | 98 | 25 | 80 | 27 | 80 | 117 | 18 |
| | 2007 | 7 | 77 | 30 | 64 | 40 | 55 | 115 | 16 |
| | $1,000, 2012 | (D) | 1,749 | 29 | 441 | 92 | 154 | (D) | 259 |
| | 2007 | 54 | 658 | 59 | 208 | 185 | 304 | 1,538 | 115 |
| Interest expense | farms, 2012 | 66 | 478 | 154 | 317 | 184 | 496 | 369 | 94 |
| | 2007 | 36 | 388 | 146 | 271 | 216 | 418 | 251 | 70 |
| | $1,000, 2012 | 609 | 5,909 | 1,231 | 4,091 | 3,036 | 4,674 | 4,873 | 1,577 |
| | 2007 | 462 | 5,115 | 1,449 | 3,402 | 3,757 | 4,605 | 3,819 | 1,092 |
| Secured by real estate | farms, 2012 | 49 | 353 | 118 | 242 | 141 | 388 | 216 | 67 |
| | 2007 | 30 | 304 | 119 | 234 | 183 | 378 | 140 | 54 |
| | $1,000, 2012 | 556 | 4,946 | 1,116 | 3,100 | 1,764 | 3,706 | 2,731 | 1,464 |
| | 2007 | 375 | 3,623 | 1,231 | 2,318 | 2,733 | 3,999 | 2,111 | 891 |
| Not secured by real estate | farms, 2012 | 33 | 241 | 66 | 178 | 78 | 214 | 222 | 40 |
| | 2007 | 18 | 232 | 69 | 156 | 125 | 202 | 193 | 45 |
| | $1,000, 2012 | 52 | 964 | 115 | 991 | 1,272 | 968 | 2,142 | 113 |
| | 2007 | 87 | 1,492 | 217 | 1,084 | 1,025 | 606 | 1,708 | 201 |
| Property taxes paid | farms, 2012 | 210 | 1,686 | 676 | 973 | 734 | 1,590 | 817 | 355 |
| | 2007 | 197 | 1,571 | 619 | 999 | 820 | 1,576 | 717 | 427 |
| | $1,000, 2012 | 908 | 8,198 | 2,305 | 3,187 | 2,575 | 4,639 | 3,426 | 1,002 |
| | 2007 | 768 | 7,489 | 2,201 | 3,339 | 2,770 | 4,967 | 2,977 | 1,145 |
| All other production expenses (see text) | farms, 2012 | 116 | 935 | 285 | 586 | 379 | 854 | 510 | 158 |
| | 2007 | 110 | 960 | 307 | 537 | 433 | 777 | 449 | 203 |
| | $1,000, 2012 | 773 | 21,312 | 863 | 5,170 | 8,528 | 4,942 | 12,600 | 2,062 |
| | 2007 | 879 | 10,844 | 1,280 | 4,764 | 10,663 | 5,801 | 6,444 | 2,904 |
| Depreciation expenses claimed (see text) | farms, 2012 | 84 | 571 | 169 | 392 | 321 | 623 | 467 | 107 |
| | 2007 | 74 | 613 | 240 | 394 | 345 | 601 | 447 | 121 |
| | $1,000, 2012 | 690 | 8,278 | 885 | 8,527 | 7,468 | 9,059 | 14,716 | 3,546 |
| | 2007 | 632 | 9,858 | 2,126 | 6,213 | 5,233 | 6,804 | 9,693 | 2,065 |

--continued

Table 3. **Farm Production Expenses: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|---|
| Total farm production expenses | farms, 2012 | 1,449 | 330 | 288 | 1,478 | 274 | 1,074 | 144 | 1,438 |
| | 2007 | 1,662 | 390 | 316 | 1,448 | 291 | 1,215 | 123 | 1,670 |
| | $1,000, 2012 | 285,383 | 26,307 | 3,716 | 87,562 | 5,418 | 252,540 | 6,040 | 141,079 |
| | 2007 | 132,606 | 29,177 | 4,847 | 83,374 | 5,983 | 215,218 | 4,244 | 115,099 |
| Average per farm | dollars, 2012 | 196,952 | 79,719 | 12,902 | 59,244 | 19,774 | 235,139 | 41,944 | 98,108 |
| | 2007 | 79,787 | 74,813 | 15,337 | 57,578 | 20,560 | 177,134 | 34,507 | 68,922 |
| Fertilizer, lime, and soil conditioners purchased | farms, 2012 | 588 | 136 | 86 | 391 | 66 | 382 | 60 | 344 |
| | 2007 | 692 | 155 | 93 | 470 | 118 | 440 | 34 | 489 |
| | $1,000, 2012 | 7,473 | 325 | 294 | 757 | 68 | 16,746 | 42 | 3,046 |
| | 2007 | 3,433 | 546 | 289 | 797 | 143 | 11,443 | 29 | 2,678 |
| Chemicals purchased | farms, 2012 | 682 | 162 | 102 | 453 | 54 | 423 | 53 | 408 |
| | 2007 | 673 | 174 | 94 | 425 | 58 | 361 | 48 | 454 |
| | $1,000, 2012 | 17,389 | 495 | 75 | 597 | 23 | 13,179 | 57 | 1,368 |
| | 2007 | 10,318 | 512 | 43 | 707 | 36 | 6,276 | 86 | 1,501 |
| Seeds, plants, vines, and trees purchased | farms, 2012 | 437 | 53 | 59 | 347 | 99 | 334 | 48 | 372 |
| | 2007 | 410 | 78 | 50 | 333 | 102 | 310 | 35 | 384 |
| | $1,000, 2012 | 2,929 | 244 | 25 | 2,429 | 120 | 21,243 | 24 | 8,004 |
| | 2007 | 1,516 | 164 | 37 | 4,097 | 161 | 17,528 | 28 | 9,180 |
| Livestock and poultry purchased or leased | farms, 2012 | 341 | 66 | 87 | 498 | 78 | 339 | 48 | 395 |
| | 2007 | 299 | 75 | 66 | 448 | 74 | 287 | 42 | 409 |
| | $1,000, 2012 | 2,891 | 576 | 199 | 2,884 | 203 | 3,654 | (D) | 2,723 |
| | 2007 | 3,753 | 344 | 74 | 1,507 | 143 | (D) | (D) | 2,742 |
| Breeding livestock purchased or leased | farms, 2012 | 160 | 36 | 28 | 237 | 41 | 147 | 13 | 163 |
| | 2007 | 140 | 27 | 38 | 265 | 28 | 144 | 27 | 196 |
| | $1,000, 2012 | 1,182 | 83 | 78 | 2,218 | 132 | 1,849 | 27 | 1,606 |
| | 2007 | 697 | 94 | 47 | 701 | 41 | 1,985 | 56 | 1,024 |
| Other livestock and poultry purchased or leased | farms, 2012 | 225 | 38 | 69 | 328 | 64 | 247 | 43 | 284 |
| | 2007 | 201 | 60 | 36 | 264 | 53 | 185 | 22 | 277 |
| | $1,000, 2012 | 1,709 | 493 | 122 | 667 | 71 | 1,804 | (D) | 1,117 |
| | 2007 | 3,056 | 250 | 27 | 805 | 102 | (D) | (D) | 1,718 |
| Feed purchased | farms, 2012 | 753 | 157 | 162 | 1,142 | 155 | 672 | 94 | 1,049 |
| | 2007 | 737 | 146 | 187 | 1,083 | 182 | 693 | 82 | 1,162 |
| | $1,000, 2012 | 23,116 | 3,791 | 501 | 36,153 | 553 | 25,008 | 974 | 40,131 |
| | 2007 | 6,596 | 3,818 | 1,017 | 26,297 | 508 | 23,370 | 663 | 24,400 |
| Gasoline, fuels, and oils purchased | farms, 2012 | 1,358 | 312 | 268 | 1,318 | 238 | 976 | 136 | 1,312 |
| | 2007 | 1,628 | 383 | 302 | 1,424 | 285 | 1,189 | 120 | 1,627 |
| | $1,000, 2012 | 10,130 | 1,521 | 429 | 2,747 | 291 | 14,479 | 174 | 5,716 |
| | 2007 | 7,179 | 1,450 | 559 | 3,768 | 391 | 11,094 | 139 | 4,597 |
| Utilities | farms, 2012 | 1,065 | 231 | 146 | 806 | 157 | 588 | 85 | 783 |
| | 2007 | 982 | 240 | 141 | 721 | 123 | 585 | 61 | 771 |
| | $1,000, 2012 | 7,151 | 977 | 157 | 2,028 | 227 | 6,706 | 321 | 3,196 |
| | 2007 | 4,621 | 900 | 158 | 2,097 | 181 | 4,890 | 304 | 3,546 |
| Repairs, supplies, and maintenance costs | farms, 2012 | 1,172 | 257 | 205 | 992 | 204 | 778 | 102 | 1,018 |
| | 2007 | 1,507 | 357 | 292 | 1,294 | 254 | 1,082 | 111 | 1,500 |
| | $1,000, 2012 | 14,523 | 2,246 | 366 | 4,221 | 444 | 21,885 | 301 | 7,608 |
| | 2007 | 10,396 | 2,633 | 996 | 7,382 | 628 | 19,990 | 462 | 11,179 |
| Hired farm labor | farms, 2012 | 499 | 132 | 45 | 295 | 84 | 312 | 35 | 347 |
| | 2007 | 496 | 145 | 40 | 321 | 77 | 275 | 31 | 339 |
| | $1,000, 2012 | 85,404 | 10,135 | 285 | 17,443 | 761 | 65,028 | 2,947 | 30,621 |
| | 2007 | 38,499 | 9,670 | 151 | 17,663 | 923 | 65,352 | 1,264 | 21,375 |
| Contract labor | farms, 2012 | 153 | 30 | 13 | 124 | 41 | 101 | 16 | 144 |
| | 2007 | 137 | 43 | 8 | 91 | 43 | 84 | 11 | 117 |
| | $1,000, 2012 | 6,469 | 412 | 13 | 799 | 282 | 4,087 | 148 | 1,425 |
| | 2007 | 3,705 | 224 | (D) | 952 | 165 | 3,482 | 153 | 651 |
| Customwork and custom hauling | farms, 2012 | 218 | 33 | 14 | 122 | 28 | 128 | 7 | 135 |
| | 2007 | 173 | 46 | 23 | 138 | 54 | 143 | 2 | 170 |
| | $1,000, 2012 | 1,323 | 226 | 13 | 603 | 98 | 4,808 | 17 | 2,139 |
| | 2007 | 1,075 | 249 | (D) | 592 | 162 | (D) | (D) | 2,003 |
| Cash rent for land, buildings, and grazing fees | farms, 2012 | 266 | 36 | 29 | 86 | 45 | 212 | 12 | 179 |
| | 2007 | 251 | 32 | 26 | 113 | 43 | 222 | 22 | 188 |
| | $1,000, 2012 | 5,577 | 520 | 96 | 1,021 | 205 | 15,494 | 18 | 4,792 |
| | 2007 | 4,491 | 698 | 267 | 1,535 | 224 | 10,835 | 34 | 4,303 |
| Rent and lease expenses for machinery, equipment, and farm share of vehicles | farms, 2012 | 118 | 9 | 9 | 52 | 26 | 87 | 2 | 59 |
| | 2007 | 82 | 17 | 8 | 65 | 15 | 78 | 4 | 59 |
| | $1,000, 2012 | 1,777 | 206 | 12 | 174 | 29 | 2,477 | (D) | 465 |
| | 2007 | 472 | 158 | 4 | 204 | 9 | 1,112 | 2 | 139 |
| Interest expense | farms, 2012 | 422 | 106 | 75 | 391 | 70 | 334 | 33 | 389 |
| | 2007 | 431 | 114 | 53 | 338 | 52 | 268 | 23 | 354 |
| | $1,000, 2012 | 11,034 | 1,488 | 318 | 4,460 | 766 | 7,115 | 337 | 4,546 |
| | 2007 | 6,973 | 1,660 | 363 | 4,601 | 978 | 7,460 | 316 | 5,218 |
| Secured by real estate | farms, 2012 | 306 | 96 | 46 | 310 | 49 | 251 | 27 | 307 |
| | 2007 | 357 | 92 | 46 | 292 | 41 | 213 | 22 | 291 |
| | $1,000, 2012 | 9,280 | 1,273 | 257 | 3,632 | 721 | 4,028 | 332 | 3,505 |
| | 2007 | 4,382 | 1,514 | 298 | 3,650 | 847 | 3,499 | 278 | 4,155 |
| Not secured by real estate | farms, 2012 | 261 | 39 | 49 | 168 | 35 | 164 | 7 | 184 |
| | 2007 | 241 | 59 | 28 | 168 | 33 | 162 | 7 | 191 |
| | $1,000, 2012 | 1,753 | 214 | 61 | 827 | 44 | 3,087 | 6 | 1,041 |
| | 2007 | 2,591 | 146 | 65 | 951 | 131 | 3,961 | 38 | 1,063 |
| Property taxes paid | farms, 2012 | 1,384 | 319 | 282 | 1,423 | 260 | 1,018 | 135 | 1,349 |
| | 2007 | 1,522 | 360 | 290 | 1,329 | 241 | 1,119 | 118 | 1,500 |
| | $1,000, 2012 | 5,430 | 873 | 593 | 5,628 | 958 | 5,097 | 427 | 5,525 |
| | 2007 | 5,406 | 1,051 | 566 | 4,689 | 824 | 4,174 | 438 | 6,280 |
| All other production expenses (see text) | farms, 2012 | 737 | 145 | 113 | 719 | 124 | 484 | 63 | 749 |
| | 2007 | 835 | 192 | 117 | 724 | 133 | 614 | 72 | 824 |
| | $1,000, 2012 | 82,764 | 2,271 | 340 | 5,617 | 390 | 25,536 | 181 | 19,774 |
| | 2007 | 24,172 | 5,100 | 282 | 6,484 | 506 | 18,116 | 250 | 15,310 |
| Depreciation expenses claimed (see text) | farms, 2012 | 626 | 142 | 91 | 406 | 93 | 366 | 61 | 443 |
| | 2007 | 637 | 181 | 87 | 519 | 139 | 403 | 49 | 581 |
| | $1,000, 2012 | 17,583 | 1,688 | 686 | 3,597 | 776 | 14,939 | 392 | 6,697 |
| | 2007 | 11,181 | 2,925 | 611 | 4,837 | 917 | 14,690 | 201 | 6,996 |

--continued

Table 3. **Farm Production Expenses: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|---|
| Total farm production expenses | farms, 2012 | 2,501 | 1,148 | 1,336 | 109 | 943 | 1,702 | 1,195 | 3,143 |
| | 2007 | 2,502 | 1,258 | 1,288 | 119 | 929 | 1,483 | 1,247 | 3,540 |
| | $1,000, 2012 | 126,855 | 33,240 | 111,653 | 3,016 | 341,151 | 314,860 | 237,688 | 1,358,478 |
| | 2007 | 103,956 | 26,993 | 99,025 | 3,416 | 279,380 | 267,962 | 166,656 | 857,111 |
| Average per farm | dollars, 2012 | 50,722 | 28,955 | 83,572 | 27,668 | 361,772 | 184,994 | 198,902 | 432,223 |
| | 2007 | 41,549 | 21,457 | 76,883 | 28,707 | 300,732 | 180,689 | 133,646 | 242,122 |
| Fertilizer, lime, and soil conditioners purchased | farms, 2012 | 892 | 386 | 367 | 20 | 510 | 566 | 657 | 1,468 |
| | 2007 | 915 | 414 | 431 | 26 | 480 | 565 | 710 | 2,086 |
| | $1,000, 2012 | 19,626 | 1,375 | 2,939 | 24 | 28,205 | 9,265 | 48,729 | 35,932 |
| | 2007 | 16,491 | 1,141 | 2,429 | 30 | 19,301 | 5,625 | 36,797 | 27,825 |
| Chemicals purchased | farms, 2012 | 1,143 | 480 | 319 | 36 | 628 | 566 | 800 | 1,844 |
| | 2007 | 959 | 382 | 363 | 33 | 517 | 479 | 780 | 2,090 |
| | $1,000, 2012 | 10,836 | 690 | 946 | 23 | 27,476 | 11,201 | 32,418 | 77,717 |
| | 2007 | 6,794 | 386 | 1,011 | 27 | 24,260 | 6,648 | 20,079 | 45,698 |
| Seeds, plants, vines, and trees purchased | farms, 2012 | 816 | 395 | 306 | 22 | 358 | 492 | 622 | 958 |
| | 2007 | 644 | 332 | 253 | 20 | 330 | 409 | 607 | 1,045 |
| | $1,000, 2012 | 7,575 | 628 | 3,767 | 46 | 13,500 | 7,700 | 19,024 | 26,870 |
| | 2007 | 7,192 | 696 | 2,645 | 34 | 9,698 | 6,284 | 13,023 | 11,734 |
| Livestock and poultry purchased or leased | farms, 2012 | 654 | 313 | 390 | 39 | 192 | 514 | 140 | 825 |
| | 2007 | 493 | 289 | 345 | 25 | 175 | 406 | 152 | 842 |
| | $1,000, 2012 | 2,730 | 2,220 | 3,119 | (D) | (D) | 13,716 | 1,851 | 51,722 |
| | 2007 | 3,583 | 1,005 | 4,223 | 90 | (D) | 9,332 | 1,327 | 41,638 |
| Breeding livestock purchased or leased | farms, 2012 | 223 | 141 | 191 | 18 | 66 | 235 | 74 | 365 |
| | 2007 | 229 | 153 | 187 | 14 | 73 | 236 | 87 | 381 |
| | $1,000, 2012 | 917 | 810 | 526 | 155 | 417 | 4,419 | 665 | 3,765 |
| | 2007 | 1,813 | 611 | 1,266 | 71 | (D) | 4,232 | 842 | 10,217 |
| Other livestock and poultry purchased or leased | farms, 2012 | 513 | 207 | 265 | 24 | 142 | 322 | 78 | 574 |
| | 2007 | 320 | 168 | 197 | 14 | 125 | 215 | 91 | 569 |
| | $1,000, 2012 | 1,813 | 1,410 | 2,593 | (D) | (D) | 9,297 | 1,186 | 47,956 |
| | 2007 | 1,770 | 394 | 2,957 | 20 | (D) | 5,101 | 486 | 31,420 |
| Feed purchased | farms, 2012 | 1,383 | 755 | 935 | 81 | 335 | 1,076 | 329 | 1,447 |
| | 2007 | 1,183 | 748 | 867 | 72 | 369 | 917 | 295 | 1,410 |
| | $1,000, 2012 | 7,481 | 6,760 | 32,371 | 1,207 | (D) | 103,779 | 4,502 | 247,896 |
| | 2007 | 7,684 | 4,294 | 22,825 | 1,063 | 17,091 | 89,701 | 3,602 | 139,054 |
| Gasoline, fuels, and oils purchased | farms, 2012 | 2,275 | 1,089 | 1,208 | 104 | 830 | 1,557 | 1,082 | 2,926 |
| | 2007 | 2,445 | 1,228 | 1,268 | 119 | 901 | 1,438 | 1,218 | 3,495 |
| | $1,000, 2012 | 9,694 | 2,771 | 3,373 | 179 | 14,517 | 10,908 | 20,284 | 47,820 |
| | 2007 | 9,719 | 2,812 | 3,458 | 179 | 10,483 | 8,070 | 16,384 | 40,247 |
| Utilities | farms, 2012 | 1,290 | 688 | 697 | 72 | 668 | 1,025 | 764 | 2,449 |
| | 2007 | 1,026 | 619 | 643 | 66 | 541 | 784 | 600 | 2,762 |
| | $1,000, 2012 | 3,507 | 997 | 3,678 | 117 | 13,577 | 6,720 | 4,055 | 34,918 |
| | 2007 | 2,616 | 843 | 3,158 | 100 | 9,757 | 6,682 | 2,216 | 26,323 |
| Repairs, supplies, and maintenance costs | farms, 2012 | 1,774 | 845 | 905 | 79 | 671 | 1,245 | 898 | 2,489 |
| | 2007 | 2,278 | 1,135 | 1,170 | 106 | 830 | 1,316 | 1,123 | 3,322 |
| | $1,000, 2012 | 11,912 | 3,186 | 6,406 | 266 | 19,183 | 20,281 | 25,721 | 83,251 |
| | 2007 | 11,454 | 3,805 | 11,270 | 450 | 16,911 | 24,104 | 17,610 | 75,522 |
| Hired farm labor | farms, 2012 | 585 | 221 | 335 | 32 | 338 | 528 | 528 | 1,288 |
| | 2007 | 373 | 209 | 276 | 41 | 284 | 481 | 417 | 1,483 |
| | $1,000, 2012 | 14,231 | 3,581 | 24,207 | 314 | 73,297 | 57,713 | 17,932 | 352,278 |
| | 2007 | 9,350 | 2,503 | 22,450 | 354 | 50,065 | 47,008 | 11,700 | 232,247 |
| Contract labor | farms, 2012 | 118 | 62 | 104 | 7 | 87 | 156 | 89 | 340 |
| | 2007 | 108 | 69 | 87 | 12 | 82 | 109 | 66 | 430 |
| | $1,000, 2012 | 1,722 | 477 | 2,928 | 34 | 5,351 | 1,771 | 857 | 23,248 |
| | 2007 | 1,496 | 237 | 877 | 138 | 1,950 | 1,448 | 513 | 9,058 |
| Customwork and custom hauling | farms, 2012 | 289 | 109 | 134 | 19 | 235 | 396 | 289 | 676 |
| | 2007 | 192 | 88 | 118 | 20 | 172 | 306 | 210 | 684 |
| | $1,000, 2012 | 2,332 | 556 | 1,402 | 40 | 9,652 | 8,884 | 4,996 | 31,468 |
| | 2007 | 722 | 117 | 505 | 46 | (D) | 8,162 | 2,270 | 16,561 |
| Cash rent for land, buildings, and grazing fees | farms, 2012 | 401 | 184 | 144 | 15 | 175 | 334 | 316 | 500 |
| | 2007 | 314 | 156 | 128 | 11 | 165 | 322 | 335 | 575 |
| | $1,000, 2012 | 9,974 | 2,697 | 1,747 | 71 | 12,350 | 14,083 | 17,396 | 27,261 |
| | 2007 | 6,701 | 1,700 | 1,668 | 31 | 16,647 | 10,781 | 12,180 | 18,915 |
| Rent and lease expenses for machinery, equipment, and farm share of vehicles | farms, 2012 | 122 | 52 | 71 | 1 | 115 | 123 | 147 | 308 |
| | 2007 | 105 | 28 | 52 | 4 | 97 | 110 | 125 | 314 |
| | $1,000, 2012 | 1,578 | 169 | 499 | (D) | (D) | 2,200 | 4,213 | 5,789 |
| | 2007 | 669 | 112 | 374 | 1 | 3,048 | 1,113 | 2,152 | 3,225 |
| Interest expense | farms, 2012 | 670 | 310 | 382 | 22 | 314 | 517 | 469 | 1,047 |
| | 2007 | 537 | 277 | 296 | 39 | 279 | 456 | 430 | 1,128 |
| | $1,000, 2012 | 5,693 | 2,315 | 4,674 | 88 | 5,365 | 12,128 | 7,185 | 37,609 |
| | 2007 | 6,262 | 2,610 | 4,222 | 393 | 6,973 | 13,256 | 7,809 | 28,070 |
| Secured by real estate | farms, 2012 | 510 | 236 | 313 | 17 | 211 | 415 | 296 | 843 |
| | 2007 | 432 | 225 | 239 | 35 | 196 | 368 | 251 | 913 |
| | $1,000, 2012 | 4,256 | 1,995 | 3,951 | 85 | 3,455 | 8,681 | 3,992 | 28,680 |
| | 2007 | 4,181 | 1,923 | 3,381 | 364 | 4,017 | 9,345 | 3,657 | 15,703 |
| Not secured by real estate | farms, 2012 | 328 | 188 | 162 | 8 | 197 | 263 | 299 | 514 |
| | 2007 | 301 | 173 | 170 | 16 | 159 | 256 | 316 | 668 |
| | $1,000, 2012 | 1,438 | 319 | 723 | 4 | 1,910 | 3,447 | 3,194 | 8,930 |
| | 2007 | 2,082 | 687 | 841 | 30 | 2,956 | 3,912 | 4,152 | 12,366 |
| Property taxes paid | farms, 2012 | 2,428 | 1,115 | 1,290 | 107 | 880 | 1,627 | 1,072 | 3,004 |
| | 2007 | 2,281 | 1,142 | 1,126 | 112 | 830 | 1,343 | 1,094 | 3,315 |
| | $1,000, 2012 | 7,358 | 2,583 | 5,146 | 222 | 5,939 | 6,300 | 5,702 | 23,132 |
| | 2007 | 5,626 | 2,287 | 3,924 | 280 | 7,771 | 5,616 | 6,072 | 19,282 |
| All other production expenses (see text) | farms, 2012 | 1,133 | 606 | 629 | 46 | 509 | 752 | 698 | 1,630 |
| | 2007 | 1,102 | 584 | 616 | 63 | 495 | 779 | 737 | 2,036 |
| | $1,000, 2012 | 10,605 | 2,237 | 14,450 | 205 | 34,562 | 28,210 | 22,823 | 251,568 |
| | 2007 | 7,595 | 2,444 | 13,988 | 199 | 26,642 | 24,132 | 12,922 | 121,712 |
| Depreciation expenses claimed (see text) | farms, 2012 | 940 | 488 | 416 | 51 | 419 | 572 | 667 | 1,377 |
| | 2007 | 945 | 510 | 468 | 62 | 442 | 656 | 644 | 1,676 |
| | $1,000, 2012 | 12,871 | 3,822 | 7,464 | 415 | 25,567 | 22,321 | 24,211 | 89,239 |
| | 2007 | 11,373 | 4,542 | 11,401 | 748 | 19,039 | 22,947 | 15,701 | 68,720 |

## Table 4. **Net Cash Farm Income of the Operations and Operators: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|---|
| Net cash farm income of the operations ..... $1,000, | 2012 | 1,752,459 | 130,948 | 4,857 | 159,631 | 30,492 | -3,218 | 2,398 | 28,644 |
| | 2007 | 1,785,615 | 107,930 | 2,998 | 175,346 | 53,180 | -3,165 | -1,289 | 14,790 |
| Average per farm ..... dollars, | 2012 | 47,047 | 183,658 | 26,252 | 105,786 | 34,260 | -6,003 | 1,243 | 92,999 |
| | 2007 | 45,454 | 138,018 | 15,616 | 107,574 | 54,321 | -6,182 | -614 | 52,260 |
| Farms with net gains [1] ..... number, | 2012 | 13,992 | 475 | 77 | 456 | 416 | 135 | 468 | 177 |
| | 2007 | 14,690 | 554 | 82 | 566 | 569 | 140 | 475 | 151 |
| Average per farm ..... dollars, | 2012 | 175,251 | 310,400 | 102,793 | 424,878 | 131,937 | 15,962 | 40,478 | 180,701 |
| | 2007 | 156,938 | 221,163 | 72,768 | 352,703 | 114,185 | 21,468 | 35,416 | 119,234 |
| Farms with net losses ..... number, | 2012 | 23,257 | 238 | 108 | 1,053 | 474 | 401 | 1,461 | 131 |
| | 2007 | 24,594 | 228 | 110 | 1,064 | 410 | 372 | 1,626 | 132 |
| Average per farm ..... dollars, | 2012 | 30,084 | 69,293 | 28,320 | 32,396 | 51,464 | 13,398 | 11,325 | 25,499 |
| | 2007 | 21,135 | 64,008 | 26,989 | 22,823 | 28,759 | 16,588 | 11,139 | 24,354 |
| Net cash farm income of operators ..... $1,000, | 2012 | 1,567,214 | 116,646 | 4,485 | 154,082 | 29,259 | -3,229 | 510 | 21,827 |
| | 2007 | 1,666,293 | 96,943 | 2,775 | 173,426 | 50,957 | -3,163 | -3,375 | 10,735 |
| Average per farm ..... dollars, | 2012 | 42,074 | 163,599 | 24,242 | 102,109 | 32,876 | -6,024 | 264 | 70,866 |
| | 2007 | 42,417 | 123,968 | 14,453 | 106,396 | 52,050 | -6,179 | -1,606 | 37,934 |
| Farm operators reporting net gains [1] ..... farms, | 2012 | 13,867 | 461 | 77 | 452 | 414 | 136 | 468 | 177 |
| | 2007 | 14,586 | 547 | 80 | 564 | 562 | 140 | 474 | 149 |
| Average per farm ..... dollars, | 2012 | 164,332 | 291,125 | 99,330 | 416,880 | 130,891 | 15,758 | 36,437 | 144,031 |
| | 2007 | 150,045 | 204,635 | 74,272 | 350,715 | 112,197 | 21,471 | 31,174 | 95,670 |
| Farm operators reporting net losses ..... farms, | 2012 | 23,382 | 252 | 108 | 1,057 | 476 | 400 | 1,461 | 131 |
| | 2007 | 24,698 | 235 | 112 | 1,066 | 417 | 372 | 1,627 | 134 |
| Average per farm ..... dollars, | 2012 | 30,433 | 69,692 | 29,294 | 32,495 | 52,373 | 13,430 | 11,323 | 27,991 |
| | 2007 | 21,146 | 63,797 | 28,275 | 22,868 | 29,011 | 16,584 | 11,156 | 26,266 |

| Item | | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|---|
| Net cash farm income of the operations ..... $1,000, | 2012 | -2,098 | 36,975 | 553 | 122,074 | 17,698 | 267,268 | 1,287 | -1,282 |
| | 2007 | 555 | 62,671 | -1,639 | 116,803 | 6,361 | 254,690 | 9,976 | -400 |
| Average per farm ..... dollars, | 2012 | -4,264 | 43,551 | 2,167 | 138,249 | 83,875 | 172,209 | 2,311 | -3,401 |
| | 2007 | 1,153 | 65,624 | -7,065 | 131,092 | 26,615 | 137,078 | 15,886 | -873 |
| Farms with net gains [1] ..... number, | 2012 | 121 | 514 | 90 | 511 | 131 | 857 | 134 | 111 |
| | 2007 | 105 | 608 | 59 | 567 | 136 | 1,019 | 180 | 116 |
| Average per farm ..... dollars, | 2012 | 39,031 | 133,086 | 26,411 | 325,286 | 158,234 | 423,833 | 68,422 | 24,199 |
| | 2007 | 71,901 | 118,102 | 20,686 | 251,727 | 75,683 | 308,087 | 91,882 | 41,123 |
| Farms with net losses ..... number, | 2012 | 371 | 335 | 165 | 372 | 80 | 695 | 423 | 266 |
| | 2007 | 376 | 347 | 173 | 324 | 103 | 839 | 448 | 342 |
| Average per farm ..... dollars, | 2012 | 18,384 | 93,824 | 11,057 | 118,676 | 37,888 | 138,067 | 18,632 | 14,919 |
| | 2007 | 18,603 | 26,326 | 16,529 | 80,019 | 38,172 | 70,620 | 14,648 | 15,117 |
| Net cash farm income of operators ..... $1,000, | 2012 | -3,118 | 29,160 | 515 | 121,064 | 12,586 | 247,686 | 1,288 | -1,121 |
| | 2007 | -1,542 | 55,788 | -1,662 | 118,802 | 4,030 | 248,440 | 9,932 | -106 |
| Average per farm ..... dollars, | 2012 | -6,337 | 34,346 | 2,021 | 137,105 | 59,648 | 159,591 | 2,312 | -2,974 |
| | 2007 | -3,206 | 58,417 | -7,166 | 133,335 | 16,861 | 133,714 | 15,815 | -232 |
| Farm operators reporting net gains [1] ..... farms, | 2012 | 118 | 506 | 90 | 506 | 131 | 845 | 134 | 110 |
| | 2007 | 104 | 605 | 59 | 572 | 134 | 1,012 | 179 | 119 |
| Average per farm ..... dollars, | 2012 | 33,173 | 121,567 | 26,011 | 327,179 | 125,132 | 407,927 | 68,417 | 26,113 |
| | 2007 | 52,559 | 107,829 | 20,284 | 251,066 | 60,956 | 303,624 | 91,871 | 41,092 |
| Farm operators reporting net losses ..... farms, | 2012 | 374 | 343 | 165 | 377 | 80 | 707 | 423 | 267 |
| | 2007 | 377 | 350 | 173 | 319 | 105 | 846 | 449 | 339 |
| Average per farm ..... dollars, | 2012 | 18,803 | 94,324 | 11,065 | 118,007 | 47,582 | 137,218 | 18,629 | 14,957 |
| | 2007 | 18,590 | 26,997 | 16,527 | 77,768 | 39,412 | 69,536 | 14,506 | 14,739 |

| Item | | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|---|
| Net cash farm income of the operations ..... $1,000, | 2012 | -246 | 8,829 | -4,800 | 5,140 | 16,726 | 26,795 | 88,984 | 7,838 |
| | 2007 | 677 | 23,943 | -1,930 | 4,767 | 6,513 | 19,185 | 61,605 | 9,472 |
| Average per farm ..... dollars, | 2012 | -1,114 | 4,806 | -6,799 | 5,110 | 22,008 | 16,269 | 99,202 | 20,790 |
| | 2007 | 3,209 | 13,376 | -2,907 | 4,592 | 7,293 | 11,174 | 77,199 | 20,111 |
| Farms with net gains [1] ..... number, | 2012 | 75 | 512 | 156 | 310 | 319 | 428 | 581 | 102 |
| | 2007 | 65 | 459 | 162 | 300 | 315 | 431 | 520 | 138 |
| Average per farm ..... dollars, | 2012 | 39,150 | 77,951 | 12,830 | 63,070 | 83,206 | 96,274 | 171,682 | 154,670 |
| | 2007 | 42,577 | 110,003 | 33,734 | 56,599 | 55,819 | 86,104 | 140,163 | 101,328 |
| Farms with net losses ..... number, | 2012 | 146 | 1,325 | 550 | 696 | 441 | 1,219 | 316 | 275 |
| | 2007 | 146 | 1,331 | 502 | 738 | 578 | 1,286 | 278 | 333 |
| Average per farm ..... dollars, | 2012 | 21,797 | 23,458 | 12,366 | 20,706 | 22,259 | 11,821 | 34,061 | 28,868 |
| | 2007 | 14,318 | 19,946 | 14,732 | 16,549 | 19,152 | 13,939 | 40,574 | 13,547 |
| Net cash farm income of operators ..... $1,000, | 2012 | -246 | 8,663 | -4,792 | 4,791 | 14,662 | 10,795 | 61,145 | 7,811 |
| | 2007 | 675 | 23,853 | -1,930 | 4,399 | 5,490 | 7,514 | 41,073 | 9,052 |
| Average per farm ..... dollars, | 2012 | -1,115 | 4,716 | -6,787 | 4,763 | 19,293 | 6,555 | 68,166 | 20,720 |
| | 2007 | 3,200 | 13,326 | -2,907 | 4,238 | 6,148 | 4,376 | 51,470 | 19,218 |
| Farm operators reporting net gains [1] ..... farms, | 2012 | 75 | 512 | 157 | 307 | 315 | 420 | 568 | 101 |
| | 2007 | 64 | 460 | 162 | 300 | 312 | 429 | 505 | 138 |
| Average per farm ..... dollars, | 2012 | 39,125 | 77,469 | 12,767 | 62,608 | 79,290 | 60,865 | 128,849 | 155,730 |
| | 2007 | 43,396 | 109,568 | 33,731 | 55,345 | 52,959 | 57,270 | 105,064 | 98,280 |
| Farm operators reporting net losses ..... farms, | 2012 | 146 | 1,325 | 549 | 699 | 445 | 1,227 | 329 | 276 |
| | 2007 | 147 | 1,330 | 502 | 738 | 581 | 1,288 | 293 | 333 |
| Average per farm ..... dollars, | 2012 | 21,787 | 23,397 | 12,379 | 20,643 | 23,177 | 12,036 | 36,599 | 28,686 |
| | 2007 | 14,300 | 19,961 | 14,731 | 16,537 | 18,989 | 13,241 | 40,900 | 13,547 |

See footnote(s) at end of table.

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Table 4. **Net Cash Farm Income of the Operations and Operators: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Net cash farm income of the operations ..... $1,000, 2012 | 17,417 | 13,352 | 466 | 8,865 | -489 | 27,933 | -130 | 6,103 |
| 2007 | 83,294 | 8,589 | -1,239 | 4,577 | -1,554 | 46,977 | -1,431 | 17,697 |
| Average per farm ..... dollars, 2012 | 12,020 | 40,461 | 1,619 | 5,998 | -1,785 | 26,008 | -905 | 4,244 |
| 2007 | 50,117 | 22,024 | -3,921 | 3,161 | -5,342 | 38,664 | -11,631 | 10,597 |
| Farms with net gains [1] ..... number, 2012 | 593 | 144 | 79 | 286 | 96 | 313 | 33 | 320 |
| 2007 | 632 | 177 | 66 | 247 | 91 | 413 | 33 | 390 |
| Average per farm ..... dollars, 2012 | 101,778 | 110,079 | 26,027 | 97,375 | 22,755 | 206,165 | 54,577 | 85,146 |
| 2007 | 157,124 | 70,457 | 22,188 | 101,381 | 16,126 | 153,117 | 13,505 | 96,642 |
| Farms with net losses ..... number, 2012 | 856 | 186 | 209 | 1,192 | 178 | 761 | 111 | 1,118 |
| 2007 | 1,030 | 213 | 250 | 1,201 | 200 | 802 | 90 | 1,280 |
| Average per farm ..... dollars, 2012 | 50,160 | 13,437 | 7,607 | 15,927 | 15,021 | 48,091 | 17,400 | 18,912 |
| 2007 | 15,542 | 18,224 | 10,814 | 17,039 | 15,110 | 20,275 | 20,847 | 15,620 |
| Net cash farm income of operators ..... $1,000, 2012 | 13,677 | 13,125 | 452 | 9,271 | -475 | 28,629 | -125 | 8,105 |
| 2007 | 82,368 | 8,410 | -1,245 | -417 | -1,564 | 47,172 | -1,429 | 17,743 |
| Average per farm ..... dollars, 2012 | 9,439 | 39,771 | 1,570 | 6,273 | -1,733 | 26,656 | -869 | 5,636 |
| 2007 | 49,559 | 21,565 | -3,941 | -288 | -5,373 | 38,825 | -11,615 | 10,624 |
| Farm operators reporting net gains [1] ..... farms, 2012 | 582 | 143 | 79 | 288 | 96 | 316 | 33 | 319 |
| 2007 | 628 | 177 | 66 | 246 | 89 | 412 | 33 | 390 |
| Average per farm ..... dollars, 2012 | 99,117 | 109,289 | 25,849 | 98,021 | 22,847 | 205,469 | 54,614 | 91,560 |
| 2007 | 156,767 | 69,382 | 22,010 | 81,814 | 16,487 | 153,758 | 13,565 | 96,655 |
| Farm operators reporting net losses ..... farms, 2012 | 867 | 187 | 209 | 1,190 | 178 | 758 | 111 | 1,119 |
| 2007 | 1,034 | 213 | 250 | 1,202 | 202 | 803 | 90 | 1,280 |
| Average per farm ..... dollars, 2012 | 50,761 | 13,390 | 7,607 | 15,932 | 14,990 | 47,888 | 17,364 | 18,858 |
| 2007 | 15,553 | 18,171 | 10,791 | 17,091 | 15,004 | 20,145 | 20,847 | 15,588 |

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Net cash farm income of the operations ..... $1,000, 2012 | 41,683 | 6,026 | 15,548 | 822 | 124,201 | 51,582 | 171,883 | 321,705 |
| 2007 | 25,401 | 1,713 | 23,071 | 153 | 96,478 | 66,840 | 119,955 | 372,055 |
| Average per farm ..... dollars, 2012 | 16,667 | 5,250 | 11,638 | 7,539 | 131,708 | 30,306 | 143,835 | 102,356 |
| 2007 | 10,152 | 1,362 | 17,912 | 1,283 | 103,852 | 45,071 | 96,195 | 105,100 |
| Farms with net gains [1] ..... number, 2012 | 908 | 441 | 314 | 41 | 463 | 603 | 889 | 1,313 |
| 2007 | 766 | 380 | 292 | 37 | 428 | 547 | 826 | 1,648 |
| Average per farm ..... dollars, 2012 | 71,468 | 34,667 | 103,671 | 33,860 | 304,236 | 128,881 | 204,270 | 299,825 |
| 2007 | 60,302 | 29,515 | 142,023 | 35,796 | 252,356 | 162,245 | 155,105 | 256,182 |
| Farms with net losses ..... number, 2012 | 1,593 | 707 | 1,022 | 68 | 480 | 1,099 | 306 | 1,830 |
| 2007 | 1,736 | 878 | 996 | 82 | 501 | 936 | 421 | 1,892 |
| Average per farm ..... dollars, 2012 | 14,570 | 13,100 | 16,638 | 8,331 | 34,710 | 23,779 | 31,742 | 39,325 |
| 2007 | 11,976 | 10,823 | 18,474 | 14,290 | 23,014 | 23,405 | 19,386 | 26,498 |
| Net cash farm income of operators ..... $1,000, 2012 | 31,413 | 5,500 | 15,565 | 841 | 109,030 | 49,971 | 135,765 | 312,002 |
| 2007 | 16,997 | 1,564 | 21,944 | 156 | 94,074 | 66,527 | 94,951 | 366,937 |
| Average per farm ..... dollars, 2012 | 12,560 | 4,791 | 11,651 | 7,713 | 115,621 | 29,360 | 113,611 | 99,269 |
| 2007 | 6,793 | 1,243 | 17,038 | 1,312 | 101,263 | 44,860 | 76,144 | 103,655 |
| Farm operators reporting net gains [1] ..... farms, 2012 | 902 | 440 | 313 | 41 | 455 | 603 | 867 | 1,310 |
| 2007 | 754 | 376 | 292 | 37 | 421 | 544 | 802 | 1,649 |
| Average per farm ..... dollars, 2012 | 61,400 | 33,576 | 103,891 | 34,272 | 278,917 | 126,101 | 169,335 | 293,390 |
| 2007 | 50,941 | 29,396 | 138,003 | 35,889 | 251,799 | 162,640 | 130,661 | 252,831 |
| Farm operators reporting net losses ..... farms, 2012 | 1,599 | 708 | 1,023 | 68 | 488 | 1,099 | 328 | 1,833 |
| 2007 | 1,748 | 882 | 996 | 82 | 508 | 939 | 445 | 1,891 |
| Average per farm ..... dollars, 2012 | 14,990 | 13,098 | 16,571 | 8,301 | 36,633 | 23,720 | 33,684 | 39,464 |
| 2007 | 12,250 | 10,758 | 18,426 | 14,290 | 23,492 | 23,375 | 22,110 | 26,431 |

[1] Farms with total production expenses equal to market value of agricultural products sold, government payments, and farm-related income are included as farms with gains of less than $1,000.

## Table 5. **Federal Government Payments and Commodity Credit Corporation Loans: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **GOVERNMENT PAYMENTS** | | | | | | | | |
| Total received ....farms, 2012 | 7,235 | 486 | 91 | 164 | 62 | 12 | 46 | 226 |
| 2007 | 6,899 | 545 | 83 | 157 | 33 | 16 | 34 | 208 |
| $1,000, 2012 | 159,269 | 15,567 | 2,504 | 6,225 | 658 | 47 | 293 | 5,273 |
| 2007 | 138,272 | 14,454 | 2,339 | 6,064 | 292 | 59 | 115 | 5,257 |
| Average per farm .... dollars, 2012 | 22,014 | 32,030 | 27,512 | 37,955 | 10,609 | 3,924 | 6,359 | 23,332 |
| 2007 | 20,042 | 26,521 | 28,179 | 38,623 | 8,857 | 3,688 | 3,397 | 25,274 |
| Amount from Conservation Reserve, Wetlands Reserve, Farmable Wetlands, and Conservation Reserve Enhancement Programs ....farms, 2012 | 3,864 | 360 | 61 | 100 | 6 | 5 | 20 | 160 |
| 2007 | 3,722 | 379 | 60 | 110 | 11 | 3 | 16 | 152 |
| $1,000, 2012 | 67,808 | 8,288 | 1,408 | 3,925 | 34 | 3 | 110 | 3,219 |
| 2007 | 68,463 | 9,067 | 1,376 | 4,170 | 72 | (D) | 17 | 2,816 |
| Average per farm .... dollars, 2012 | 17,549 | 23,021 | 23,074 | 39,246 | 5,738 | 509 | 5,522 | 20,117 |
| 2007 | 18,394 | 23,924 | 22,933 | 37,905 | 6,562 | (D) | 1,075 | 18,525 |
| Amount from other federal farm programs ....farms, 2012 | 6,002 | 372 | 72 | 123 | 62 | 7 | 31 | 161 |
| 2007 | 5,370 | 379 | 64 | 103 | 28 | 14 | 25 | 159 |
| $1,000, 2012 | 91,461 | 7,279 | 1,096 | 2,300 | 623 | 45 | 182 | 2,054 |
| 2007 | 69,809 | 5,387 | 963 | 1,894 | 220 | (D) | 98 | 2,441 |
| Average per farm .... dollars, 2012 | 15,238 | 19,567 | 15,223 | 18,699 | 10,054 | 6,364 | 5,873 | 12,760 |
| 2007 | 13,000 | 14,213 | 15,045 | 18,391 | 7,860 | (D) | 3,932 | 15,353 |
| **COMMODITY CREDIT CORPORATION LOANS** | | | | | | | | |
| Total ....farms, 2012 | 36 | 2 | 1 | - | - | - | - | - |
| 2007 | 153 | 24 | 1 | 2 | - | - | - | 3 |
| $1,000, 2012 | 3,530 | (D) | (D) | - | - | - | - | - |
| 2007 | 9,701 | 1,000 | (D) | (D) | - | - | - | (D) |
| Amount spent to repay CCC loans ....farms, 2012 | 32 | 1 | - | - | - | - | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 2,013 | (D) | - | - | - | - | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **GOVERNMENT PAYMENTS** | | | | | | | | |
| Total received ....farms, 2012 | 8 | 412 | 34 | 342 | 170 | 598 | 30 | 16 |
| 2007 | 9 | 379 | 22 | 298 | 174 | 634 | 43 | 18 |
| $1,000, 2012 | 44 | 12,940 | 159 | 8,142 | 4,878 | 11,429 | 186 | 56 |
| 2007 | 29 | 11,647 | 73 | 7,238 | 5,086 | 11,192 | 326 | 161 |
| Average per farm .... dollars, 2012 | 5,491 | 31,408 | 4,690 | 23,806 | 28,695 | 19,112 | 6,211 | 3,476 |
| 2007 | 3,250 | 30,732 | 3,300 | 24,288 | 29,230 | 17,653 | 7,576 | 8,956 |
| Amount from Conservation Reserve, Wetlands Reserve, Farmable Wetlands, and Conservation Reserve Enhancement Programs ....farms, 2012 | 5 | 309 | 1 | 150 | 125 | 224 | 10 | 2 |
| 2007 | 5 | 285 | 11 | 105 | 133 | 199 | 21 | 2 |
| $1,000, 2012 | (D) | 6,988 | (D) | 4,606 | 2,108 | 3,311 | 10 | (D) |
| 2007 | 9 | 7,071 | 32 | 4,393 | 2,675 | 3,416 | 60 | (D) |
| Average per farm .... dollars, 2012 | (D) | 22,614 | (D) | 30,707 | 16,866 | 14,779 | 1,018 | (D) |
| 2007 | 1,714 | 24,812 | 2,925 | 41,840 | 20,113 | 17,167 | 2,834 | (D) |
| Amount from other federal farm programs ....farms, 2012 | 3 | 358 | 34 | 281 | 149 | 519 | 22 | 14 |
| 2007 | 4 | 270 | 17 | 246 | 139 | 537 | 27 | 18 |
| $1,000, 2012 | (D) | 5,952 | (D) | 3,536 | 2,770 | 8,119 | 176 | (D) |
| 2007 | 21 | 4,576 | 40 | 2,845 | 2,411 | 7,776 | 266 | (D) |
| Average per farm .... dollars, 2012 | (D) | 16,626 | (D) | 12,583 | 18,590 | 15,643 | 8,007 | (D) |
| 2007 | 5,170 | 16,948 | 2,378 | 11,563 | 17,345 | 14,480 | 9,861 | (D) |
| **COMMODITY CREDIT CORPORATION LOANS** | | | | | | | | |
| Total ....farms, 2012 | - | 1 | - | 3 | - | 9 | - | - |
| 2007 | - | 7 | - | 11 | 5 | 17 | - | 3 |
| $1,000, 2012 | - | (D) | - | 231 | - | 863 | - | - |
| 2007 | - | 190 | - | 248 | 496 | 620 | - | 15 |
| Amount spent to repay CCC loans ....farms, 2012 | - | 1 | - | 3 | - | 4 | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | - | (D) | - | 269 | - | 480 | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |

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Table 5. **Federal Government Payments and Commodity Credit Corporation Loans: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **GOVERNMENT PAYMENTS** | | | | | | | | |
| Total received ..... farms, 2012 | 20 | 74 | 18 | 104 | 287 | 112 | 696 | 8 |
| 2007 | 11 | 52 | 17 | 80 | 305 | 88 | 595 | 11 |
| $1,000, 2012 | 94 | 791 | 30 | 875 | 4,275 | 879 | 20,307 | 57 |
| 2007 | 59 | 316 | 88 | 435 | 4,400 | 255 | 15,371 | 39 |
| Average per farm .....dollars, 2012 | 4,707 | 10,692 | 1,676 | 8,411 | 14,897 | 7,848 | 29,176 | 7,136 |
| 2007 | 5,379 | 6,075 | 5,163 | 5,439 | 14,425 | 2,895 | 25,834 | 3,576 |
| Amount from Conservation Reserve, Wetlands Reserve, Farmable Wetlands, and Conservation Reserve Enhancement Programs ..... farms, 2012 | 15 | 25 | 8 | 17 | 149 | 56 | 501 | 3 |
| 2007 | 6 | 6 | 7 | 14 | 181 | 36 | 405 | 6 |
| $1,000, 2012 | 36 | 82 | 9 | 362 | 2,475 | 166 | 7,403 | 6 |
| 2007 | 26 | 53 | 8 | 187 | 3,145 | 130 | 6,149 | 4 |
| Average per farm .....dollars, 2012 | 2,383 | 3,274 | 1,129 | 21,320 | 16,610 | 2,960 | 14,777 | 1,982 |
| 2007 | 4,275 | 8,845 | 1,206 | 13,384 | 17,374 | 3,618 | 15,183 | 714 |
| Amount from other federal farm programs ..... farms, 2012 | 10 | 61 | 10 | 99 | 247 | 79 | 597 | 6 |
| 2007 | 6 | 46 | 15 | 74 | 230 | 66 | 491 | 7 |
| $1,000, 2012 | 58 | 709 | 21 | 512 | 1,800 | 713 | 12,903 | 51 |
| 2007 | 34 | 263 | 79 | 248 | 1,255 | 124 | 9,222 | 35 |
| Average per farm .....dollars, 2012 | 5,840 | 11,629 | 2,114 | 5,175 | 7,289 | 9,029 | 21,614 | 8,524 |
| 2007 | 5,587 | 5,714 | 5,288 | 3,348 | 5,456 | 1,886 | 18,782 | 5,007 |
| **COMMODITY CREDIT CORPORATION LOANS** | | | | | | | | |
| Total ..... farms, 2012 | - | - | - | - | - | - | 6 | - |
| 2007 | - | - | - | 1 | 5 | - | 12 | - |
| $1,000, 2012 | - | - | - | - | - | - | 1,042 | - |
| 2007 | - | - | - | (D) | 345 | - | 682 | - |
| Amount spent to repay CCC loans..... farms, 2012 | - | - | - | 6 | - | - | 6 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | - | - | - | 68 | - | - | 452 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **GOVERNMENT PAYMENTS** | | | | | | | | |
| Total received ..... farms, 2012 | 137 | 31 | 8 | 19 | 10 | 119 | - | 71 |
| 2007 | 75 | 27 | 9 | 17 | 12 | 108 | 3 | 66 |
| $1,000, 2012 | 2,383 | 305 | 27 | 96 | 41 | 1,442 | - | 620 |
| 2007 | 1,065 | 173 | 50 | 68 | 165 | 630 | 15 | 630 |
| Average per farm .....dollars, 2012 | 17,397 | 9,854 | 3,390 | 5,030 | 4,122 | 12,121 | - | 8,729 |
| 2007 | 14,195 | 6,406 | 5,529 | 4,011 | 13,754 | 5,835 | 4,900 | 9,547 |
| Amount from Conservation Reserve, Wetlands Reserve, Farmable Wetlands, and Conservation Reserve Enhancement Programs ..... farms, 2012 | 18 | 10 | 3 | 6 | 2 | 41 | - | 28 |
| 2007 | 31 | 10 | 7 | 8 | 3 | 47 | - | 14 |
| $1,000, 2012 | 210 | (D) | 21 | 10 | (D) | 47 | - | 60 |
| 2007 | 448 | 26 | (D) | 1 | 2 | 45 | - | 14 |
| Average per farm .....dollars, 2012 | 11,651 | (D) | 7,119 | 1,714 | (D) | 1,141 | - | 2,155 |
| 2007 | 14,467 | 2,590 | (D) | 156 | 700 | 966 | - | 1,029 |
| Amount from other federal farm programs ..... farms, 2012 | 134 | 23 | 8 | 13 | 8 | 90 | - | 58 |
| 2007 | 57 | 22 | 3 | 10 | 9 | 81 | 3 | 55 |
| $1,000, 2012 | 2,174 | (D) | 6 | 85 | (D) | 1,396 | - | 559 |
| 2007 | 616 | 147 | (D) | 67 | 163 | 585 | 15 | 616 |
| Average per farm .....dollars, 2012 | 16,222 | (D) | 721 | 6,561 | (D) | 15,507 | - | 9,645 |
| 2007 | 10,810 | 6,685 | (D) | 6,694 | 18,105 | 7,219 | 4,900 | 11,194 |
| **COMMODITY CREDIT CORPORATION LOANS** | | | | | | | | |
| Total ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | 2 | - | - | - | - | 2 | - | 1 |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | (D) | - | - | - | - | (D) | - | (D) |
| Amount spent to repay CCC loans..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | - | - | - | - | - | - | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |

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Table 5. **Federal Government Payments and Commodity Credit Corporation Loans: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **GOVERNMENT PAYMENTS** | | | | | | | | |
| Total received ....farms, 2012 | 618 | 145 | 32 | 13 | 426 | 299 | 931 | 360 |
| 2007 | 612 | 179 | 36 | 21 | 402 | 292 | 903 | 325 |
| $1,000, 2012 | 7,355 | 926 | 267 | 92 | 12,372 | 3,425 | 28,405 | 5,804 |
| 2007 | 5,929 | 846 | 297 | 142 | 11,909 | 1,050 | 25,305 | 4,705 |
| Average per farm .... dollars, 2012 | 11,902 | 6,388 | 8,332 | 7,083 | 29,041 | 11,456 | 30,510 | 16,123 |
| 2007 | 9,687 | 4,729 | 8,239 | 6,776 | 29,623 | 3,594 | 28,023 | 14,477 |
| Amount from Conservation Reserve, Wetlands Reserve, Farmable Wetlands, and Conservation Reserve Enhancement Programs ....farms, 2012 | 310 | 27 | 9 | 8 | 261 | 137 | 638 | 54 |
| 2007 | 333 | 53 | 17 | 13 | 234 | 142 | 598 | 59 |
| $1,000, 2012 | 2,288 | 127 | 23 | 14 | 6,950 | 122 | 11,341 | 1,923 |
| 2007 | 2,285 | 317 | 16 | 55 | 6,361 | 158 | 12,198 | 1,609 |
| Average per farm .... dollars, 2012 | 7,380 | 4,716 | 2,528 | 1,749 | 26,627 | 889 | 17,776 | 35,608 |
| 2007 | 6,863 | 5,982 | 920 | 4,233 | 27,182 | 1,111 | 20,398 | 27,269 |
| Amount from other federal farm programs ....farms, 2012 | 520 | 132 | 26 | 9 | 315 | 229 | 784 | 336 |
| 2007 | 458 | 151 | 22 | 11 | 305 | 198 | 729 | 291 |
| $1,000, 2012 | 5,067 | 799 | 244 | 78 | 5,422 | 3,304 | 17,064 | 3,881 |
| 2007 | 3,643 | 529 | 281 | 87 | 5,548 | 892 | 13,107 | 3,096 |
| Average per farm .... dollars, 2012 | 9,745 | 6,052 | 9,379 | 8,677 | 17,213 | 14,426 | 21,765 | 11,552 |
| 2007 | 7,955 | 3,506 | 12,771 | 7,933 | 18,190 | 4,504 | 17,979 | 10,640 |
| **COMMODITY CREDIT CORPORATION LOANS** | | | | | | | | |
| Total ....farms, 2012 | 6 | - | - | - | - | - | 7 | 1 |
| 2007 | 9 | 1 | - | - | 14 | 1 | 23 | 9 |
| $1,000, 2012 | 746 | - | - | - | - | - | 511 | (D) |
| 2007 | 691 | (D) | - | - | 1,132 | (D) | 2,198 | 175 |
| Amount spent to repay CCC loans ....farms, 2012 | 5 | - | - | - | - | 1 | 3 | 2 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 326 | - | - | - | - | (D) | 333 | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |

## Table 6. **Income From Farm-Related Sources: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|---|
| Total income from farm-related sources, gross before taxes and expenses (see text) | farms, 2012 | 12,086 | 396 | 67 | 336 | 336 | 125 | 384 | 135 |
| | 2007 | 10,733 | 342 | 76 | 294 | 333 | 113 | 330 | 127 |
| | $1,000, 2012 | 311,995 | 23,802 | 759 | 14,776 | 7,315 | 2,622 | 5,980 | 3,160 |
| | 2007 | 244,801 | 11,764 | 1,759 | 10,507 | 5,351 | 1,374 | 4,232 | 3,471 |
| Average per farm | dollars, 2012 | 25,815 | 60,106 | 11,334 | 43,975 | 21,772 | 20,972 | 15,574 | 23,410 |
| | 2007 | 22,808 | 34,397 | 23,145 | 35,739 | 16,069 | 12,156 | 12,823 | 27,327 |
| Customwork and other agricultural services | farms, 2012 | 1,752 | 72 | 9 | 32 | 30 | 20 | 66 | 18 |
| | 2007 | 1,852 | 58 | 15 | 58 | 21 | 23 | 69 | 32 |
| | $1,000, 2012 | 44,501 | 3,114 | 117 | 1,773 | 705 | 58 | 262 | 681 |
| | 2007 | 46,653 | 2,073 | 298 | 2,018 | 346 | 97 | 326 | 1,082 |
| Gross cash rent or share payments (see text) | farms, 2012 | 3,711 | 172 | 20 | 122 | 35 | 20 | 73 | 52 |
| | 2007 | 3,318 | 154 | 25 | 95 | 24 | 19 | 66 | 37 |
| | $1,000, 2012 | 111,349 | 12,976 | 144 | (D) | 448 | 41 | (D) | 1,152 |
| | 2007 | 66,542 | 5,774 | 175 | 4,966 | 391 | 31 | 160 | 364 |
| Sales of forest products, excluding Christmas trees, short rotation woody crops, and maple products | farms, 2012 | 745 | 1 | 1 | 1 | 7 | 19 | 77 | 4 |
| | 2007 | 933 | - | 2 | 6 | 7 | 29 | 79 | 18 |
| | $1,000, 2012 | 20,054 | (D) | (D) | (D) | (D) | 151 | 1,583 | (D) |
| | 2007 | 20,812 | - | (D) | 8 | 100 | 274 | 1,183 | 1,364 |
| Agri-tourism and recreational services | farms, 2012 | 585 | 4 | 4 | 4 | 16 | 11 | 72 | 2 |
| | 2007 | 342 | 3 | 5 | 8 | 9 | 7 | 11 | 4 |
| | $1,000, 2012 | 15,313 | (D) | (D) | (D) | 986 | 2,087 | 249 | (D) |
| | 2007 | 11,292 | 17 | (D) | 134 | 479 | 699 | 83 | 5 |
| Patronage dividends and refunds from cooperatives | farms, 2012 | 5,022 | 241 | 33 | 121 | 248 | 29 | 17 | 89 |
| | 2007 | 4,496 | 222 | 31 | 100 | 259 | 27 | 17 | 77 |
| | $1,000, 2012 | 29,583 | 1,781 | 70 | 1,594 | 3,864 | 8 | 20 | 351 |
| | 2007 | 24,917 | 1,980 | 140 | 558 | 3,491 | 50 | 43 | 183 |
| Crop and livestock insurance payments | farms, 2012 | 713 | 54 | 14 | 32 | 30 | 2 | 1 | 22 |
| | 2007 | 616 | 36 | 11 | 33 | 17 | - | 5 | 16 |
| | $1,000, 2012 | 38,625 | 4,140 | 185 | (D) | 720 | (D) | (D) | 697 |
| | 2007 | 23,510 | 903 | 450 | 678 | 217 | - | 5 | 194 |
| Amount from state and local government agricultural program payments | farms, 2012 | 221 | 12 | 17 | 2 | 3 | 4 | 3 | 7 |
| | 2007 | 193 | 4 | 10 | 7 | - | - | - | 9 |
| | $1,000, 2012 | 1,629 | 333 | 158 | (D) | (D) | (D) | 2 | 26 |
| | 2007 | 1,396 | 20 | 125 | 42 | - | - | - | 90 |
| Average per farm | dollars, 2012 | 7,373 | 27,740 | 9,316 | (D) | (D) | (D) | 502 | 3,693 |
| | 2007 | 7,235 | 4,935 | 12,535 | 5,996 | - | - | - | 9,996 |
| Other farm-related income sources (see text) | farms, 2012 | 2,319 | 24 | 9 | 77 | 27 | 27 | 117 | 12 |
| | 2007 | 2,037 | 32 | 14 | 73 | 35 | 28 | 124 | 12 |
| | $1,000, 2012 | 50,838 | 1,441 | 50 | 1,245 | 421 | 273 | 3,622 | 228 |
| | 2007 | 49,678 | 998 | 257 | 2,104 | 328 | 222 | 2,432 | 188 |

--continued

Table 6. **Income From Farm-Related Sources: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|---|
| Total income from farm-related sources, gross before taxes and expenses (see text) | farms, 2012 | 113 | 388 | 72 | 389 | 123 | 702 | 135 | 139 |
| | 2007 | 84 | 291 | 46 | 360 | 107 | 672 | 129 | 108 |
| | $1,000, 2012 | 659 | 6,937 | 959 | 31,079 | 3,490 | 40,048 | 3,309 | 1,008 |
| | 2007 | 1,614 | 5,421 | 455 | 26,956 | 1,650 | 27,185 | 4,418 | 1,487 |
| Average per farm | dollars, 2012 | 5,832 | 17,878 | 13,320 | 79,896 | 28,378 | 57,049 | 24,512 | 7,251 |
| | 2007 | 19,217 | 18,629 | 9,886 | 74,878 | 15,421 | 40,453 | 34,250 | 13,766 |
| Customwork and other agricultural services | farms, 2012 | 12 | 36 | 6 | 78 | 22 | 164 | 29 | 17 |
| | 2007 | 24 | 34 | - | 125 | 15 | 175 | 31 | 11 |
| | $1,000, 2012 | 38 | 1,126 | 64 | 4,850 | 636 | 8,866 | 301 | 163 |
| | 2007 | 69 | 829 | - | 8,443 | 189 | 7,590 | 558 | 155 |
| Gross cash rent or share payments (see text) | farms, 2012 | 25 | 114 | 31 | 199 | 57 | 314 | 39 | 16 |
| | 2007 | 16 | 84 | 28 | 180 | 42 | 314 | 34 | 26 |
| | $1,000, 2012 | 72 | 2,627 | 403 | 21,167 | 1,374 | 19,402 | 214 | 76 |
| | 2007 | 644 | 1,790 | 109 | 15,101 | 739 | 13,527 | 142 | 106 |
| Sales of forest products, excluding Christmas trees, short rotation woody crops, and maple products | farms, 2012 | 23 | 1 | 14 | - | - | 4 | 27 | 15 |
| | 2007 | 20 | 3 | 10 | 3 | 2 | 7 | 31 | 8 |
| | $1,000, 2012 | 323 | (D) | (D) | - | - | 71 | (D) | 67 |
| | 2007 | 259 | 1 | 189 | 10 | (D) | 144 | 2,514 | 235 |
| Agri-tourism and recreational services | farms, 2012 | 5 | 6 | 6 | 10 | 2 | 10 | 15 | 6 |
| | 2007 | - | 2 | 5 | 8 | 3 | 9 | 5 | 12 |
| | $1,000, 2012 | (D) | (D) | (D) | (D) | (D) | 200 | (D) | 110 |
| | 2007 | - | (D) | (D) | 119 | (D) | 110 | (D) | 148 |
| Patronage dividends and refunds from cooperatives | farms, 2012 | 10 | 271 | 13 | 179 | 78 | 349 | 29 | 74 |
| | 2007 | 7 | 192 | 3 | 168 | 69 | 356 | 29 | 62 |
| | $1,000, 2012 | 16 | 1,380 | 7 | 888 | 297 | 2,741 | 115 | 22 |
| | 2007 | 6 | 1,151 | (D) | 672 | 123 | 1,885 | 466 | 46 |
| Crop and livestock insurance payments | farms, 2012 | - | 62 | 2 | 38 | 17 | 69 | - | - |
| | 2007 | 1 | 25 | 1 | 21 | 24 | 34 | - | 6 |
| | $1,000, 2012 | - | 1,450 | (D) | 2,079 | 325 | 5,684 | - | - |
| | 2007 | (D) | 731 | (D) | 725 | 297 | 2,034 | - | (D) |
| Amount from state and local government agricultural program payments | farms, 2012 | 1 | 10 | 3 | 5 | 3 | 12 | 3 | - |
| | 2007 | 3 | 2 | 2 | 6 | 8 | 16 | 2 | 2 |
| | $1,000, 2012 | (D) | 106 | 18 | (D) | (D) | 185 | 5 | - |
| | 2007 | 125 | (D) | (D) | 50 | 45 | 157 | (D) | (D) |
| Average per farm | dollars, 2012 | (D) | 10,629 | 5,861 | (D) | (D) | 15,395 | 1,792 | - |
| | 2007 | 41,667 | (D) | (D) | 8,281 | 5,680 | 9,800 | (D) | (D) |
| Other farm-related income sources (see text) | farms, 2012 | 50 | 23 | 8 | 44 | 18 | 84 | 28 | 39 |
| | 2007 | 17 | 21 | 7 | 38 | 14 | 59 | 13 | 18 |
| | $1,000, 2012 | 194 | 195 | 78 | 1,998 | 850 | 2,900 | 199 | 569 |
| | 2007 | (D) | (D) | 37 | 1,836 | 121 | 1,738 | 579 | 769 |

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Table 6. **Income From Farm-Related Sources: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|---|
| Total income from farm-related sources, gross before taxes and expenses (see text) | farms, 2012 | 50 | 514 | 153 | 343 | 290 | 372 | 509 | 66 |
| | 2007 | 25 | 401 | 153 | 338 | 239 | 321 | 420 | 69 |
| | $1,000, 2012 | 764 | 13,095 | 1,943 | 2,760 | 8,132 | 9,686 | 13,439 | 1,212 |
| | 2007 | 229 | 12,106 | 5,068 | 2,600 | 2,962 | 10,647 | 6,687 | 1,654 |
| Average per farm | dollars, 2012 | 15,277 | 25,477 | 12,700 | 8,047 | 28,043 | 26,039 | 26,402 | 18,363 |
| | 2007 | 9,172 | 30,188 | 33,122 | 7,694 | 12,395 | 33,168 | 15,921 | 23,974 |
| Customwork and other agricultural services | farms, 2012 | 13 | 77 | 10 | 52 | 46 | 66 | 49 | 7 |
| | 2007 | 8 | 29 | 16 | 59 | 46 | 52 | 44 | 8 |
| | $1,000, 2012 | 190 | 1,020 | 14 | 697 | 432 | 493 | 911 | 21 |
| | 2007 | 36 | 1,087 | (D) | 765 | 592 | 1,394 | 926 | 7 |
| Gross cash rent or share payments (see text) | farms, 2012 | 8 | 100 | 15 | 126 | 143 | 121 | 212 | 6 |
| | 2007 | 3 | 99 | 13 | 109 | 98 | 89 | 147 | 13 |
| | $1,000, 2012 | (D) | 844 | 57 | 901 | 1,253 | 363 | 9,633 | (D) |
| | 2007 | 27 | 896 | 25 | 486 | 510 | 404 | 3,193 | 115 |
| Sales of forest products, excluding Christmas trees, short rotation woody crops, and maple products | farms, 2012 | 10 | 23 | 26 | 6 | 27 | 66 | 1 | 31 |
| | 2007 | 8 | 36 | 33 | 9 | 23 | 91 | 5 | 24 |
| | $1,000, 2012 | 229 | 78 | 203 | 32 | 791 | 7,426 | (D) | 1,023 |
| | 2007 | 61 | 116 | 82 | 83 | 855 | 5,755 | 73 | 1,237 |
| Agri-tourism and recreational services | farms, 2012 | 15 | 63 | 16 | 13 | 11 | 20 | 4 | 1 |
| | 2007 | 2 | 26 | 13 | 7 | 20 | 11 | 3 | - |
| | $1,000, 2012 | 249 | 2,625 | 134 | 69 | 36 | 56 | (D) | (D) |
| | 2007 | (D) | 1,849 | 431 | 71 | 77 | 1,619 | (D) | - |
| Patronage dividends and refunds from cooperatives | farms, 2012 | 4 | 72 | 34 | 169 | 67 | 54 | 330 | 3 |
| | 2007 | 3 | 26 | - | 168 | 44 | 38 | 310 | - |
| | $1,000, 2012 | 7 | 219 | (D) | 73 | 226 | 234 | 1,926 | (D) |
| | 2007 | (D) | 178 | - | 249 | (D) | 140 | 1,264 | - |
| Crop and livestock insurance payments | farms, 2012 | - | 2 | - | 9 | 9 | 6 | 41 | - |
| | 2007 | - | 6 | - | 1 | 24 | 11 | 57 | - |
| | $1,000, 2012 | - | (D) | - | 53 | 4,431 | 91 | 373 | - |
| | 2007 | - | 83 | - | (D) | 220 | 83 | 829 | - |
| Amount from state and local government agricultural program payments | farms, 2012 | 1 | 8 | 2 | 10 | 11 | 5 | 3 | - |
| | 2007 | 1 | 5 | 2 | 6 | 4 | 14 | 3 | 7 |
| | $1,000, 2012 | (D) | (D) | (D) | 34 | 61 | 7 | 64 | - |
| | 2007 | (D) | 19 | (D) | 2 | (D) | 74 | (D) | 31 |
| Average per farm | dollars, 2012 | (D) | (D) | (D) | 3,450 | 5,537 | 1,330 | 21,407 | - |
| | 2007 | (D) | 3,750 | (D) | 389 | (D) | 5,261 | (D) | 4,376 |
| Other farm-related income sources (see text) | farms, 2012 | 13 | 228 | 60 | 55 | 46 | 87 | 50 | 21 |
| | 2007 | 7 | 224 | 90 | 55 | 50 | 69 | 32 | 26 |
| | $1,000, 2012 | 51 | 8,292 | 1,530 | 901 | 903 | 1,016 | 465 | 70 |
| | 2007 | (D) | 7,878 | 4,496 | (D) | 648 | 1,179 | 310 | 265 |

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Table 6. **Income From Farm-Related Sources: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|---|
| Total income from farm-related sources, gross before taxes and expenses (see text) | farms, 2012 | 482 | 93 | 42 | 328 | 94 | 406 | 18 | 506 |
| | 2007 | 417 | 109 | 57 | 277 | 78 | 397 | 19 | 500 |
| | $1,000, 2012 | 13,297 | 2,572 | 201 | 5,398 | 643 | 6,755 | 372 | 7,076 |
| | 2007 | 6,078 | 2,597 | 740 | 4,480 | 646 | 5,317 | 138 | 6,547 |
| Average per farm | dollars, 2012 | 27,588 | 27,654 | 4,775 | 16,457 | 6,837 | 16,637 | 20,660 | 13,983 |
| | 2007 | 14,575 | 23,829 | 12,981 | 16,174 | 8,282 | 13,394 | 7,262 | 13,093 |
| Customwork and other agricultural services | farms, 2012 | 55 | 18 | 4 | 44 | 16 | 52 | - | 65 |
| | 2007 | 50 | 15 | 5 | 47 | 23 | 65 | 4 | 47 |
| | $1,000, 2012 | 575 | 311 | (D) | 213 | 56 | 1,012 | - | 664 |
| | 2007 | 421 | 183 | 11 | (D) | 40 | 972 | 52 | 686 |
| Gross cash rent or share payments (see text) | farms, 2012 | 143 | 14 | 12 | 33 | 19 | 141 | 2 | 86 |
| | 2007 | 165 | 15 | 12 | 65 | 28 | 156 | 4 | 84 |
| | $1,000, 2012 | 1,557 | 81 | 35 | (D) | 28 | 1,999 | (D) | 966 |
| | 2007 | 2,426 | 119 | 33 | 232 | 59 | 1,367 | 7 | 361 |
| Sales of forest products, excluding Christmas trees, short rotation woody crops, and maple products | farms, 2012 | 15 | 16 | 13 | 66 | 26 | 24 | 6 | 30 |
| | 2007 | 28 | 37 | 38 | 43 | 8 | 42 | 6 | 49 |
| | $1,000, 2012 | 173 | 83 | 119 | 538 | 30 | 1,049 | (D) | 313 |
| | 2007 | 361 | 584 | 627 | 183 | 150 | 150 | (D) | 274 |
| Agri-tourism and recreational services | farms, 2012 | 22 | - | - | 42 | 20 | 21 | - | 27 |
| | 2007 | 25 | 2 | - | 15 | 11 | 11 | - | 14 |
| | $1,000, 2012 | 351 | - | - | 1,118 | 138 | (D) | - | 1,064 |
| | 2007 | 377 | (D) | - | 292 | 167 | 223 | - | 855 |
| Patronage dividends and refunds from cooperatives | farms, 2012 | 238 | 43 | 8 | 28 | 18 | 213 | 3 | 277 |
| | 2007 | 154 | 41 | - | 26 | 19 | 201 | 2 | 274 |
| | $1,000, 2012 | 3,260 | 2,066 | (D) | 36 | (D) | 600 | 3 | 185 |
| | 2007 | 1,418 | 1,678 | - | 76 | 5 | 495 | (D) | 402 |
| Crop and livestock insurance payments | farms, 2012 | 52 | - | - | 1 | - | 11 | - | 1 |
| | 2007 | 25 | 1 | 3 | 2 | 1 | 6 | - | 6 |
| | $1,000, 2012 | 6,512 | - | - | (D) | - | 668 | - | (D) |
| | 2007 | 391 | (D) | 1 | (D) | (D) | 8 | - | 1 |
| Amount from state and local government agricultural program payments | farms, 2012 | 13 | 3 | - | - | 2 | 2 | - | 2 |
| | 2007 | 7 | 3 | - | - | 2 | 6 | - | - |
| | $1,000, 2012 | 33 | 12 | - | - | (D) | (D) | - | (D) |
| | 2007 | 103 | (D) | - | - | (D) | 14 | - | - |
| Average per farm | dollars, 2012 | 2,500 | 3,876 | - | - | (D) | (D) | - | (D) |
| | 2007 | 14,643 | (D) | - | - | (D) | 2,304 | - | - |
| Other farm-related income sources (see text) | farms, 2012 | 51 | 11 | 8 | 131 | 21 | 53 | 9 | 125 |
| | 2007 | 43 | 10 | 3 | 118 | 17 | 69 | 6 | 136 |
| | $1,000, 2012 | 837 | 20 | 26 | 3,279 | 389 | 1,252 | 185 | 3,818 |
| | 2007 | 581 | 23 | 68 | 3,338 | 222 | 2,088 | (D) | 3,968 |

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Table 6. **Income From Farm-Related Sources: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Total income from farm-related sources, gross before taxes and expenses (see text) ..... farms, 2012 | 803 | 298 | 294 | 31 | 381 | 582 | 663 | 928 |
| 2007 | 552 | 265 | 245 | 34 | 337 | 535 | 565 | 968 |
| $1,000, 2012 | 11,422 | 1,995 | 4,511 | 258 | 15,621 | 5,704 | 10,365 | 28,869 |
| 2007 | 6,362 | 3,329 | 3,915 | 360 | 19,460 | 7,303 | 7,276 | 20,655 |
| Average per farm .....dollars, 2012 | 14,225 | 6,695 | 15,344 | 8,333 | 40,999 | 9,801 | 15,633 | 31,109 |
| 2007 | 11,526 | 12,564 | 15,980 | 10,575 | 57,746 | 13,650 | 12,878 | 21,338 |
| Customwork and other agricultural services ..... farms, 2012 | 110 | 35 | 40 | 5 | 50 | 59 | 92 | 176 |
| 2007 | 111 | 43 | 36 | - | 69 | 60 | 81 | 243 |
| $1,000, 2012 | 978 | 147 | 144 | (D) | 2,068 | 887 | 2,697 | 8,190 |
| 2007 | 1,088 | 206 | 224 | - | (D) | 755 | 1,590 | 9,088 |
| Gross cash rent or share payments (see text) ..... farms, 2012 | 289 | 97 | 56 | 8 | 190 | 171 | 243 | 187 |
| 2007 | 203 | 108 | 71 | 16 | 124 | 155 | 179 | 218 |
| $1,000, 2012 | 2,983 | 332 | 226 | 21 | 8,405 | 1,313 | 4,019 | 9,062 |
| 2007 | 1,429 | 509 | 221 | 35 | 3,648 | 1,448 | 2,723 | 2,247 |
| Sales of forest products, excluding Christmas trees, short rotation woody crops, and maple products ..... farms, 2012 | 27 | 49 | 53 | 6 | 1 | 23 | 2 | 4 |
| 2007 | 26 | 68 | 63 | 12 | 6 | 34 | 5 | 14 |
| $1,000, 2012 | 93 | 666 | 1,845 | 175 | (D) | 147 | (D) | 15 |
| 2007 | 323 | 1,025 | 1,855 | 288 | 19 | 93 | 7 | 37 |
| Agri-tourism and recreational services ..... farms, 2012 | 18 | 26 | 36 | - | 3 | 26 | 2 | 26 |
| 2007 | 16 | 13 | 14 | - | 2 | 14 | 8 | 24 |
| $1,000, 2012 | 2,806 | 126 | 440 | - | (D) | 376 | (D) | 799 |
| 2007 | (D) | (D) | 98 | - | (D) | 75 | 166 | 262 |
| Patronage dividends and refunds from cooperatives ..... farms, 2012 | 221 | 45 | 22 | 6 | 173 | 319 | 414 | 480 |
| 2007 | 143 | 31 | 17 | 11 | 208 | 307 | 370 | 484 |
| $1,000, 2012 | 461 | 26 | 81 | 22 | 1,776 | 870 | 1,067 | 3,286 |
| 2007 | 185 | (D) | 30 | 23 | (D) | 1,536 | 725 | 4,397 |
| Crop and livestock insurance payments ..... farms, 2012 | 50 | 1 | 2 | 2 | 35 | 17 | 59 | 72 |
| 2007 | 21 | 2 | 5 | - | 30 | 15 | 71 | 99 |
| $1,000, 2012 | 529 | (D) | (D) | (D) | 2,952 | 169 | 808 | 3,561 |
| 2007 | (D) | (D) | 10 | - | (D) | 789 | 818 | 1,771 |
| Amount from state and local government agricultural program payments ..... farms, 2012 | 6 | 12 | 6 | 5 | 3 | 9 | 23 | 10 |
| 2007 | 16 | 3 | 3 | 3 | 9 | 4 | 14 | 10 |
| $1,000, 2012 | 57 | (D) | (D) | 2 | 23 | 5 | (D) | 16 |
| 2007 | 89 | 3 | 4 | 4 | 77 | 30 | 80 | 52 |
| Average per farm .....dollars, 2012 | 9,469 | (D) | (D) | 322 | 7,798 | 504 | (D) | 1,600 |
| 2007 | 5,593 | 1,067 | 1,200 | 1,378 | 8,551 | 7,522 | 5,691 | 5,240 |
| Other farm-related income sources (see text) ..... farms, 2012 | 226 | 55 | 118 | 4 | 42 | 81 | 73 | 164 |
| 2007 | 129 | 49 | 71 | 4 | 39 | 89 | 55 | 141 |
| $1,000, 2012 | 3,516 | 629 | 1,729 | 9 | 377 | 1,901 | 1,439 | 3,941 |
| 2007 | 1,707 | 1,122 | 1,474 | 10 | (D) | 2,576 | 1,167 | 2,800 |

## Table 7. **Hired Farm Labor – Workers and Payroll: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Hired farm labor ....farms | 11,746 | 317 | 44 | 449 | 572 | 116 | 371 | 86 |
| workers | 256,036 | 6,623 | 193 | 19,422 | 20,361 | 547 | 2,211 | 486 |
| $1,000 payroll | 1,713,124 | 47,513 | 2,247 | 187,357 | 66,194 | 4,809 | 9,032 | 5,461 |
| Farms with- | | | | | | | | |
| 1 worker ....farms | 2,954 | 85 | 11 | 103 | 42 | 39 | 141 | 24 |
| workers | 2,954 | 85 | 11 | 103 | 42 | 39 | 141 | 24 |
| 2 workers ....farms | 1,944 | 51 | 11 | 59 | 25 | 19 | 75 | 22 |
| workers | 3,888 | 102 | 22 | 118 | 50 | 38 | 150 | 44 |
| 3 or 4 workers ....farms | 2,002 | 64 | 14 | 41 | 43 | 21 | 69 | 19 |
| workers | 6,818 | 219 | 46 | 130 | 147 | 67 | 238 | 61 |
| 5 to 9 workers ....farms | 1,779 | 59 | 2 | 50 | 92 | 20 | 51 | 11 |
| workers | 11,259 | 357 | (D) | 321 | 611 | 131 | 312 | 73 |
| 10 workers or more ....farms | 3,067 | 58 | 6 | 196 | 370 | 17 | 35 | 10 |
| workers | 231,117 | 5,860 | (D) | 18,750 | 19,511 | 272 | 1,370 | 284 |
| Workers by days worked: | | | | | | | | |
| 150 days or more ....farms | 6,067 | 214 | 24 | 240 | 297 | 57 | 97 | 48 |
| workers | 56,387 | 1,801 | 71 | 4,196 | 2,448 | 169 | 329 | 148 |
| Farms with- | | | | | | | | |
| 1 worker ....farms | 2,130 | 74 | 8 | 71 | 93 | 27 | 45 | 20 |
| workers | 2,130 | 74 | 8 | 71 | 93 | 27 | 45 | 20 |
| 2 workers ....farms | 1,184 | 51 | 8 | 36 | 45 | 13 | 17 | 8 |
| workers | 2,368 | 102 | 16 | 72 | 90 | 26 | 34 | 16 |
| 3 or 4 workers ....farms | 1,091 | 45 | 4 | 32 | 54 | 10 | 20 | 11 |
| workers | 3,696 | 159 | 13 | 112 | 180 | 36 | 69 | 35 |
| 5 to 9 workers ....farms | 751 | 10 | 2 | 39 | 44 | 3 | 8 | 6 |
| workers | 4,696 | 67 | (D) | 235 | 271 | 18 | 47 | 34 |
| 10 workers or more ....farms | 911 | 34 | 2 | 62 | 61 | 4 | 7 | 3 |
| workers | 43,497 | 1,399 | (D) | 3,706 | 1,814 | 62 | 134 | 43 |
| Less than 150 days ....farms | 9,398 | 230 | 38 | 390 | 529 | 94 | 318 | 68 |
| workers | 199,649 | 4,822 | 122 | 15,226 | 17,913 | 378 | 1,882 | 338 |
| Farms with- | | | | | | | | |
| 1 worker ....farms | 2,323 | 62 | 17 | 87 | 19 | 29 | 121 | 22 |
| workers | 2,323 | 62 | 17 | 87 | 19 | 29 | 121 | 22 |
| 2 workers ....farms | 1,618 | 42 | 10 | 53 | 32 | 17 | 65 | 16 |
| workers | 3,236 | 84 | 20 | 106 | 64 | 34 | 130 | 32 |
| 3 or 4 workers ....farms | 1,693 | 55 | 6 | 37 | 38 | 20 | 65 | 17 |
| workers | 5,707 | 181 | 20 | 119 | 134 | 67 | 225 | 55 |
| 5 to 9 workers ....farms | 1,230 | 36 | 1 | 39 | 97 | 18 | 40 | 9 |
| workers | 7,754 | 204 | (D) | 232 | 661 | 121 | 241 | 59 |
| 10 workers or more ....farms | 2,534 | 35 | 4 | 174 | 343 | 10 | 27 | 4 |
| workers | 180,629 | 4,291 | (D) | 14,682 | 17,035 | 127 | 1,165 | 170 |
| Reported only workers working 150 days or more ....farms | 2,348 | 87 | 6 | 59 | 43 | 22 | 53 | 18 |
| workers | 11,366 | 633 | 9 | 479 | 173 | 41 | 145 | 41 |
| $1,000 payroll | 230,552 | 6,592 | 123 | 12,811 | 3,074 | 1,162 | 1,932 | 443 |
| Reported only workers working less than 150 days ....farms | 5,679 | 103 | 20 | 209 | 275 | 59 | 274 | 38 |
| workers | 37,254 | 664 | 42 | 1,840 | 5,002 | 160 | 1,095 | 72 |
| $1,000 payroll | 82,024 | 5,038 | 295 | 2,692 | 7,746 | 167 | 1,470 | 302 |
| Reported both - workers working 150 days or more and workers working less than 150 days ....farms | 3,719 | 127 | 18 | 181 | 254 | 35 | 44 | 30 |
| 150 days or more, workers | 45,021 | 1,168 | 62 | 3,717 | 2,275 | 128 | 184 | 107 |
| less than 150 days, workers | 162,395 | 4,158 | 80 | 13,386 | 12,911 | 218 | 787 | 266 |
| $1,000 payroll | 1,400,548 | 35,883 | 1,828 | 171,854 | 55,374 | 3,480 | 5,631 | 4,716 |
| Total migrant workers (see text) ....farms | 1,397 | 19 | 4 | 71 | 264 | 4 | 20 | 2 |
| workers | 57,618 | 546 | 7 | 4,974 | 7,871 | 8 | 454 | (D) |
| Migrant farm labor on farms with hired labor ....farms | 1,314 | 18 | 4 | 69 | 251 | 4 | 12 | 2 |
| workers | 56,104 | (D) | 7 | (D) | 7,680 | 8 | 335 | (D) |
| Migrant farm labor on farms reporting only contract labor ....farms | 83 | 1 | - | 2 | 13 | - | 8 | - |
| workers | 1,514 | (D) | - | (D) | 191 | - | 119 | - |
| Unpaid workers (see text) ....farms | 17,457 | 206 | 95 | 693 | 395 | 303 | 1,052 | 111 |
| workers | 40,375 | 388 | 221 | 1,655 | 960 | 632 | 2,476 | 237 |

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Table 7. **Hired Farm Labor – Workers and Payroll: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| Hired farm labor ..... farms | 97 | 442 | 61 | 479 | 87 | 814 | 143 | 112 |
| workers | 923 | 15,093 | 166 | 15,728 | 281 | 46,797 | 949 | 426 |
| $1,000 payroll | 6,426 | 67,906 | 615 | 117,447 | 3,632 | 317,235 | 10,307 | 2,209 |
| Farms with- | | | | | | | | |
| 1 worker ..... farms | 24 | 81 | 25 | 77 | 27 | 143 | 51 | 39 |
| workers | 24 | 81 | 25 | 77 | 27 | 143 | 51 | 39 |
| 2 workers ..... farms | 16 | 46 | 11 | 57 | 24 | 95 | 23 | 29 |
| workers | 32 | 92 | 22 | 114 | 48 | 190 | 46 | 58 |
| 3 or 4 workers ..... farms | 24 | 45 | 11 | 68 | 23 | 86 | 29 | 21 |
| workers | 79 | 146 | 39 | 246 | 82 | 295 | 102 | 68 |
| 5 to 9 workers ..... farms | 20 | 38 | 14 | 81 | 8 | 103 | 26 | 16 |
| workers | 137 | 254 | 80 | 501 | 48 | 655 | 158 | 97 |
| 10 workers or more ..... farms | 13 | 232 | - | 196 | 5 | 387 | 14 | 7 |
| workers | 651 | 14,520 | - | 14,790 | 76 | 45,514 | 592 | 164 |
| Workers by days worked: | | | | | | | | |
| 150 days or more ..... farms | 39 | 265 | 18 | 370 | 44 | 596 | 57 | 48 |
| workers | 192 | 1,991 | 27 | 3,108 | 100 | 11,538 | 290 | 111 |
| Farms with- | | | | | | | | |
| 1 worker ..... farms | 8 | 100 | 13 | 79 | 23 | 162 | 20 | 16 |
| workers | 8 | 100 | 13 | 79 | 23 | 162 | 20 | 16 |
| 2 workers ..... farms | 6 | 42 | 2 | 58 | 9 | 82 | 17 | 17 |
| workers | 12 | 84 | 4 | 116 | 18 | 164 | 34 | 34 |
| 3 or 4 workers ..... farms | 16 | 55 | 3 | 95 | 9 | 92 | 9 | 12 |
| workers | 59 | 192 | 10 | 325 | 31 | 300 | 27 | 40 |
| 5 to 9 workers ..... farms | 6 | 34 | - | 53 | 1 | 106 | 7 | 3 |
| workers | 41 | 213 | - | 339 | (D) | 669 | 44 | 21 |
| 10 workers or more ..... farms | 3 | 34 | - | 85 | 2 | 154 | 4 | - |
| workers | 72 | 1,402 | - | 2,249 | (D) | 10,243 | 165 | - |
| Less than 150 days ..... farms | 88 | 368 | 54 | 344 | 62 | 639 | 111 | 73 |
| workers | 731 | 13,102 | 139 | 12,620 | 181 | 35,259 | 659 | 315 |
| Farms with- | | | | | | | | |
| 1 worker ..... farms | 23 | 51 | 23 | 61 | 16 | 127 | 36 | 26 |
| workers | 23 | 51 | 23 | 61 | 16 | 127 | 36 | 26 |
| 2 workers ..... farms | 16 | 38 | 9 | 46 | 22 | 58 | 22 | 16 |
| workers | 32 | 76 | 18 | 92 | 44 | 116 | 44 | 32 |
| 3 or 4 workers ..... farms | 27 | 35 | 14 | 46 | 15 | 75 | 24 | 16 |
| workers | 91 | 118 | 51 | 167 | 53 | 262 | 80 | 50 |
| 5 to 9 workers ..... farms | 13 | 25 | 8 | 31 | 7 | 62 | 20 | 8 |
| workers | 86 | 173 | 47 | 174 | (D) | 379 | 117 | 51 |
| 10 workers or more ..... farms | 9 | 219 | - | 160 | 2 | 317 | 9 | 7 |
| workers | 499 | 12,684 | - | 12,126 | (D) | 34,375 | 382 | 156 |
| Reported only workers working 150 days or more ..... farms | 9 | 74 | 7 | 135 | 25 | 175 | 32 | 39 |
| workers | 18 | 264 | 11 | 651 | 49 | 2,771 | 77 | 88 |
| $1,000 payroll | 203 | 3,395 | 76 | 20,626 | 1,050 | 40,263 | 1,975 | 1,126 |
| Reported only workers working less than 150 days ..... farms | 58 | 177 | 43 | 109 | 43 | 218 | 86 | 64 |
| workers | 151 | 3,284 | 105 | 1,210 | 109 | 2,907 | 337 | 248 |
| $1,000 payroll | 375 | 6,270 | 249 | 3,070 | 629 | 6,165 | 597 | 694 |
| Reported both - workers working 150 days or more and workers working less than 150 days ..... farms | 30 | 191 | 11 | 235 | 19 | 421 | 25 | 9 |
| 150 days or more, workers | 174 | 1,727 | 16 | 2,457 | 51 | 8,767 | 213 | 23 |
| less than 150 days, workers | 580 | 9,818 | 34 | 11,410 | 72 | 32,352 | 322 | 67 |
| $1,000 payroll | 5,849 | 58,241 | 289 | 93,751 | 1,953 | 270,807 | 7,735 | 389 |
| Total migrant workers (see text) ..... farms | 10 | 133 | - | 96 | 1 | 179 | - | 3 |
| workers | 44 | 4,358 | - | 4,678 | (D) | 12,474 | - | 7 |
| Migrant farm labor on farms with hired labor ..... farms | 10 | 128 | - | 86 | 1 | 173 | - | 3 |
| workers | 44 | 4,210 | - | 4,218 | (D) | 12,398 | - | 7 |
| Migrant farm labor on farms reporting only contract labor ..... farms | - | 5 | - | 10 | - | 6 | - | - |
| workers | - | 148 | - | 460 | - | 76 | - | - |
| Unpaid workers (see text) ..... farms | 242 | 311 | 143 | 307 | 71 | 490 | 304 | 192 |
| workers | 611 | 647 | 412 | 623 | 145 | 1,055 | 681 | 433 |

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Table 7. **Hired Farm Labor – Workers and Payroll: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Hired farm labor ....farms | 63 | 455 | 132 | 232 | 212 | 412 | 342 | 104 |
| workers | 262 | 2,367 | 470 | 966 | 2,288 | 2,271 | 1,126 | 831 |
| $1,000 payroll | 2,802 | 30,206 | 1,991 | 8,435 | 18,519 | 16,837 | 11,256 | 18,511 |
| Farms with- | | | | | | | | |
| 1 worker ....farms | 19 | 179 | 45 | 77 | 71 | 111 | 100 | 29 |
| workers | 19 | 179 | 45 | 77 | 71 | 111 | 100 | 29 |
| 2 workers ....farms | 9 | 78 | 31 | 50 | 46 | 84 | 66 | 19 |
| workers | 18 | 156 | 62 | 100 | 92 | 168 | 132 | 38 |
| 3 or 4 workers ....farms | 16 | 77 | 25 | 40 | 34 | 105 | 92 | 29 |
| workers | 59 | 258 | 87 | 132 | 118 | 356 | 313 | 97 |
| 5 to 9 workers ....farms | 15 | 75 | 22 | 42 | 25 | 81 | 73 | 14 |
| workers | 87 | 498 | 152 | 254 | 164 | 508 | 433 | 86 |
| 10 workers or more ....farms | 4 | 46 | 9 | 23 | 36 | 31 | 11 | 13 |
| workers | 79 | 1,276 | 124 | 403 | 1,843 | 1,128 | 148 | 581 |
| Workers by days worked: | | | | | | | | |
| 150 days or more ....farms | 33 | 244 | 49 | 99 | 106 | 144 | 207 | 56 |
| workers | 95 | 1,166 | 98 | 219 | 516 | 638 | 394 | 469 |
| Farms with- | | | | | | | | |
| 1 worker ....farms | 10 | 93 | 25 | 46 | 52 | 62 | 102 | 18 |
| workers | 10 | 93 | 25 | 46 | 52 | 62 | 102 | 18 |
| 2 workers ....farms | 8 | 43 | 13 | 26 | 18 | 41 | 58 | 13 |
| workers | 16 | 86 | 26 | 52 | 36 | 82 | 116 | 26 |
| 3 or 4 workers ....farms | 10 | 64 | 9 | 15 | 16 | 11 | 37 | 5 |
| workers | 35 | 214 | (D) | (D) | 51 | 36 | 119 | 17 |
| 5 to 9 workers ....farms | 4 | 25 | 2 | 11 | 7 | 15 | 9 | 11 |
| workers | (D) | 159 | (D) | 58 | 41 | 97 | (D) | 69 |
| 10 workers or more ....farms | 1 | 19 | - | 1 | 13 | 15 | 1 | 9 |
| workers | (D) | 614 | - | (D) | 336 | 361 | (D) | 339 |
| Less than 150 days ....farms | 43 | 309 | 105 | 185 | 163 | 330 | 256 | 74 |
| workers | 167 | 1,201 | 372 | 747 | 1,772 | 1,633 | 732 | 362 |
| Farms with- | | | | | | | | |
| 1 worker ....farms | 15 | 149 | 35 | 67 | 54 | 88 | 79 | 24 |
| workers | 15 | 149 | 35 | 67 | 54 | 88 | 79 | 24 |
| 2 workers ....farms | 7 | 54 | 23 | 39 | 34 | 63 | 51 | 17 |
| workers | 14 | 108 | 46 | 78 | 68 | 126 | 102 | 34 |
| 3 or 4 workers ....farms | 9 | 42 | 20 | 35 | 29 | 92 | 90 | 17 |
| workers | 33 | 140 | 67 | 115 | 100 | 309 | 305 | 56 |
| 5 to 9 workers ....farms | 9 | 35 | 20 | 28 | 15 | 67 | 33 | 9 |
| workers | 52 | 241 | 133 | 178 | 91 | 420 | 201 | 62 |
| 10 workers or more ....farms | 3 | 29 | 7 | 16 | 31 | 20 | 3 | 7 |
| workers | 53 | 563 | 91 | 309 | 1,459 | 690 | 45 | 186 |
| Reported only workers working 150 days or more ....farms | 20 | 146 | 27 | 47 | 49 | 82 | 86 | 30 |
| workers | 50 | 467 | 45 | 99 | 150 | 250 | 149 | 90 |
| $1,000 payroll | 1,499 | 8,133 | 342 | 1,998 | 4,386 | 5,045 | 2,928 | 1,850 |
| Reported only workers working less than 150 days ....farms | 30 | 211 | 83 | 133 | 106 | 268 | 135 | 48 |
| workers | 96 | 608 | 275 | 425 | 402 | 982 | 341 | 122 |
| $1,000 payroll | 374 | 1,280 | 628 | 2,014 | 607 | 2,042 | 1,880 | 222 |
| Reported both - workers working 150 days or more and workers working less than 150 days ....farms | 13 | 98 | 22 | 52 | 57 | 62 | 121 | 26 |
| 150 days or more, workers | 45 | 699 | 53 | 120 | 366 | 388 | 245 | 379 |
| less than 150 days, workers | 71 | 593 | 97 | 322 | 1,370 | 651 | 391 | 240 |
| $1,000 payroll | 929 | 20,793 | 1,021 | 4,422 | 13,525 | 9,750 | 6,447 | 16,439 |
| Total migrant workers (see text) ....farms | - | 13 | - | 7 | 19 | 18 | 1 | 2 |
| workers | - | 211 | - | 276 | 812 | 343 | (D) | (D) |
| Migrant farm labor on farms with hired labor ....farms | - | 11 | - | 7 | 19 | 14 | 1 | 2 |
| workers | - | (D) | - | 276 | 812 | 314 | (D) | (D) |
| Migrant farm labor on farms reporting only contract labor ....farms | - | 2 | - | - | - | 4 | - | - |
| workers | - | (D) | - | - | - | 29 | - | - |
| Unpaid workers (see text) ....farms | 110 | 1,028 | 390 | 475 | 318 | 882 | 387 | 167 |
| workers | 249 | 2,541 | 924 | 1,098 | 715 | 2,041 | 840 | 419 |

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Table 7. **Hired Farm Labor – Workers and Payroll: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Hired farm labor ..... farms | 499 | 132 | 45 | 295 | 84 | 312 | 35 | 347 |
| workers | 14,887 | 1,122 | 129 | 1,829 | 224 | 6,881 | 211 | 2,985 |
| $1,000 payroll | 85,404 | 10,135 | 285 | 17,443 | 761 | 65,028 | 2,947 | 30,621 |
| Farms with- | | | | | | | | |
| 1 worker ..... farms | 77 | 30 | 17 | 111 | 27 | 85 | 5 | 107 |
| workers | 77 | 30 | 17 | 111 | 27 | 85 | 5 | 107 |
| 2 workers ..... farms | 58 | 16 | 14 | 66 | 31 | 28 | 11 | 53 |
| workers | 116 | 32 | 28 | 132 | 62 | 56 | 22 | 106 |
| 3 or 4 workers ..... farms | 47 | 30 | 6 | 49 | 9 | 66 | 3 | 68 |
| workers | 160 | 100 | 18 | 164 | 29 | 231 | 11 | 229 |
| 5 to 9 workers ..... farms | 77 | 42 | 7 | 40 | 16 | 56 | 9 | 62 |
| workers | 501 | 252 | (D) | 256 | (D) | 353 | 66 | 383 |
| 10 workers or more ..... farms | 240 | 14 | 1 | 29 | 1 | 77 | 7 | 57 |
| workers | 14,033 | 708 | (D) | 1,166 | (D) | 6,156 | 107 | 2,160 |
| Workers by days worked: | | | | | | | | |
| 150 days or more ..... farms | 282 | 51 | 11 | 132 | 38 | 158 | 17 | 186 |
| workers | 3,769 | 457 | (D) | 548 | 80 | 1,854 | 64 | 1,091 |
| Farms with- | | | | | | | | |
| 1 worker ..... farms | 67 | 23 | 8 | 59 | 13 | 43 | 2 | 72 |
| workers | 67 | 23 | 8 | 59 | 13 | 43 | 2 | 72 |
| 2 workers ..... farms | 59 | 5 | 2 | 28 | 16 | 28 | 6 | 37 |
| workers | 118 | 10 | 4 | 56 | 32 | 56 | 12 | 74 |
| 3 or 4 workers ..... farms | 55 | 12 | 1 | 21 | 7 | 19 | 2 | 26 |
| workers | 191 | (D) | (D) | 70 | (D) | 65 | (D) | 88 |
| 5 to 9 workers ..... farms | 61 | 2 | - | 11 | 2 | 27 | 6 | 26 |
| workers | 380 | (D) | - | 75 | (D) | 183 | 34 | 183 |
| 10 workers or more ..... farms | 40 | 9 | - | 13 | - | 41 | 1 | 25 |
| workers | 3,013 | 370 | - | 288 | - | 1,507 | (D) | 674 |
| Less than 150 days ..... farms | 455 | 113 | 37 | 214 | 64 | 252 | 27 | 243 |
| workers | 11,118 | 665 | (D) | 1,281 | 144 | 5,027 | 147 | 1,894 |
| Farms with- | | | | | | | | |
| 1 worker ..... farms | 68 | 22 | 10 | 79 | 24 | 67 | 6 | 89 |
| workers | 68 | 22 | 10 | 79 | 24 | 67 | 6 | 89 |
| 2 workers ..... farms | 45 | 24 | 15 | 47 | 23 | 39 | 7 | 24 |
| workers | 90 | 48 | 30 | 94 | 46 | 78 | 14 | 48 |
| 3 or 4 workers ..... farms | 54 | 28 | 5 | 37 | 12 | 57 | 3 | 61 |
| workers | 175 | 94 | 15 | 123 | 40 | 193 | 11 | 207 |
| 5 to 9 workers ..... farms | 62 | 34 | 6 | 26 | 4 | 33 | 6 | 43 |
| workers | 412 | 195 | (D) | 167 | (D) | 185 | 44 | 263 |
| 10 workers or more ..... farms | 226 | 5 | 1 | 25 | 1 | 56 | 5 | 26 |
| workers | 10,373 | 306 | (D) | 818 | (D) | 4,504 | 72 | 1,287 |
| Reported only workers working 150 days or more ..... farms | 44 | 19 | 8 | 81 | 20 | 60 | 8 | 104 |
| workers | 226 | 98 | 8 | 166 | 34 | 409 | 31 | 504 |
| $1,000 payroll | 3,669 | 3,246 | (D) | 2,629 | 263 | 8,976 | 1,331 | 13,635 |
| Reported only workers working less than 150 days ..... farms | 217 | 81 | 34 | 163 | 46 | 154 | 18 | 161 |
| workers | 1,519 | 282 | 91 | 532 | 100 | 862 | 83 | 515 |
| $1,000 payroll | 2,903 | 426 | 100 | 3,594 | 140 | 2,416 | 106 | 1,174 |
| Reported both - workers working 150 days or more and workers working less than 150 days ..... farms | 238 | 32 | 3 | 51 | 18 | 98 | 9 | 82 |
| 150 days or more, workers | 3,543 | 359 | (D) | 382 | 46 | 1,445 | 33 | 587 |
| less than 150 days, workers | 9,599 | 383 | (D) | 749 | 44 | 4,165 | 64 | 1,379 |
| $1,000 payroll | 78,832 | 6,464 | (D) | 11,220 | 358 | 53,636 | 1,510 | 15,811 |
| Total migrant workers (see text) ..... farms | 203 | 2 | - | 5 | 2 | 28 | 2 | 5 |
| workers | 5,456 | (D) | - | 16 | (D) | 1,961 | (D) | (D) |
| Migrant farm labor on farms with hired labor ..... farms | 193 | 2 | - | 5 | 2 | 28 | 2 | 5 |
| workers | 5,358 | (D) | - | 16 | (D) | 1,961 | (D) | (D) |
| Migrant farm labor on farms reporting only contract labor ..... farms | 10 | - | - | - | - | - | - | - |
| workers | 98 | - | - | - | - | - | - | - |
| Unpaid workers (see text) ..... farms | 664 | 167 | 138 | 808 | 146 | 505 | 60 | 797 |
| workers | 1,602 | 426 | 327 | 1,952 | 342 | 1,104 | 135 | 1,815 |

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Table 7. **Hired Farm Labor – Workers and Payroll: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Hired farm labor ....farms | 585 | 221 | 335 | 32 | 338 | 528 | 528 | 1,288 |
| workers | 2,456 | 655 | 2,283 | 79 | 8,021 | 8,142 | 1,719 | 63,626 |
| $1,000 payroll | 14,231 | 3,581 | 24,207 | 314 | 73,297 | 57,713 | 17,932 | 352,278 |
| Farms with- | | | | | | | | |
| 1 worker ....farms | 180 | 87 | 102 | 10 | 99 | 116 | 158 | 200 |
| workers | 180 | 87 | 102 | 10 | 99 | 116 | 158 | 200 |
| 2 workers ....farms | 152 | 52 | 83 | 12 | 76 | 77 | 122 | 147 |
| workers | 304 | 104 | 166 | 24 | 152 | 154 | 244 | 294 |
| 3 or 4 workers ....farms | 146 | 54 | 61 | 6 | 54 | 109 | 151 | 147 |
| workers | 497 | 169 | 208 | 20 | 181 | 387 | 521 | 508 |
| 5 to 9 workers ....farms | 79 | 17 | 49 | 4 | 57 | 108 | 79 | 139 |
| workers | 497 | 110 | 307 | 25 | 373 | 679 | 472 | 915 |
| 10 workers or more ....farms | 28 | 11 | 40 | - | 52 | 118 | 18 | 655 |
| workers | 978 | 185 | 1,500 | - | 7,216 | 6,806 | 324 | 61,709 |
| Workers by days worked: | | | | | | | | |
| 150 days or more ....farms | 220 | 54 | 124 | 12 | 195 | 258 | 297 | 680 |
| workers | 599 | 142 | 958 | (D) | 1,891 | 1,911 | 595 | 12,279 |
| Farms with- | | | | | | | | |
| 1 worker ....farms | 105 | 26 | 51 | 6 | 89 | 58 | 154 | 187 |
| workers | 105 | 26 | 51 | 6 | 89 | 58 | 154 | 187 |
| 2 workers ....farms | 46 | 14 | 24 | 4 | 42 | 62 | 77 | 103 |
| workers | 92 | 28 | 48 | 8 | 84 | 124 | 154 | 206 |
| 3 or 4 workers ....farms | 29 | 10 | 20 | 2 | 31 | 62 | 53 | 107 |
| workers | 95 | (D) | 66 | (D) | 104 | 220 | 170 | 377 |
| 5 to 9 workers ....farms | 34 | 1 | 11 | - | 15 | 40 | 8 | 101 |
| workers | 184 | (D) | 75 | - | 89 | 259 | 46 | 629 |
| 10 workers or more ....farms | 6 | 3 | 18 | - | 18 | 36 | 5 | 182 |
| workers | 123 | 52 | 718 | - | 1,525 | 1,250 | 71 | 10,880 |
| Less than 150 days ....farms | 489 | 184 | 267 | 24 | 245 | 405 | 406 | 1,102 |
| workers | 1,857 | 513 | 1,325 | (D) | 6,130 | 6,231 | 1,124 | 51,347 |
| Farms with- | | | | | | | | |
| 1 worker ....farms | 152 | 75 | 71 | 8 | 63 | 107 | 109 | 142 |
| workers | 152 | 75 | 71 | 8 | 63 | 107 | 109 | 142 |
| 2 workers ....farms | 154 | 41 | 68 | 8 | 49 | 63 | 138 | 123 |
| workers | 308 | 82 | 136 | 16 | 98 | 126 | 276 | 246 |
| 3 or 4 workers ....farms | 122 | 44 | 60 | 5 | 66 | 76 | 109 | 130 |
| workers | 407 | 139 | 204 | 17 | 218 | 268 | 358 | 440 |
| 5 to 9 workers ....farms | 43 | 17 | 38 | 3 | 31 | 74 | 42 | 138 |
| workers | 252 | 117 | 227 | (D) | 214 | 468 | 251 | 912 |
| 10 workers or more ....farms | 18 | 7 | 30 | - | 36 | 85 | 8 | 569 |
| workers | 738 | 100 | 687 | - | 5,537 | 5,262 | 130 | 49,607 |
| Reported only workers working 150 days or more ....farms | 96 | 37 | 68 | 8 | 93 | 123 | 122 | 186 |
| workers | 167 | 74 | 478 | 13 | 279 | 445 | 195 | 1,489 |
| $1,000 payroll | 2,667 | 1,022 | 11,155 | (D) | 7,714 | 11,634 | 3,297 | 38,116 |
| Reported only workers working less than 150 days ....farms | 365 | 167 | 211 | 20 | 143 | 270 | 231 | 608 |
| workers | 1,252 | 441 | 707 | 50 | 891 | 1,780 | 549 | 7,123 |
| $1,000 payroll | 2,482 | 711 | 1,206 | 123 | 2,457 | 3,118 | 2,998 | 13,262 |
| Reported both - workers working 150 days or more and workers working less than 150 days ....farms | 124 | 17 | 56 | 4 | 102 | 135 | 175 | 494 |
| 150 days or more, workers | 432 | 68 | 480 | (D) | 1,612 | 1,466 | 400 | 10,790 |
| less than 150 days, workers | 605 | 72 | 618 | (D) | 5,239 | 4,451 | 575 | 44,224 |
| $1,000 payroll | 9,083 | 1,848 | 11,846 | (D) | 63,125 | 42,961 | 11,637 | 300,901 |
| Total migrant workers (see text) ....farms | 6 | 4 | 2 | - | 23 | 53 | 3 | 193 |
| workers | 29 | 12 | (D) | - | 1,009 | 2,197 | 15 | 9,598 |
| Migrant farm labor on farms with hired labor ....farms | 5 | 4 | 2 | - | 21 | 48 | 3 | 179 |
| workers | (D) | 12 | (D) | - | (D) | 2,057 | 15 | 9,427 |
| Migrant farm labor on farms reporting only contract labor ....farms | 1 | - | - | - | 2 | 5 | - | 14 |
| workers | (D) | - | - | - | (D) | 140 | - | 171 |
| Unpaid workers (see text) ....farms | 1,214 | 552 | 699 | 50 | 401 | 789 | 449 | 1,346 |
| workers | 2,693 | 1,352 | 1,590 | 109 | 928 | 2,022 | 928 | 3,047 |

## Table 8. **Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **FARMS AND LAND IN FARMS** | | | | | | | | |
| Farms ..... number, 2012 | 37,249 | 713 | 185 | 1,509 | 890 | 536 | 1,929 | 308 |
| 2007 | 39,284 | 782 | 192 | 1,630 | 979 | 512 | 2,101 | 283 |
| Land in farms ..... acres, 2012 | 14,748,107 | 1,036,975 | 263,166 | 703,505 | 75,820 | 23,640 | 74,758 | 297,412 |
| 2007 | 14,972,789 | 1,098,487 | 273,860 | 632,636 | 93,883 | 22,822 | 78,359 | 313,307 |
| Average size of farm ..... acres, 2012 | 396 | 1,454 | 1,423 | 466 | 85 | 44 | 39 | 966 |
| 2007 | 381 | 1,405 | 1,426 | 388 | 96 | 45 | 37 | 1,107 |
| Estimated market value of land and buildings ..... farms, 2012 | 37,249 | 713 | 185 | 1,509 | 890 | 536 | 1,929 | 308 |
| 2007 | 39,284 | 782 | 192 | 1,630 | 979 | 512 | 2,101 | 283 |
| $1,000, 2012 | 33,905,871 | 1,276,546 | 223,936 | 1,925,946 | 664,212 | 294,651 | 945,843 | 319,920 |
| 2007 | 29,822,309 | 1,124,757 | 227,546 | 1,469,847 | 683,504 | 239,370 | 1,036,654 | 312,662 |
| Average per farm ..... dollars, 2012 | 910,249 | 1,790,387 | 1,210,467 | 1,276,306 | 746,305 | 549,722 | 490,328 | 1,038,700 |
| 2007 | 759,146 | 1,438,309 | 1,185,136 | 901,747 | 698,166 | 467,520 | 493,410 | 1,104,813 |
| Average per acre ..... dollars, 2012 | 2,299 | 1,231 | 851 | 2,738 | 8,760 | 12,464 | 12,652 | 1,076 |
| 2007 | 1,992 | 1,024 | 831 | 2,323 | 7,280 | 10,489 | 13,230 | 998 |
| 2012 farms by value group: | | | | | | | | |
| $1 to $49,999 ..... | 2,184 | 46 | 12 | 102 | 30 | 25 | 71 | 17 |
| $50,000 to $99,999 ..... | 2,070 | 40 | 9 | 131 | 41 | 27 | 63 | 27 |
| $100,000 to $199,999 ..... | 5,446 | 126 | 28 | 384 | 94 | 74 | 256 | 38 |
| $200,000 to $499,999 ..... | 15,162 | 183 | 47 | 539 | 353 | 244 | 1,048 | 102 |
| $500,000 to $999,999 ..... | 6,299 | 99 | 34 | 165 | 201 | 105 | 355 | 46 |
| $1,000,000 to $1,999,999 ..... | 2,851 | 75 | 23 | 81 | 111 | 34 | 88 | 33 |
| $2,000,000 to $4,999,999 ..... | 2,248 | 94 | 26 | 60 | 53 | 24 | 35 | 37 |
| $5,000,000 to $9,999,999 ..... | 618 | 31 | 3 | 14 | 4 | 1 | 9 | 6 |
| $10,000,000 or more ..... | 371 | 19 | 3 | 33 | 3 | 2 | 4 | 2 |
| Approximate land area ..... acres, 2012 | 42,531,819 | 1,231,986 | 407,167 | 1,088,246 | 1,869,145 | 1,112,513 | 402,563 | 555,936 |
| Proportion in farms ..... percent, 2012 | 34.7 | 84.2 | 64.6 | 64.6 | 4.1 | 2.1 | 18.6 | 53.5 |
| 2012 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 10,559 | 48 | 38 | 686 | 292 | 220 | 851 | 19 |
| acres | 48,650 | 225 | 98 | 3,057 | 1,301 | 1,056 | 4,175 | 92 |
| 10 to 49 acres ..... farms | 12,980 | 79 | 27 | 461 | 351 | 207 | 814 | 52 |
| acres | 294,392 | 1,940 | 666 | 9,514 | 8,321 | 4,458 | 17,328 | 1,415 |
| 50 to 69 acres ..... farms | 1,826 | 28 | 10 | 33 | 69 | 22 | 71 | 13 |
| acres | 105,323 | 1,543 | 558 | 1,866 | 4,096 | 1,265 | 4,037 | 734 |
| 70 to 99 acres ..... farms | 2,018 | 21 | 8 | 60 | 49 | 26 | 67 | 27 |
| acres | 164,501 | 1,788 | 680 | 5,036 | 4,064 | 2,078 | 5,401 | 2,185 |
| 100 to 139 acres ..... farms | 1,513 | 36 | 9 | 49 | 35 | 19 | 29 | 19 |
| acres | 174,267 | 4,351 | 1,093 | 5,496 | 4,092 | 2,225 | 3,229 | 2,179 |
| 140 to 179 acres ..... farms | 1,180 | 48 | 4 | 19 | 22 | 4 | 28 | 12 |
| acres | 186,465 | 7,582 | 626 | 3,017 | 3,429 | 659 | 4,418 | 1,870 |
| 180 to 219 acres ..... farms | 739 | 19 | 5 | 14 | 16 | 8 | 24 | 12 |
| acres | 146,175 | 3,771 | 998 | 2,769 | 3,133 | 1,514 | 4,783 | 2,298 |
| 220 to 259 acres ..... farms | 527 | 25 | - | 21 | 7 | 7 | 13 | 11 |
| acres | 125,101 | 5,926 | - | 5,049 | 1,682 | 1,690 | 3,124 | 2,603 |
| 260 to 499 acres ..... farms | 1,805 | 77 | 10 | 49 | 23 | 20 | 22 | 27 |
| acres | 650,461 | 28,678 | 3,263 | 16,562 | 8,278 | 6,261 | 7,899 | 9,016 |
| 500 to 999 acres ..... farms | 1,508 | 106 | 19 | 29 | 14 | 2 | 6 | 50 |
| acres | 1,056,164 | 72,204 | 14,614 | 19,701 | 9,603 | (D) | 3,990 | 32,625 |
| 1,000 to 1,999 acres ..... farms | 1,123 | 90 | 17 | 27 | 9 | 1 | 2 | 27 |
| acres | 1,575,863 | 133,398 | 23,229 | 39,953 | 12,471 | (D) | (D) | (D) |
| 2,000 acres or more ..... farms | 1,471 | 136 | 38 | 61 | 3 | - | 2 | 39 |
| acres | 10,220,745 | 775,569 | 217,341 | 591,485 | 15,350 | - | (D) | (D) |
| 2007 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 9,211 | 56 | 51 | 603 | 323 | 181 | 710 | 19 |
| acres | 44,360 | 257 | 179 | 2,694 | 1,457 | 904 | (D) | (D) |
| 10 to 49 acres ..... farms | 14,790 | 82 | 28 | 595 | 370 | 229 | 1,043 | 60 |
| acres | 343,160 | 2,192 | 807 | 12,712 | 8,913 | 4,640 | 22,785 | 1,626 |
| 50 to 69 acres ..... farms | 1,959 | 34 | 6 | 54 | 70 | 29 | 92 | 1 |
| acres | 113,333 | 1,947 | 315 | 3,142 | 3,980 | 1,738 | 5,291 | (D) |
| 70 to 99 acres ..... farms | 2,188 | 35 | 4 | 66 | 65 | 15 | 95 | 7 |
| acres | 178,155 | 2,992 | 294 | 5,366 | 5,305 | 1,193 | 7,877 | 562 |
| 100 to 139 acres ..... farms | 1,758 | 24 | 10 | 42 | 36 | 14 | 64 | 22 |
| acres | 201,820 | 2,725 | 1,127 | 4,818 | 4,213 | 1,567 | 7,369 | 2,573 |
| 140 to 179 acres ..... farms | 1,402 | 58 | 6 | 43 | 37 | 13 | 28 | 12 |
| acres | 220,706 | 9,345 | 950 | 6,782 | 6,063 | 2,106 | 4,369 | 1,888 |
| 180 to 219 acres ..... farms | 805 | 22 | - | 19 | 14 | 12 | 13 | 9 |
| acres | 158,400 | 4,310 | - | 3,768 | 2,740 | 2,302 | 2,628 | 1,733 |
| 220 to 259 acres ..... farms | 638 | 25 | 4 | 21 | 7 | 3 | 15 | 10 |
| acres | 151,809 | 6,105 | 944 | 4,997 | 1,651 | (D) | 3,574 | 2,381 |
| 260 to 499 acres ..... farms | 2,036 | 97 | 3 | 42 | 30 | 12 | 29 | 41 |
| acres | 729,409 | 34,227 | 1,000 | 15,088 | 11,061 | 4,409 | 9,876 | 15,876 |
| 500 to 999 acres ..... farms | 1,731 | 112 | 15 | 41 | 14 | 3 | 11 | 36 |
| acres | 1,206,606 | 77,160 | 10,746 | 28,621 | 9,508 | 2,173 | 7,334 | 23,797 |
| 1,000 to 1,999 acres ..... farms | 1,218 | 85 | 24 | 33 | 7 | 1 | - | 19 |
| acres | 1,688,140 | 114,006 | 34,986 | 45,094 | 9,222 | (D) | - | 26,852 |
| 2,000 acres or more ..... farms | 1,548 | 152 | 41 | 71 | 6 | - | 1 | 47 |
| acres | 9,936,891 | 843,221 | 222,512 | 499,554 | 29,770 | - | (D) | 235,891 |
| **LAND IN FARMS ACCORDING TO USE** | | | | | | | | |
| Total cropland ..... farms, 2012 | 25,045 | 621 | 119 | 813 | 776 | 306 | 1,101 | 260 |
| 2007 | 26,005 | 678 | 119 | 996 | 885 | 297 | 1,281 | 206 |
| acres, 2012 | 7,526,742 | 815,010 | 84,330 | 519,123 | 31,537 | 8,124 | 28,986 | 184,477 |
| 2007 | 7,609,210 | 825,863 | 80,438 | 476,548 | 43,503 | 8,750 | 34,296 | 184,124 |
| Harvested cropland ..... farms, 2012 | 20,846 | 370 | 74 | 675 | 734 | 278 | 1,022 | 147 |
| 2007 | 20,091 | 375 | 64 | 700 | 842 | 256 | 1,037 | 126 |
| acres, 2012 | 4,342,904 | 364,428 | 35,811 | 296,362 | 23,458 | 6,513 | 24,099 | 98,182 |
| 2007 | 4,387,169 | 368,235 | (D) | 251,332 | 25,790 | 6,995 | 25,423 | 105,501 |
| Other pasture and grazing land that could have been used for crops without additional improvements (see text) ..... farms, 2012 | 2,099 | 24 | 25 | 64 | 33 | 32 | 123 | 17 |
| 2007 | 6,166 | 89 | 27 | 246 | 81 | 80 | 342 | 51 |
| acres, 2012 | 125,262 | 860 | 2,056 | 570 | 1,016 | 298 | 1,017 | 2,893 |
| 2007 | 371,026 | 25,888 | (D) | 12,043 | 7,256 | 1,205 | 5,314 | 4,379 |

--continued

Table 8. **Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **FARMS AND LAND IN FARMS** | | | | | | | | |
| Farms ....number, 2012 | 492 | 849 | 255 | 883 | 211 | 1,552 | 557 | 377 |
| 2007 | 481 | 955 | 232 | 891 | 239 | 1,858 | 628 | 458 |
| Land in farms ....acres, 2012 | 39,009 | 814,109 | 792,250 | 625,047 | 308,486 | 963,784 | 119,440 | 15,249 |
| 2007 | 30,702 | 883,094 | 749,452 | 609,046 | 308,212 | 1,087,952 | 119,267 | 17,699 |
| Average size of farm ....acres, 2012 | 79 | 959 | 3,107 | 708 | 1,462 | 621 | 214 | 40 |
| 2007 | 64 | 925 | 3,230 | 684 | 1,290 | 586 | 190 | 39 |
| Estimated market value of land and buildings ....farms, 2012 | 492 | 849 | 255 | 883 | 211 | 1,552 | 557 | 377 |
| 2007 | 481 | 955 | 232 | 891 | 239 | 1,858 | 628 | 458 |
| $1,000, 2012 | 339,104 | 829,343 | 336,819 | 1,829,411 | 292,117 | 3,303,587 | 251,107 | 217,091 |
| 2007 | 233,706 | 974,365 | 330,168 | 1,316,283 | 249,445 | 2,714,028 | 319,333 | 217,613 |
| Average per farm ....dollars, 2012 | 689,236 | 976,847 | 1,320,859 | 2,071,814 | 1,384,442 | 2,128,600 | 450,821 | 575,839 |
| 2007 | 485,875 | 1,020,277 | 1,423,137 | 1,477,309 | 1,043,703 | 1,460,726 | 508,492 | 475,138 |
| Average per acre ....dollars, 2012 | 8,693 | 1,019 | 425 | 2,927 | 947 | 3,428 | 2,102 | 14,236 |
| 2007 | 7,612 | 1,103 | 441 | 2,161 | 809 | 2,495 | 2,677 | 12,295 |
| 2012 farms by value group: | | | | | | | | |
| $1 to $49,999 .... | 30 | 79 | 6 | 47 | 22 | 86 | 60 | 20 |
| $50,000 to $99,999 .... | 39 | 54 | 16 | 50 | 3 | 94 | 43 | 9 |
| $100,000 to $199,999 .... | 68 | 112 | 60 | 98 | 30 | 172 | 111 | 51 |
| $200,000 to $499,999 .... | 250 | 261 | 102 | 232 | 51 | 373 | 223 | 160 |
| $500,000 to $999,999 .... | 52 | 146 | 34 | 110 | 42 | 252 | 72 | 88 |
| $1,000,000 to $1,999,999 .... | 23 | 103 | 19 | 115 | 26 | 176 | 22 | 29 |
| $2,000,000 to $4,999,999 .... | 13 | 66 | 15 | 144 | 25 | 238 | 24 | 17 |
| $5,000,000 to $9,999,999 .... | 9 | 16 | - | 48 | 8 | 103 | 1 | 3 |
| $10,000,000 or more .... | 8 | 12 | 3 | 39 | 4 | 58 | 1 | - |
| Approximate land area ....acres, 2012 | 729,687 | 1,164,333 | 1,410,008 | 794,919 | 454,840 | 1,714,881 | 1,217,297 | 133,412 |
| Proportion in farms ....percent, 2012 | 5.3 | 69.9 | 56.2 | 78.6 | 67.8 | 56.2 | 9.8 | 11.4 |
| 2012 size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 166 | 142 | 17 | 210 | 12 | 189 | 132 | 122 |
| acres | 761 | 667 | 77 | 895 | (D) | 876 | 657 | 572 |
| 10 to 49 acres ....farms | 190 | 223 | 54 | 121 | 21 | 295 | 224 | 182 |
| acres | 3,992 | 5,441 | 1,435 | 2,819 | 568 | 7,272 | 5,764 | 4,014 |
| 50 to 69 acres ....farms | 23 | 29 | 32 | 17 | 1 | 86 | 42 | 23 |
| acres | 1,349 | 1,664 | 1,857 | 960 | (D) | 4,928 | 2,404 | 1,332 |
| 70 to 99 acres ....farms | 24 | 50 | 18 | 37 | 18 | 126 | 45 | 17 |
| acres | 1,861 | 4,092 | 1,403 | 3,195 | 1,489 | 10,478 | 3,617 | 1,332 |
| 100 to 139 acres ....farms | 14 | 35 | 31 | 48 | 9 | 85 | 26 | 9 |
| acres | 1,527 | 4,006 | 3,461 | 5,324 | 970 | 9,951 | 3,015 | 1,036 |
| 140 to 179 acres ....farms | 20 | 53 | 13 | 35 | 13 | 108 | 23 | 7 |
| acres | 3,055 | 8,444 | 2,059 | 5,536 | 2,116 | 17,142 | 3,593 | 1,095 |
| 180 to 219 acres ....farms | 12 | 20 | 16 | 24 | 3 | 55 | 13 | 4 |
| acres | 2,400 | 3,962 | 3,186 | 4,683 | 570 | 10,998 | 2,627 | 820 |
| 220 to 259 acres ....farms | 9 | 5 | 7 | 29 | 4 | 37 | 4 | 5 |
| acres | 2,121 | 1,185 | 1,679 | 6,801 | 909 | 8,746 | 963 | 1,171 |
| 260 to 499 acres ....farms | 20 | 72 | 26 | 122 | 22 | 169 | 22 | 5 |
| acres | 7,129 | 26,383 | (D) | 43,579 | 8,850 | 60,409 | 7,613 | 1,857 |
| 500 to 999 acres ....farms | 3 | 39 | 13 | 111 | 35 | 176 | 16 | 3 |
| acres | 2,150 | 29,730 | (D) | 79,667 | 23,581 | 124,671 | 11,348 | 2,020 |
| 1,000 to 1,999 acres ....farms | 11 | 51 | 18 | 52 | 22 | 110 | 6 | - |
| acres | 12,664 | 71,178 | (D) | 75,315 | 28,830 | 151,319 | 6,582 | - |
| 2,000 acres or more ....farms | - | 130 | 10 | 77 | 51 | 116 | 4 | - |
| acres | - | 657,357 | (D) | 396,273 | 240,488 | 556,994 | 71,257 | - |
| 2007 size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 134 | 208 | 11 | 183 | 8 | 245 | 131 | 139 |
| acres | (D) | 913 | 51 | 862 | 24 | 1,128 | 685 | 663 |
| 10 to 49 acres ....farms | 192 | 226 | 39 | 136 | 33 | 388 | 261 | 235 |
| acres | 4,011 | 5,310 | 863 | 2,832 | 922 | 9,540 | 6,819 | 5,139 |
| 50 to 69 acres ....farms | 41 | 41 | 13 | 14 | 4 | 89 | 36 | 24 |
| acres | 2,248 | 2,397 | 786 | 828 | (D) | 5,162 | 2,065 | 1,391 |
| 70 to 99 acres ....farms | 37 | 42 | 24 | 30 | 22 | 119 | 58 | 20 |
| acres | 3,025 | 3,375 | 1,995 | 2,554 | 1,847 | 9,775 | 4,655 | 1,543 |
| 100 to 139 acres ....farms | 22 | 32 | 18 | 52 | 3 | 100 | 41 | 8 |
| acres | 2,468 | 3,699 | 2,010 | 5,956 | 336 | 11,646 | 4,662 | 904 |
| 140 to 179 acres ....farms | 20 | 72 | 20 | 54 | 15 | 122 | 19 | 11 |
| acres | 3,130 | 11,291 | 3,029 | 8,555 | 2,373 | 19,330 | 2,939 | 1,704 |
| 180 to 219 acres ....farms | 3 | 16 | 17 | 30 | 6 | 70 | 16 | 7 |
| acres | 582 | 3,191 | 3,331 | 5,824 | 1,164 | 13,847 | 3,157 | 1,434 |
| 220 to 259 acres ....farms | 7 | 7 | 15 | 25 | 7 | 36 | 5 | 1 |
| acres | 1,617 | 1,650 | 3,587 | 6,003 | 1,610 | 8,545 | 1,116 | (D) |
| 260 to 499 acres ....farms | 16 | 60 | 37 | 111 | 32 | 205 | 42 | 11 |
| acres | 5,467 | 21,745 | (D) | 39,020 | 12,441 | 73,101 | 15,525 | 3,581 |
| 500 to 999 acres ....farms | 7 | 65 | 18 | 121 | 30 | 221 | 15 | 2 |
| acres | 5,282 | 50,557 | (D) | 85,999 | 21,591 | 157,933 | (D) | (D) |
| 1,000 to 1,999 acres ....farms | 2 | 56 | 10 | 61 | 30 | 135 | 2 | - |
| acres | (D) | 78,694 | (D) | 87,460 | (D) | 185,137 | (D) | - |
| 2,000 acres or more ....farms | - | 130 | 10 | 74 | 49 | 128 | 2 | - |
| acres | - | 700,272 | (D) | 363,153 | (D) | 592,808 | (D) | - |
| **LAND IN FARMS ACCORDING TO USE** | | | | | | | | |
| Total cropland ....farms, 2012 | 243 | 768 | 170 | 715 | 188 | 1,272 | 329 | 231 |
| 2007 | 219 | 844 | 143 | 713 | 160 | 1,462 | 376 | 283 |
| acres, 2012 | 18,633 | 545,449 | 19,413 | 452,174 | 187,523 | 720,023 | 22,786 | 7,422 |
| 2007 | 10,933 | 539,531 | 14,842 | 467,865 | 174,571 | 771,805 | 24,070 | 8,557 |
| Harvested cropland ....farms, 2012 | 221 | 545 | 145 | 563 | 113 | 1,047 | 293 | 219 |
| 2007 | 186 | 581 | 105 | 597 | 98 | 1,158 | 311 | 237 |
| acres, 2012 | 17,462 | 191,252 | 8,895 | 261,364 | 90,550 | 525,432 | 20,461 | 6,454 |
| 2007 | 9,091 | 183,242 | (D) | (D) | 83,518 | (D) | 17,391 | 7,019 |
| Other pasture and grazing land that could have been used for crops without additional improvements (see text) ....farms, 2012 | 23 | 25 | 24 | 51 | 17 | 51 | 26 | 23 |
| 2007 | 54 | 90 | 42 | 116 | 29 | 284 | 113 | 85 |
| acres, 2012 | 609 | (D) | 5,412 | (D) | 3,404 | 3,156 | 644 | 177 |
| 2007 | 1,308 | 17,192 | (D) | (D) | 3,465 | (D) | 4,594 | 741 |

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Table 8. **Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **FARMS AND LAND IN FARMS** | | | | | | | | |
| Farms ..... number, 2012 | 221 | 1,837 | 706 | 1,006 | 760 | 1,647 | 897 | 377 |
| 2007 | 211 | 1,790 | 664 | 1,038 | 893 | 1,717 | 798 | 471 |
| Land in farms ..... acres, 2012 | 15,556 | 46,717 | 10,070 | 183,124 | 551,097 | 132,839 | 1,114,940 | 23,743 |
| 2007 | 12,717 | 49,285 | 15,294 | 191,087 | 601,216 | 131,554 | 1,090,178 | 25,185 |
| Average size of farm ..... acres, 2012 | 70 | 25 | 14 | 182 | 725 | 81 | 1,243 | 63 |
| 2007 | 60 | 28 | 23 | 184 | 673 | 77 | 1,366 | 53 |
| Estimated market value of land and buildings ..... farms, 2012 | 221 | 1,837 | 706 | 1,006 | 760 | 1,647 | 897 | 377 |
| 2007 | 211 | 1,790 | 664 | 1,038 | 893 | 1,717 | 798 | 471 |
| $1,000, 2012 | 142,116 | 1,001,231 | 266,314 | 809,670 | 785,402 | 836,143 | 1,240,991 | 196,957 |
| 2007 | 92,778 | 876,682 | 285,514 | 746,831 | 749,341 | 777,892 | 1,085,460 | 207,108 |
| Average per farm ..... dollars, 2012 | 643,060 | 545,036 | 377,215 | 804,841 | 1,033,423 | 507,676 | 1,383,491 | 522,431 |
| 2007 | 439,708 | 489,767 | 429,990 | 719,491 | 839,128 | 453,053 | 1,360,226 | 439,720 |
| Average per acre ..... dollars, 2012 | 9,136 | 21,432 | 26,446 | 4,421 | 1,425 | 6,294 | 1,113 | 8,295 |
| 2007 | 7,296 | 17,788 | 18,668 | 3,908 | 1,246 | 5,913 | 996 | 8,223 |
| 2012 farms by value group: | | | | | | | | |
| $1 to $49,999 ..... | 13 | 127 | 49 | 34 | 30 | 85 | 74 | 30 |
| $50,000 to $99,999 ..... | 11 | 59 | 28 | 67 | 42 | 73 | 48 | 41 |
| $100,000 to $199,999 ..... | 35 | 166 | 115 | 132 | 112 | 243 | 105 | 64 |
| $200,000 to $499,999 ..... | 74 | 834 | 376 | 397 | 305 | 787 | 184 | 171 |
| $500,000 to $999,999 ..... | 61 | 482 | 106 | 207 | 103 | 299 | 168 | 40 |
| $1,000,000 to $1,999,999 ..... | 13 | 99 | 21 | 85 | 72 | 94 | 138 | 15 |
| $2,000,000 to $4,999,999 ..... | 10 | 58 | 11 | 64 | 69 | 59 | 131 | 11 |
| $5,000,000 to $9,999,999 ..... | 4 | 10 | - | 17 | 14 | 6 | 37 | 3 |
| $10,000,000 or more ..... | - | 2 | - | 3 | 13 | 1 | 12 | 2 |
| Approximate land area ..... acres, 2012 | 1,154,356 | 1,354,028 | 252,769 | 1,470,452 | 1,197,635 | 1,537,792 | 1,478,716 | 614,056 |
| Proportion in farms ..... percent, 2012 | 1.3 | 3.5 | 4.0 | 12.5 | 46.0 | 8.6 | 75.4 | 3.9 |
| 2012 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 51 | 975 | 439 | 204 | 66 | 303 | 23 | 159 |
| acres | (D) | 4,214 | 1,728 | 989 | 330 | 1,607 | 98 | 654 |
| 10 to 49 acres ..... farms | 92 | 688 | 231 | 464 | 272 | 748 | 127 | 157 |
| acres | 2,455 | 13,721 | 4,421 | 10,679 | 6,879 | 18,007 | 3,162 | 3,340 |
| 50 to 69 acres ..... farms | 16 | 41 | 13 | 51 | 38 | 123 | 45 | 13 |
| acres | 926 | 2,348 | (D) | 2,882 | 2,150 | 7,250 | 2,694 | 749 |
| 70 to 99 acres ..... farms | 15 | 36 | 9 | 45 | 35 | 136 | 38 | 16 |
| acres | 1,189 | 2,971 | 738 | 3,596 | 2,868 | 11,137 | 3,126 | 1,249 |
| 100 to 139 acres ..... farms | 14 | 26 | 6 | 40 | 42 | 105 | 37 | 9 |
| acres | 1,560 | 3,049 | 605 | 4,648 | 4,943 | 12,136 | 4,376 | 1,019 |
| 140 to 179 acres ..... farms | 5 | 22 | 6 | 34 | 38 | 60 | 54 | 7 |
| acres | 802 | 3,459 | 954 | 5,282 | 6,001 | 9,505 | 8,520 | 1,112 |
| 180 to 219 acres ..... farms | 13 | 16 | - | 27 | 19 | 44 | 26 | 2 |
| acres | 2,450 | 3,110 | - | 5,341 | 3,696 | 8,718 | 5,195 | (D) |
| 220 to 259 acres ..... farms | 3 | 5 | 1 | 17 | 15 | 32 | 22 | 2 |
| acres | 707 | (D) | (D) | 4,028 | 3,630 | 7,548 | 5,256 | (D) |
| 260 to 499 acres ..... farms | 10 | 21 | - | 57 | 62 | 61 | 89 | 5 |
| acres | 4,003 | 7,987 | - | 20,801 | 22,441 | 20,927 | 33,332 | 1,927 |
| 500 to 999 acres ..... farms | 2 | 6 | 1 | 37 | 66 | 23 | 111 | 4 |
| acres | (D) | 3,679 | (D) | 23,504 | 44,982 | 15,265 | 79,152 | 2,580 |
| 1,000 to 1,999 acres ..... farms | - | 1 | - | 16 | 36 | 9 | 127 | - |
| acres | - | (D) | - | 20,187 | 50,354 | 11,062 | 182,308 | - |
| 2,000 acres or more ..... farms | - | - | - | 14 | 71 | 3 | 198 | 3 |
| acres | - | - | - | 81,187 | 402,823 | 9,677 | 787,721 | 10,265 |
| 2007 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 75 | 806 | 315 | 153 | 76 | 259 | 22 | 149 |
| acres | (D) | 3,637 | 1,522 | 817 | 340 | (D) | 82 | (D) |
| 10 to 49 acres ..... farms | 74 | 802 | 291 | 465 | 347 | 831 | 93 | 227 |
| acres | 2,029 | 15,899 | 5,564 | 10,389 | 8,751 | 21,158 | 2,452 | 4,947 |
| 50 to 69 acres ..... farms | 11 | 45 | 20 | 40 | 44 | 126 | 31 | 25 |
| acres | 639 | 2,603 | 1,184 | 2,225 | 2,542 | 7,298 | 1,875 | 1,474 |
| 70 to 99 acres ..... farms | 15 | 31 | 13 | 90 | 52 | 170 | 26 | 26 |
| acres | 1,264 | 2,451 | 1,067 | 7,302 | 4,187 | 13,824 | 2,156 | 2,137 |
| 100 to 139 acres ..... farms | 10 | 29 | 12 | 51 | 52 | 109 | 33 | 10 |
| acres | 1,146 | 3,327 | 1,319 | 5,682 | 5,990 | 12,683 | 3,839 | 1,109 |
| 140 to 179 acres ..... farms | 3 | 22 | 5 | 42 | 47 | 59 | 35 | 9 |
| acres | 475 | 3,462 | 810 | 6,603 | 7,416 | 9,267 | 5,496 | 1,412 |
| 180 to 219 acres ..... farms | 10 | 10 | 1 | 21 | 21 | 41 | 24 | 6 |
| acres | 1,980 | 1,904 | (D) | 4,173 | 4,250 | 8,189 | 4,706 | 1,170 |
| 220 to 259 acres ..... farms | 4 | 14 | 4 | 28 | 17 | 42 | 21 | 7 |
| acres | 907 | 3,293 | 1,020 | 6,541 | 4,072 | 10,083 | 5,030 | 1,641 |
| 260 to 499 acres ..... farms | 7 | 24 | 1 | 64 | 69 | 56 | 79 | 6 |
| acres | 2,547 | 7,942 | (D) | 22,712 | 24,234 | 20,376 | 28,731 | 1,960 |
| 500 to 999 acres ..... farms | 2 | 7 | 1 | 43 | 56 | 14 | 117 | 4 |
| acres | (D) | 4,767 | (D) | 29,095 | 41,152 | 9,652 | 79,695 | 2,615 |
| 1,000 to 1,999 acres ..... farms | - | - | 1 | 26 | 45 | 8 | 113 | - |
| acres | - | - | (D) | 34,070 | 63,505 | 9,540 | 159,762 | - |
| 2,000 acres or more ..... farms | - | - | - | 15 | 67 | 2 | 204 | 2 |
| acres | - | - | - | 61,478 | 434,777 | (D) | 796,354 | (D) |
| **LAND IN FARMS ACCORDING TO USE** | | | | | | | | |
| Total cropland ..... farms, 2012 | 147 | 972 | 358 | 615 | 537 | 1,067 | 770 | 180 |
| 2007 | 128 | 833 | 345 | 641 | 561 | 1,106 | 670 | 233 |
| acres, 2012 | 4,173 | 19,654 | 2,527 | 68,314 | 192,258 | 54,331 | 808,471 | 4,754 |
| 2007 | 3,833 | 17,963 | 3,674 | 69,739 | 191,395 | 54,408 | 743,236 | 6,075 |
| Harvested cropland ..... farms, 2012 | 122 | 851 | 327 | 525 | 365 | 965 | 461 | 156 |
| 2007 | 119 | 621 | 269 | 505 | 358 | 889 | 437 | 157 |
| acres, 2012 | 2,903 | 13,340 | 1,913 | 51,234 | 80,898 | 45,858 | 383,304 | 3,847 |
| 2007 | 1,999 | 9,459 | 2,211 | 53,117 | 87,324 | 37,388 | 386,081 | 3,374 |
| Other pasture and grazing land that could have been used for crops without additional improvements (see text) ..... farms, 2012 | 17 | 121 | 36 | 73 | 74 | 86 | 54 | 22 |
| 2007 | 26 | 290 | 99 | 187 | 157 | 312 | 105 | 85 |
| acres, 2012 | 363 | 1,917 | 303 | 5,604 | (D) | (D) | 5,831 | 450 |
| 2007 | 1,259 | 5,699 | 913 | 10,241 | 17,814 | 10,127 | 16,801 | 1,640 |

--continued

Table 8. **Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **FARMS AND LAND IN FARMS** | | | | | | | | |
| Farms ....number, 2012 | 1,449 | 330 | 288 | 1,478 | 274 | 1,074 | 144 | 1,438 |
| 2007 | 1,662 | 390 | 316 | 1,448 | 291 | 1,215 | 123 | 1,670 |
| Land in farms ....acres, 2012 | 1,205,285 | 52,157 | 43,619 | 49,483 | 15,669 | 106,538 | 6,473 | 70,863 |
| 2007 | 1,205,229 | 61,749 | 55,109 | 47,677 | 21,472 | 108,541 | 5,472 | 76,837 |
| Average size of farm ....acres, 2012 | 832 | 158 | 151 | 33 | 57 | 99 | 45 | 49 |
| 2007 | 725 | 158 | 174 | 33 | 74 | 89 | 44 | 46 |
| Estimated market value of land and buildings ....farms, 2012 | 1,449 | 330 | 288 | 1,478 | 274 | 1,074 | 144 | 1,438 |
| 2007 | 1,662 | 390 | 316 | 1,448 | 291 | 1,215 | 123 | 1,670 |
| $1,000, 2012 | 1,598,574 | 180,272 | 133,204 | 703,753 | 207,273 | 808,040 | 65,803 | 1,137,622 |
| 2007 | 1,462,082 | 204,754 | 166,517 | 703,140 | 186,605 | 732,168 | 48,218 | 830,840 |
| Average per farm ....dollars, 2012 | 1,103,226 | 546,279 | 462,512 | 476,152 | 756,469 | 752,365 | 456,963 | 791,114 |
| 2007 | 879,713 | 525,009 | 526,951 | 485,594 | 641,253 | 602,607 | 392,013 | 497,509 |
| Average per acre ....dollars, 2012 | 1,326 | 3,456 | 3,054 | 14,222 | 13,228 | 7,585 | 10,166 | 16,054 |
| 2007 | 1,213 | 3,316 | 3,022 | 14,748 | 8,691 | 6,746 | 8,812 | 10,813 |
| 2012 farms by value group: | | | | | | | | |
| $1 to $49,999 | 93 | 13 | 9 | 60 | 11 | 60 | 10 | 73 |
| $50,000 to $99,999 | 109 | 38 | 23 | 34 | 6 | 40 | 5 | 69 |
| $100,000 to $199,999 | 258 | 49 | 53 | 205 | 32 | 139 | 12 | 146 |
| $200,000 to $499,999 | 481 | 132 | 132 | 766 | 86 | 520 | 78 | 687 |
| $500,000 to $999,999 | 234 | 53 | 49 | 316 | 75 | 163 | 29 | 325 |
| $1,000,000 to $1,999,999 | 135 | 24 | 13 | 70 | 48 | 68 | 8 | 93 |
| $2,000,000 to $4,999,999 | 96 | 20 | 7 | 20 | 12 | 54 | 2 | 30 |
| $5,000,000 to $9,999,999 | 27 | 1 | 2 | 5 | 4 | 20 | - | 10 |
| $10,000,000 or more | 16 | - | - | 2 | - | 10 | - | 5 |
| Approximate land area ....acres, 2012 | 3,371,518 | 596,902 | 896,006 | 1,068,463 | 111,308 | 1,107,987 | 1,059,634 | 1,335,841 |
| Proportion in farms ....percent, 2012 | 35.7 | 8.7 | 4.9 | 4.6 | 14.1 | 9.6 | 0.6 | 5.3 |
| 2012 size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 244 | 70 | 18 | 657 | 49 | 328 | 41 | 610 |
| acres | 1,230 | 389 | (D) | 2,854 | (D) | 1,625 | (D) | 2,866 |
| 10 to 49 acres ....farms | 514 | 134 | 113 | 603 | 151 | 456 | 67 | 574 |
| acres | 13,200 | 3,136 | 2,755 | 12,694 | 3,716 | 10,301 | 1,589 | 11,929 |
| 50 to 69 acres ....farms | 113 | 19 | 36 | 67 | 12 | 59 | 10 | 71 |
| acres | 6,675 | 1,124 | 2,075 | 3,838 | 666 | 3,379 | 581 | 4,147 |
| 70 to 99 acres ....farms | 100 | 32 | 26 | 63 | 29 | 58 | 11 | 74 |
| acres | 8,106 | 2,490 | 2,155 | 5,021 | 2,376 | 4,602 | 915 | 6,006 |
| 100 to 139 acres ....farms | 94 | 18 | 32 | 40 | 14 | 39 | 8 | 28 |
| acres | 11,153 | 1,934 | 3,592 | 4,594 | 1,635 | 4,362 | 895 | 3,230 |
| 140 to 179 acres ....farms | 76 | 11 | 21 | 16 | 4 | 25 | 2 | 16 |
| acres | 12,300 | 1,794 | 3,358 | 2,490 | 656 | 3,845 | (D) | 2,506 |
| 180 to 219 acres ....farms | 47 | 8 | 9 | 11 | 1 | 19 | - | 7 |
| acres | 9,141 | 1,566 | 1,851 | 2,177 | (D) | 3,833 | - | 1,377 |
| 220 to 259 acres ....farms | 23 | 5 | 2 | 6 | 4 | 9 | - | 13 |
| acres | 5,450 | 1,232 | (D) | 1,471 | 941 | 2,077 | - | 3,017 |
| 260 to 499 acres ....farms | 72 | 13 | 19 | 11 | 6 | 34 | 5 | 28 |
| acres | 25,196 | 4,103 | 6,912 | 4,018 | 2,050 | 12,411 | 2,006 | 9,678 |
| 500 to 999 acres ....farms | 75 | 7 | 5 | - | 3 | 25 | - | 9 |
| acres | 55,365 | 4,735 | 3,513 | - | 2,068 | 18,691 | - | 6,459 |
| 1,000 to 1,999 acres ....farms | 38 | 8 | 3 | 2 | 1 | 13 | - | 4 |
| acres | 53,243 | 10,225 | 4,645 | (D) | (D) | 17,917 | - | 4,726 |
| 2,000 acres or more ....farms | 53 | 5 | 4 | 2 | - | 9 | - | 4 |
| acres | 1,004,226 | 19,429 | 12,186 | (D) | - | 23,495 | - | 14,922 |
| 2007 size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 227 | 55 | 20 | 582 | 42 | 325 | 27 | 600 |
| acres | 1,076 | 272 | 116 | 2,640 | 216 | 1,619 | 124 | 2,844 |
| 10 to 49 acres ....farms | 575 | 156 | 117 | 643 | 155 | 583 | 67 | 762 |
| acres | 15,381 | 4,233 | 3,025 | 14,724 | 4,339 | 14,426 | 1,718 | 16,131 |
| 50 to 69 acres ....farms | 124 | 39 | 41 | 51 | 17 | 57 | 10 | 94 |
| acres | 7,336 | 2,309 | 2,426 | 2,885 | 972 | 3,278 | 535 | 5,484 |
| 70 to 99 acres ....farms | 121 | 40 | 27 | 58 | 18 | 60 | 8 | 43 |
| acres | 9,922 | 3,201 | 2,235 | 4,630 | 1,433 | 4,950 | 630 | 3,512 |
| 100 to 139 acres ....farms | 107 | 22 | 11 | 54 | 23 | 54 | 4 | 59 |
| acres | 12,300 | 2,534 | 1,271 | 6,258 | 2,574 | 6,217 | 457 | 6,799 |
| 140 to 179 acres ....farms | 73 | 14 | 31 | 31 | 13 | 20 | 4 | 24 |
| acres | 11,276 | 2,197 | 4,834 | 4,863 | 2,014 | 3,107 | 616 | 3,715 |
| 180 to 219 acres ....farms | 54 | 16 | 8 | 4 | 7 | 18 | - | 18 |
| acres | 10,567 | 3,108 | 1,559 | (D) | 1,388 | 3,579 | - | 3,555 |
| 220 to 259 acres ....farms | 39 | 9 | 6 | 7 | 2 | 10 | 1 | 10 |
| acres | 9,312 | 2,159 | 1,335 | 1,716 | (D) | 2,399 | (D) | 2,375 |
| 260 to 499 acres ....farms | 108 | 14 | 34 | 12 | 9 | 34 | - | 31 |
| acres | 37,208 | 4,517 | 12,639 | 4,042 | 2,789 | 11,819 | - | 11,315 |
| 500 to 999 acres ....farms | 109 | 9 | 13 | 4 | 1 | 34 | 2 | 26 |
| acres | 72,821 | 6,869 | 9,104 | 2,547 | (D) | 22,601 | (D) | 17,564 |
| 1,000 to 1,999 acres ....farms | 60 | 13 | 4 | 2 | 4 | 14 | - | 3 |
| acres | 79,832 | 16,050 | 5,240 | (D) | 4,559 | 18,206 | - | 3,543 |
| 2,000 acres or more ....farms | 65 | 3 | 4 | - | - | 6 | - | - |
| acres | 938,198 | 14,300 | 11,325 | - | - | 16,340 | - | - |
| **LAND IN FARMS ACCORDING TO USE** | | | | | | | | |
| Total cropland ....farms, 2012 | 1,041 | 252 | 203 | 672 | 194 | 698 | 83 | 715 |
| 2007 | 1,075 | 291 | 197 | 644 | 206 | 793 | 61 | 799 |
| acres, 2012 | 129,232 | 12,962 | 15,315 | 11,524 | 5,522 | 66,765 | 1,312 | 29,082 |
| 2007 | 127,148 | 15,042 | 19,041 | 17,319 | 9,033 | 69,810 | 1,610 | 37,039 |
| Harvested cropland ....farms, 2012 | 941 | 226 | 173 | 603 | 180 | 612 | 81 | 609 |
| 2007 | 878 | 258 | 134 | 497 | 185 | 640 | 48 | 616 |
| acres, 2012 | 78,819 | 6,529 | 12,433 | 9,643 | 4,332 | 57,055 | 972 | 23,425 |
| 2007 | 75,704 | 8,406 | 10,948 | 12,100 | 5,607 | 58,163 | 1,111 | 25,965 |
| Other pasture and grazing land that could have been used for crops without additional improvements (see text) ....farms, 2012 | 88 | 9 | 16 | 81 | 25 | 81 | 3 | 109 |
| 2007 | 251 | 55 | 64 | 221 | 77 | 234 | 14 | 264 |
| acres, 2012 | (D) | 330 | 722 | 701 | 860 | 4,088 | 28 | 2,856 |
| 2007 | 23,123 | 4,867 | 4,916 | 3,918 | 3,061 | 8,246 | 193 | 7,257 |

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Table 8. **Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **FARMS AND LAND IN FARMS** | | | | | | | | |
| Farms ..... number, 2012 | 2,501 | 1,148 | 1,336 | 109 | 943 | 1,702 | 1,195 | 3,143 |
| 2007 | 2,502 | 1,258 | 1,288 | 119 | 929 | 1,483 | 1,247 | 3,540 |
| Land in farms ..... acres, 2012 | 537,406 | 527,123 | 76,638 | 9,557 | 645,121 | 115,831 | 1,275,110 | 1,780,498 |
| 2007 | 626,329 | 531,082 | 80,617 | 12,025 | 682,350 | 102,584 | 1,271,141 | 1,649,281 |
| Average size of farm ..... acres, 2012 | 215 | 459 | 57 | 88 | 684 | 68 | 1,067 | 566 |
| 2007 | 250 | 422 | 63 | 101 | 734 | 69 | 1,019 | 466 |
| Estimated market value of land and buildings ..... farms, 2012 | 2,501 | 1,148 | 1,336 | 109 | 943 | 1,702 | 1,195 | 3,143 |
| 2007 | 2,502 | 1,258 | 1,288 | 119 | 929 | 1,483 | 1,247 | 3,540 |
| $1,000, 2012 | 1,528,328 | 828,879 | 665,914 | 44,840 | 1,345,587 | 1,338,355 | 1,781,304 | 3,209,668 |
| 2007 | 1,472,539 | 740,325 | 689,613 | 47,926 | 1,176,333 | 1,147,456 | 1,418,993 | 2,523,913 |
| Average per farm ..... dollars, 2012 | 611,087 | 722,020 | 498,438 | 411,379 | 1,426,922 | 786,342 | 1,490,631 | 1,021,211 |
| 2007 | 588,545 | 588,494 | 535,414 | 402,743 | 1,266,236 | 773,740 | 1,137,925 | 712,970 |
| Average per acre ..... dollars, 2012 | 2,844 | 1,572 | 8,689 | 4,692 | 2,086 | 11,554 | 1,397 | 1,803 |
| 2007 | 2,351 | 1,394 | 8,554 | 3,986 | 1,724 | 11,186 | 1,116 | 1,530 |
| 2012 farms by value group: | | | | | | | | |
| $1 to $49,999 ..... | 161 | 73 | 61 | 8 | 52 | 95 | 94 | 216 |
| $50,000 to $99,999 ..... | 111 | 84 | 54 | 8 | 49 | 72 | 73 | 280 |
| $100,000 to $199,999 ..... | 372 | 224 | 173 | 18 | 112 | 166 | 113 | 700 |
| $200,000 to $499,999 ..... | 1,140 | 454 | 698 | 49 | 360 | 805 | 291 | 1,187 |
| $500,000 to $999,999 ..... | 415 | 166 | 221 | 19 | 131 | 285 | 192 | 359 |
| $1,000,000 to $1,999,999 ..... | 164 | 78 | 87 | 5 | 106 | 141 | 143 | 173 |
| $2,000,000 to $4,999,999 ..... | 103 | 46 | 31 | 2 | 75 | 92 | 226 | 148 |
| $5,000,000 to $9,999,999 ..... | 26 | 18 | 9 | - | 31 | 34 | 46 | 38 |
| $10,000,000 or more ..... | 9 | 5 | 2 | - | 27 | 12 | 17 | 42 |
| Approximate land area ..... acres, 2012 | 1,128,826 | 1,585,746 | 462,056 | 168,560 | 812,881 | 1,348,398 | 1,381,813 | 2,749,142 |
| Proportion in farms ..... percent, 2012 | 47.6 | 33.2 | 16.6 | 5.7 | 79.4 | 8.6 | 92.3 | 64.8 |
| 2012 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 432 | 96 | 590 | 13 | 215 | 578 | 86 | 1,168 |
| acres | 2,123 | 449 | 2,729 | (D) | 929 | 2,943 | 430 | 5,056 |
| 10 to 49 acres ..... farms | 1,061 | 412 | 470 | 42 | 285 | 693 | 171 | 1,154 |
| acres | 23,342 | 10,567 | 10,702 | 1,054 | 6,534 | 14,899 | 3,678 | 26,685 |
| 50 to 69 acres ..... farms | 141 | 88 | 61 | 15 | 30 | 102 | 50 | 113 |
| acres | 7,969 | 5,177 | 3,493 | 835 | 1,748 | 5,779 | 2,954 | 6,474 |
| 70 to 99 acres ..... farms | 174 | 116 | 65 | 8 | 32 | 97 | 34 | 176 |
| acres | 14,129 | 9,657 | 5,269 | 647 | 2,609 | 7,770 | 2,782 | 14,394 |
| 100 to 139 acres ..... farms | 129 | 95 | 40 | 14 | 24 | 62 | 35 | 109 |
| acres | 14,837 | 11,019 | 4,558 | 1,551 | 2,823 | 7,262 | 3,976 | 12,555 |
| 140 to 179 acres ..... farms | 93 | 57 | 29 | 4 | 50 | 26 | 46 | 69 |
| acres | 14,642 | 8,928 | 4,548 | (D) | 8,015 | 4,080 | 7,196 | 10,961 |
| 180 to 219 acres ..... farms | 63 | 42 | 13 | 4 | 12 | 23 | 34 | 54 |
| acres | 12,482 | 8,376 | 2,585 | 810 | 2,379 | 4,576 | 6,740 | 10,644 |
| 220 to 259 acres ..... farms | 57 | 23 | 13 | - | 12 | 15 | 31 | 33 |
| acres | 13,517 | 5,497 | 3,112 | - | 2,850 | 3,522 | 7,422 | 7,854 |
| 260 to 499 acres ..... farms | 120 | 92 | 28 | 7 | 57 | 63 | 165 | 94 |
| acres | (D) | 35,232 | (D) | 2,362 | 21,010 | 22,536 | 59,865 | 34,380 |
| 500 to 999 acres ..... farms | 105 | 74 | 18 | 1 | 46 | 33 | 168 | 67 |
| acres | 72,615 | (D) | 10,814 | (D) | 34,557 | 22,253 | 119,926 | 46,582 |
| 1,000 to 1,999 acres ..... farms | 56 | 33 | 8 | 1 | 82 | 6 | 175 | 61 |
| acres | 76,322 | 42,775 | 10,150 | (D) | 117,324 | 7,607 | 249,591 | 85,047 |
| 2,000 acres or more ..... farms | 70 | 20 | 1 | - | 98 | 4 | 200 | 45 |
| acres | (D) | (D) | (D) | - | 444,343 | 12,604 | 810,550 | 1,519,866 |
| 2007 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 330 | 83 | 425 | 10 | 200 | 393 | 69 | 966 |
| acres | 1,704 | 400 | (D) | 36 | 928 | 1,906 | 386 | 4,736 |
| 10 to 49 acres ..... farms | 1,040 | 425 | 565 | 44 | 269 | 663 | 175 | 1,504 |
| acres | 23,560 | 11,448 | 13,117 | 1,183 | 5,828 | 15,573 | 3,608 | 34,566 |
| 50 to 69 acres ..... farms | 131 | 80 | 56 | 14 | 39 | 87 | 41 | 188 |
| acres | 7,541 | 4,667 | 3,264 | 768 | 2,196 | 5,172 | 2,344 | 10,737 |
| 70 to 99 acres ..... farms | 197 | 129 | 58 | 8 | 31 | 88 | 39 | 201 |
| acres | 15,925 | 10,518 | 4,625 | 703 | 2,567 | 7,237 | 3,115 | 16,206 |
| 100 to 139 acres ..... farms | 142 | 115 | 52 | 18 | 27 | 70 | 66 | 140 |
| acres | 16,386 | 13,062 | 5,739 | 2,053 | 3,190 | 8,228 | 7,569 | 16,015 |
| 140 to 179 acres ..... farms | 120 | 84 | 31 | 5 | 24 | 33 | 51 | 92 |
| acres | 18,943 | 13,231 | 4,884 | 796 | 3,841 | 5,100 | 7,984 | 14,510 |
| 180 to 219 acres ..... farms | 60 | 62 | 24 | 4 | 11 | 26 | 37 | 68 |
| acres | 11,802 | 12,262 | 4,623 | (D) | 2,261 | 5,106 | 7,126 | 13,270 |
| 220 to 259 acres ..... farms | 59 | 30 | 25 | 4 | 14 | 14 | 31 | 52 |
| acres | 14,007 | 7,236 | 5,914 | 940 | 3,350 | 3,336 | 7,355 | 12,420 |
| 260 to 499 acres ..... farms | 158 | 118 | 26 | 10 | 72 | 77 | 142 | 117 |
| acres | 55,004 | (D) | 8,803 | 3,612 | 26,729 | 27,397 | 51,865 | 42,780 |
| 500 to 999 acres ..... farms | 113 | 76 | 14 | 2 | 63 | 26 | 180 | 104 |
| acres | 77,194 | (D) | 8,628 | (D) | 45,180 | 15,911 | 128,782 | 71,476 |
| 1,000 to 1,999 acres ..... farms | 73 | 33 | 10 | - | 66 | 6 | 216 | 56 |
| acres | 99,284 | 42,819 | 13,173 | - | 97,496 | 7,618 | 309,781 | 75,729 |
| 2,000 acres or more ..... farms | 79 | 23 | 2 | - | 113 | - | 200 | 52 |
| acres | 284,979 | (D) | (D) | - | 488,784 | - | 741,226 | 1,336,836 |
| **LAND IN FARMS ACCORDING TO USE** | | | | | | | | |
| Total cropland ..... farms, 2012 | 1,756 | 805 | 728 | 79 | 735 | 1,229 | 1,074 | 2,223 |
| 2007 | 1,754 | 786 | 659 | 86 | 685 | 1,010 | 1,069 | 2,711 |
| acres, 2012 | 369,641 | 88,785 | 23,071 | 2,701 | 565,792 | 78,744 | 1,019,951 | 306,851 |
| 2007 | 394,876 | 88,344 | 26,283 | 4,660 | 567,192 | 73,705 | 1,057,584 | 344,505 |
| Harvested cropland ..... farms, 2012 | 1,402 | 687 | 647 | 68 | 532 | 1,110 | 709 | 2,048 |
| 2007 | 1,254 | 635 | 494 | 68 | 455 | 840 | 708 | 2,353 |
| acres, 2012 | 289,301 | 57,638 | 18,357 | 2,201 | 280,934 | 69,731 | 659,460 | 218,054 |
| 2007 | 297,843 | 55,263 | 18,066 | 2,140 | 282,092 | 64,336 | 685,419 | 251,114 |
| Other pasture and grazing land that could have been used for crops without additional improvements (see text) ..... farms, 2012 | 134 | 101 | 97 | 4 | 38 | 110 | 46 | 116 |
| 2007 | 403 | 222 | 202 | 38 | 129 | 304 | 181 | 517 |
| acres, 2012 | 4,613 | 12,204 | 2,162 | 214 | 1,704 | 4,542 | 3,289 | 1,965 |
| 2007 | 21,717 | 20,374 | 6,081 | 2,237 | 12,691 | 5,965 | 20,090 | 24,349 |

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Table 8. **Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **LAND IN FARMS ACCORDING TO USE** - Con. | | | | | | | | |
| Total cropland - Con. | | | | | | | | |
| Other cropland ....farms, 2012 | 7,922 | 451 | 86 | 225 | 140 | 61 | 155 | 190 |
| 2007 | 7,678 | 457 | 69 | 315 | 130 | 44 | 231 | 132 |
| acres, 2012 | 3,058,576 | 449,722 | 46,463 | 222,191 | 7,063 | 1,313 | 3,870 | 83,402 |
| 2007 | 2,851,015 | 431,740 | 42,799 | 213,173 | 10,457 | 550 | 3,559 | 74,244 |
| Cropland idle or used for cover crops or soil improvement, but not harvested and not pastured or grazed ....farms, 2012 | 6,408 | 394 | 73 | 205 | 112 | 47 | 113 | 175 |
| 2007 | 5,672 | 348 | 51 | 254 | 101 | 26 | 178 | 104 |
| acres, 2012 | 1,829,484 | 246,450 | 30,808 | 133,433 | 5,791 | 1,208 | 3,295 | 66,566 |
| 2007 | 1,527,638 | 209,370 | 26,217 | 112,732 | 7,077 | 391 | 2,492 | 38,818 |
| Cropland on which all crops failed ....farms, 2012 | 850 | 11 | 5 | 22 | 24 | 13 | 33 | 6 |
| 2007 | 1,038 | 10 | 8 | 36 | 26 | 14 | 31 | 4 |
| acres, 2012 | 32,034 | 1,057 | (D) | 2,047 | 465 | 54 | 190 | 341 |
| 2007 | 27,627 | 272 | 282 | 1,103 | 384 | 149 | 472 | 53 |
| Cropland in cultivated summer fallow ....farms, 2012 | 1,963 | 172 | 22 | 32 | 15 | 6 | 17 | 41 |
| 2007 | 2,125 | 213 | 23 | 64 | 11 | 6 | 36 | 46 |
| acres, 2012 | 1,197,058 | 202,215 | (D) | 86,711 | 807 | 51 | 385 | 16,495 |
| 2007 | 1,295,750 | 222,098 | 16,300 | 99,338 | 2,996 | 10 | 595 | 35,373 |
| Total woodland ....farms, 2012 | 10,198 | 5 | 38 | 58 | 125 | 241 | 715 | 63 |
| 2007 | 10,438 | 10 | 33 | 48 | 136 | 202 | 747 | 69 |
| acres, 2012 | 2,139,141 | 144 | 14,412 | 2,769 | 10,042 | 7,698 | 14,897 | 23,592 |
| 2007 | 1,988,322 | 373 | 33,639 | 4,952 | 15,241 | 5,990 | 18,554 | 28,699 |
| Woodland pastured ....farms, 2012 | 4,624 | 3 | 30 | 16 | 18 | 114 | 331 | 17 |
| 2007 | 5,045 | - | 24 | 14 | 25 | 106 | 357 | 22 |
| acres, 2012 | 1,141,696 | 75 | 10,766 | 894 | 1,514 | 3,167 | 4,363 | 12,463 |
| 2007 | 1,516,554 | - | (D) | 654 | 1,524 | (D) | 6,737 | 19,986 |
| Woodland not pastured ....farms, 2012 | 6,908 | 3 | 13 | 45 | 115 | 156 | 475 | 53 |
| 2007 | 6,761 | 10 | 10 | 35 | 125 | 131 | 498 | 56 |
| acres, 2012 | 997,445 | 69 | 3,646 | 1,875 | 8,528 | 4,531 | 10,534 | 11,129 |
| 2007 | 471,768 | 373 | (D) | 4,298 | 13,717 | (D) | 11,817 | 8,713 |
| Permanent pasture and rangeland, other than cropland and woodland pastured (see text) ....farms, 2012 | 18,465 | 192 | 122 | 821 | 181 | 301 | 1,139 | 142 |
| 2007 | 18,898 | 234 | 123 | 784 | 181 | 280 | 1,177 | 139 |
| acres, 2012 | 4,518,550 | 204,215 | 162,462 | 114,965 | 11,278 | 5,355 | 24,489 | 80,877 |
| 2007 | 4,775,287 | 250,944 | 155,777 | 69,773 | 24,571 | (D) | 20,129 | 87,857 |
| Land in farmsteads, homes, buildings, livestock facilities, ponds, roads, wasteland, etc. ....farms, 2012 | 23,631 | 314 | 114 | 863 | 435 | 396 | 1,369 | 191 |
| 2007 | 20,427 | 257 | 85 | 728 | 411 | 296 | 1,240 | 162 |
| acres, 2012 | 563,674 | 17,606 | 1,962 | 66,648 | 22,963 | 2,463 | 6,386 | 8,466 |
| 2007 | 599,970 | 21,307 | 4,006 | 81,363 | 10,568 | (D) | 5,380 | 12,627 |
| Pastureland, all types ....farms, 2012 | 20,947 | 207 | 128 | 879 | 207 | 361 | 1,294 | 148 |
| 2007 | 24,581 | 289 | 139 | 990 | 244 | 369 | 1,521 | 174 |
| acres, 2012 | 5,785,508 | 205,150 | 175,284 | 116,429 | 13,808 | 8,820 | 29,869 | 96,233 |
| 2007 | 6,662,867 | 276,832 | 177,224 | 82,470 | 33,351 | (D) | 32,180 | 112,222 |
| **CONSERVATION AND CROP INSURANCE** | | | | | | | | |
| Land enrolled in Conservation Reserve, Wetlands Reserve, Farmable Wetlands, or Conservation Reserve Enhancement Programs ....farms, 2012 | 3,864 | 360 | 61 | 100 | 6 | 5 | 20 | 160 |
| 2007 | 3,722 | 379 | 60 | 110 | 11 | 3 | 16 | 152 |
| acres, 2012 | 1,474,873 | 205,350 | 27,825 | 103,675 | 1,359 | 27 | 2,319 | 57,443 |
| 2007 | 1,602,342 | 231,878 | 27,632 | 119,935 | 3,215 | 23 | 300 | 47,633 |
| Land enrolled in crop insurance programs ....farms, 2012 | 4,192 | 240 | 39 | 237 | 226 | 1 | 8 | 82 |
| 2007 | 4,545 | 243 | 26 | 231 | 196 | 2 | 9 | 72 |
| acres, 2012 | 2,928,924 | 274,130 | 35,538 | 179,836 | 13,411 | (D) | 424 | 93,622 |
| 2007 | 2,621,075 | 260,825 | 32,843 | 133,120 | 9,392 | (D) | 305 | 95,568 |

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Table 8. **Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|---|
| **LAND IN FARMS ACCORDING TO USE** - Con. | | | | | | | | | |
| Total cropland - Con. | | | | | | | | | |
| Other cropland | farms, 2012 | 24 | 422 | 32 | 240 | 155 | 401 | 65 | 35 |
| | 2007 | 36 | 376 | 56 | 199 | 130 | 438 | 76 | 50 |
| | acres, 2012 | 562 | (D) | 5,106 | (D) | 93,569 | 191,435 | 1,681 | 791 |
| | 2007 | 534 | 339,097 | 4,097 | 174,099 | 87,588 | 191,491 | 2,085 | 797 |
| Cropland idle or used for cover crops or soil improvement, but not harvested and not pastured or grazed | farms, 2012 | 19 | 368 | 17 | 215 | 147 | 357 | 57 | 22 |
| | 2007 | 26 | 300 | 30 | 158 | 105 | 322 | 61 | 27 |
| | acres, 2012 | (D) | 195,291 | 4,750 | 131,944 | 53,620 | 102,103 | 1,373 | 684 |
| | 2007 | 437 | 180,870 | 2,434 | 118,006 | 48,098 | 94,436 | 1,668 | 208 |
| Cropland on which all crops failed | farms, 2012 | 2 | 12 | 8 | 13 | - | 18 | 8 | 10 |
| | 2007 | 8 | 18 | 21 | 23 | 7 | 48 | 15 | 16 |
| | acres, 2012 | (D) | (D) | 133 | (D) | - | 1,561 | (D) | 66 |
| | 2007 | 84 | 570 | 1,297 | 736 | 616 | 1,951 | 242 | 255 |
| Cropland in cultivated summer fallow | farms, 2012 | 5 | 148 | 8 | 57 | 62 | 85 | 7 | 10 |
| | 2007 | 4 | 143 | 12 | 50 | 61 | 123 | 15 | 11 |
| | acres, 2012 | 7 | 141,462 | 223 | 53,032 | 39,949 | 87,771 | (D) | 41 |
| | 2007 | 13 | 157,657 | 366 | 55,357 | 38,874 | 95,104 | 175 | 334 |
| Total woodland | farms, 2012 | 259 | 18 | 155 | 13 | 16 | 38 | 287 | 190 |
| | 2007 | 231 | 28 | 134 | 8 | 19 | 48 | 307 | 242 |
| | acres, 2012 | 12,136 | 3,768 | (D) | 3,964 | 2,304 | 12,479 | 72,718 | 2,898 |
| | 2007 | 11,810 | 5,076 | (D) | 842 | 2,882 | 28,636 | 74,211 | 3,363 |
| Woodland pastured | farms, 2012 | 133 | 9 | 94 | 4 | 7 | 16 | 125 | 79 |
| | 2007 | 133 | 6 | 92 | 2 | 11 | 9 | 139 | 81 |
| | acres, 2012 | 3,021 | (D) | (D) | (D) | 1,348 | 9,481 | 1,856 | 415 |
| | 2007 | 3,599 | 373 | (D) | (D) | 1,377 | (D) | 2,860 | 581 |
| Woodland not pastured | farms, 2012 | 180 | 11 | 88 | 9 | 10 | 25 | 207 | 149 |
| | 2007 | 156 | 22 | 63 | 6 | 13 | 39 | 212 | 194 |
| | acres, 2012 | 9,115 | (D) | (D) | (D) | 956 | 2,998 | 70,862 | 2,483 |
| | 2007 | 8,211 | 4,703 | (D) | (D) | 1,505 | (D) | 71,351 | 2,782 |
| Permanent pasture and rangeland, other than cropland and woodland pastured (see text) | farms, 2012 | 269 | 202 | 148 | 265 | 119 | 525 | 326 | 239 |
| | 2007 | 310 | 222 | 149 | 264 | 187 | 610 | 371 | 243 |
| | acres, 2012 | 5,120 | 231,849 | (D) | 134,201 | 112,144 | 184,557 | 9,461 | 3,638 |
| | 2007 | 5,650 | 303,816 | (D) | 107,512 | 124,913 | 243,893 | 11,897 | 4,479 |
| Land in farmsteads, homes, buildings, livestock facilities, ponds, roads, wasteland, etc. | farms, 2012 | 325 | 405 | 164 | 460 | 126 | 798 | 418 | 276 |
| | 2007 | 264 | 313 | 136 | 386 | 105 | 831 | 355 | 303 |
| | acres, 2012 | 3,120 | 33,043 | (D) | 34,708 | 6,515 | 46,725 | 14,475 | 1,291 |
| | 2007 | 2,309 | 34,671 | 3,840 | 32,827 | 5,846 | 43,618 | 9,089 | 1,300 |
| Pastureland, all types | farms, 2012 | 342 | 219 | 188 | 302 | 131 | 562 | 377 | 258 |
| | 2007 | 379 | 299 | 194 | 359 | 198 | 834 | 473 | 324 |
| | acres, 2012 | 8,750 | 250,752 | 540,605 | 139,554 | 116,896 | 197,194 | 11,961 | 4,230 |
| | 2007 | 10,557 | 321,381 | (D) | 125,244 | 129,755 | 298,165 | 19,351 | 5,801 |
| **CONSERVATION AND CROP INSURANCE** | | | | | | | | | |
| Land enrolled in Conservation Reserve, Wetlands Reserve, Farmable Wetlands, or Conservation Reserve Enhancement Programs | farms, 2012 | 5 | 309 | 1 | 150 | 125 | 224 | 10 | 2 |
| | 2007 | 5 | 285 | 11 | 105 | 133 | 199 | 21 | 2 |
| | acres, 2012 | 20 | 164,889 | (D) | 118,389 | 38,894 | 80,315 | 75 | (D) |
| | 2007 | 120 | 197,553 | 981 | 118,066 | 50,053 | 93,239 | 1,004 | (D) |
| Land enrolled in crop insurance programs | farms, 2012 | 4 | 284 | 7 | 246 | 82 | 400 | 18 | 8 |
| | 2007 | 1 | 227 | 4 | 248 | 77 | 540 | 36 | 13 |
| | acres, 2012 | 1,672 | 191,463 | 1,030 | 131,860 | 112,388 | 245,461 | 6,794 | 1,641 |
| | 2007 | (D) | 164,871 | 471 | 117,032 | 79,046 | 238,182 | 3,881 | 1,523 |

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Table 8. **Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **LAND IN FARMS ACCORDING TO USE** - Con. | | | | | | | | |
| Total cropland - Con. | | | | | | | | |
| Other cropland ....farms, 2012 | 45 | 144 | 45 | 117 | 308 | 195 | 637 | 39 |
| 2007 | 24 | 111 | 63 | 124 | 278 | 178 | 495 | 57 |
| acres, 2012 | 907 | 4,397 | 311 | 11,476 | (D) | (D) | 419,336 | 457 |
| 2007 | 575 | 2,805 | 550 | 6,381 | 86,257 | 6,893 | 340,354 | 1,061 |
| Cropland idle or used for cover crops or soil improvement, but not harvested and not pastured or grazed ....farms, 2012 | 37 | 107 | 34 | 82 | 221 | 133 | 532 | 32 |
| 2007 | 16 | 89 | 51 | 85 | 179 | 123 | 343 | 42 |
| acres, 2012 | 855 | 3,755 | 203 | 10,555 | 68,372 | 5,725 | 193,218 | 356 |
| 2007 | 500 | 1,980 | (D) | 5,175 | 66,100 | 5,428 | 105,926 | 810 |
| Cropland on which all crops failed ....farms, 2012 | 5 | 30 | 7 | 20 | 33 | 54 | 12 | 9 |
| 2007 | 7 | 9 | 4 | 30 | 57 | 39 | 22 | 16 |
| acres, 2012 | 38 | 242 | 42 | 375 | (D) | (D) | 1,216 | 91 |
| 2007 | (D) | 68 | (D) | 627 | 2,349 | 661 | 963 | 222 |
| Cropland in cultivated summer fallow ....farms, 2012 | 6 | 26 | 4 | 22 | 93 | 17 | 287 | 3 |
| 2007 | 2 | 20 | 12 | 19 | 86 | 22 | 281 | 10 |
| acres, 2012 | 14 | 400 | 66 | 546 | 21,686 | 269 | 224,902 | 10 |
| 2007 | (D) | 757 | (D) | 579 | 17,808 | 804 | 233,465 | 29 |
| Total woodland ....farms, 2012 | 111 | 490 | 276 | 131 | 288 | 834 | 131 | 173 |
| 2007 | 122 | 490 | 283 | 140 | 333 | 814 | 130 | 207 |
| acres, 2012 | 4,408 | 5,743 | 2,448 | 15,062 | 69,305 | (D) | 31,082 | 12,464 |
| 2007 | 4,281 | 4,843 | 3,910 | 16,323 | 92,215 | (D) | 39,892 | 10,794 |
| Woodland pastured ....farms, 2012 | 36 | 235 | 106 | 55 | 165 | 388 | 60 | 73 |
| 2007 | 58 | 245 | 116 | 42 | 188 | 358 | 60 | 84 |
| acres, 2012 | 502 | 1,840 | 518 | 4,275 | (D) | (D) | 16,220 | 546 |
| 2007 | 988 | 1,665 | 603 | 7,529 | 63,056 | (D) | 28,873 | 1,160 |
| Woodland not pastured ....farms, 2012 | 86 | 316 | 208 | 92 | 167 | 591 | 83 | 128 |
| 2007 | 91 | 307 | 209 | 107 | 187 | 571 | 75 | 137 |
| acres, 2012 | 3,906 | 3,903 | 1,930 | 10,787 | (D) | (D) | 14,862 | 11,918 |
| 2007 | 3,293 | 3,178 | 3,307 | 8,794 | 29,159 | (D) | 11,019 | 9,634 |
| Permanent pasture and rangeland, other than cropland and woodland pastured (see text) ....farms, 2012 | 109 | 1,008 | 386 | 632 | 455 | 1,001 | 409 | 156 |
| 2007 | 106 | 1,036 | 372 | 605 | 478 | 956 | 368 | 206 |
| acres, 2012 | 3,527 | 15,037 | 3,663 | 91,499 | (D) | (D) | 254,287 | 3,577 |
| 2007 | 3,065 | 20,843 | 4,468 | 95,160 | 298,354 | (D) | 282,223 | 4,715 |
| Land in farmsteads, homes, buildings, livestock facilities, ponds, roads, wasteland, etc. ....farms, 2012 | 177 | 1,173 | 467 | 647 | 490 | 1,227 | 494 | 313 |
| 2007 | 130 | 1,004 | 397 | 510 | 507 | 1,038 | 327 | 304 |
| acres, 2012 | 3,448 | 6,283 | 1,432 | 8,249 | (D) | 10,313 | 21,100 | 2,948 |
| 2007 | 1,538 | 5,636 | 3,242 | 9,865 | 19,252 | (D) | 24,827 | 3,601 |
| Pastureland, all types ....farms, 2012 | 126 | 1,143 | 438 | 688 | 516 | 1,135 | 459 | 187 |
| 2007 | 136 | 1,340 | 477 | 755 | 635 | 1,239 | 444 | 314 |
| acres, 2012 | 4,392 | 18,794 | 4,484 | 101,378 | 343,540 | 40,481 | 276,338 | 4,573 |
| 2007 | 5,312 | 28,207 | 5,984 | 112,930 | 379,224 | 49,799 | 327,897 | 7,515 |
| **CONSERVATION AND CROP INSURANCE** | | | | | | | | |
| Land enrolled in Conservation Reserve, Wetlands Reserve, Farmable Wetlands, or Conservation Reserve Enhancement Programs ....farms, 2012 | 15 | 25 | 8 | 17 | 149 | 56 | 501 | 3 |
| 2007 | 6 | 6 | 7 | 14 | 181 | 36 | 405 | 6 |
| acres, 2012 | 450 | 2,830 | 60 | 8,019 | 52,335 | 3,110 | 168,539 | 137 |
| 2007 | 759 | 1,046 | 92 | 4,296 | 79,874 | 2,047 | 148,830 | 86 |
| Land enrolled in crop insurance programs ....farms, 2012 | - | 5 | - | 12 | 97 | 6 | 312 | - |
| 2007 | - | 7 | 7 | 15 | 92 | 9 | 265 | 1 |
| acres, 2012 | - | 768 | - | 1,878 | 62,874 | 535 | 357,233 | - |
| 2007 | - | 837 | 232 | 2,503 | 50,858 | 879 | 318,061 | (D) |

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Table 8. **Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|---|
| **LAND IN FARMS ACCORDING TO USE** - Con. | | | | | | | | | |
| Total cropland - Con. | | | | | | | | | |
| Other cropland | farms, 2012 | 261 | 59 | 54 | 87 | 39 | 156 | 10 | 136 |
| | 2007 | 298 | 38 | 68 | 90 | 33 | 168 | 10 | 136 |
| | acres, 2012 | (D) | 6,103 | 2,160 | 1,180 | 330 | 5,622 | 312 | 2,801 |
| | 2007 | 28,321 | 1,769 | 3,177 | 1,301 | 365 | 3,401 | 306 | 3,817 |
| Cropland idle or used for cover crops or soil improvement, but not harvested and not pastured or grazed | farms, 2012 | 210 | 42 | 32 | 63 | 34 | 121 | 9 | 91 |
| | 2007 | 204 | 25 | 35 | 64 | 25 | 133 | 10 | 103 |
| | acres, 2012 | 24,555 | 4,458 | 1,488 | 514 | 274 | 2,527 | (D) | 2,312 |
| | 2007 | 12,984 | 1,430 | 1,239 | 1,045 | 308 | 2,665 | 306 | 2,866 |
| Cropland on which all crops failed | farms, 2012 | 29 | 18 | 15 | 9 | 7 | 32 | 1 | 40 |
| | 2007 | 65 | 18 | 39 | 17 | 9 | 23 | - | 29 |
| | acres, 2012 | 760 | 452 | 243 | 69 | 29 | 1,449 | (D) | 304 |
| | 2007 | 2,421 | 339 | 1,694 | 134 | 40 | 249 | - | 443 |
| Cropland in cultivated summer fallow | farms, 2012 | 46 | 4 | 10 | 17 | 8 | 20 | - | 21 |
| | 2007 | 46 | - | 6 | 12 | 7 | 26 | - | 15 |
| | acres, 2012 | (D) | 1,193 | 429 | 597 | 27 | 1,646 | - | 185 |
| | 2007 | 12,916 | - | 244 | 122 | 17 | 487 | - | 508 |
| Total woodland | farms, 2012 | 271 | 133 | 185 | 591 | 168 | 414 | 84 | 509 |
| | 2007 | 332 | 163 | 204 | 522 | 188 | 449 | 74 | 595 |
| | acres, 2012 | 662,263 | 11,753 | 16,569 | 17,525 | 4,216 | 13,209 | 2,538 | 17,098 |
| | 2007 | 342,250 | 13,964 | 21,546 | 10,440 | 4,953 | 12,243 | 2,067 | 11,954 |
| Woodland pastured | farms, 2012 | 147 | 32 | 89 | 345 | 66 | 154 | 40 | 196 |
| | 2007 | 241 | 53 | 96 | 315 | 89 | 212 | 39 | 257 |
| | acres, 2012 | (D) | 1,692 | 4,083 | 3,596 | 1,189 | 2,046 | 394 | 3,169 |
| | 2007 | 309,058 | 1,551 | 9,050 | 4,759 | 1,449 | 3,229 | 814 | 4,705 |
| Woodland not pastured | farms, 2012 | 143 | 118 | 136 | 315 | 138 | 312 | 59 | 363 |
| | 2007 | 127 | 137 | 137 | 271 | 143 | 314 | 47 | 406 |
| | acres, 2012 | (D) | 10,061 | 12,486 | 13,929 | 3,027 | 11,163 | 2,144 | 13,929 |
| | 2007 | 33,192 | 12,413 | 12,496 | 5,681 | 3,504 | 9,014 | 1,253 | 7,249 |
| Permanent pasture and rangeland, other than cropland and woodland pastured (see text) | farms, 2012 | 796 | 145 | 158 | 921 | 158 | 561 | 75 | 851 |
| | 2007 | 921 | 157 | 177 | 910 | 164 | 619 | 72 | 979 |
| | acres, 2012 | 394,904 | 6,405 | 9,464 | 14,934 | 4,257 | 14,882 | 1,910 | 13,912 |
| | 2007 | 706,965 | 12,563 | 10,006 | 14,326 | 5,455 | 14,598 | 1,222 | 22,303 |
| Land in farmsteads, homes, buildings, livestock facilities, ponds, roads, wasteland, etc. | farms, 2012 | 853 | 222 | 193 | 962 | 206 | 752 | 96 | 1,012 |
| | 2007 | 824 | 213 | 199 | 836 | 215 | 685 | 69 | 946 |
| | acres, 2012 | 18,886 | 21,037 | 2,271 | 5,500 | 1,674 | 11,682 | 713 | 10,771 |
| | 2007 | 28,866 | 20,180 | 4,516 | 5,592 | 2,031 | 11,890 | 573 | 5,541 |
| Pastureland, all types | farms, 2012 | 873 | 153 | 198 | 1,062 | 193 | 649 | 86 | 989 |
| | 2007 | 1,114 | 206 | 247 | 1,129 | 230 | 838 | 86 | 1,247 |
| | acres, 2012 | 851,893 | 8,427 | 14,269 | 19,231 | 6,306 | 21,016 | 2,332 | 19,937 |
| | 2007 | 1,039,146 | 18,981 | 23,972 | 23,003 | 9,965 | 26,073 | 2,229 | 34,265 |
| **CONSERVATION AND CROP INSURANCE** | | | | | | | | | |
| Land enrolled in Conservation Reserve, Wetlands Reserve, Farmable Wetlands, or Conservation Reserve Enhancement Programs | farms, 2012 | 18 | 10 | 3 | 6 | 2 | 41 | - | 28 |
| | 2007 | 31 | 10 | 7 | 8 | 3 | 47 | - | 14 |
| | acres, 2012 | 6,661 | (D) | 330 | (D) | (D) | 828 | - | 1,197 |
| | 2007 | 10,272 | 471 | 1,054 | 41 | (D) | 1,087 | - | 333 |
| Land enrolled in crop insurance programs | farms, 2012 | 228 | 18 | 2 | 1 | 2 | 27 | - | 19 |
| | 2007 | 221 | 21 | 1 | 37 | 2 | 37 | - | 12 |
| | acres, 2012 | 39,371 | 479 | (D) | (D) | (D) | 9,825 | - | 3,148 |
| | 2007 | 24,861 | 530 | (D) | 753 | (D) | 10,232 | - | 2,020 |

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Table 8. **Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **LAND IN FARMS ACCORDING TO USE** - Con. | | | | | | | | |
| Total cropland - Con. | | | | | | | | |
| Other cropland ....farms, 2012 | 676 | 241 | 92 | 20 | 401 | 213 | 806 | 459 |
| 2007 | 647 | 237 | 99 | 8 | 369 | 161 | 677 | 570 |
| acres, 2012 | 75,727 | 18,943 | 2,552 | 286 | 283,154 | 4,471 | 357,202 | 86,832 |
| 2007 | 75,316 | 12,707 | 2,136 | 283 | 272,409 | 3,404 | 352,075 | 69,042 |
| Cropland idle or used for cover crops or soil improvement, but not harvested and not pastured or grazed ....farms, 2012 | 499 | 151 | 62 | 16 | 336 | 168 | 692 | 383 |
| 2007 | 450 | 139 | 69 | 5 | 288 | 131 | 521 | 451 |
| acres, 2012 | 53,848 | 11,209 | 1,968 | (D) | 169,911 | 3,765 | 218,504 | 72,818 |
| 2007 | 47,097 | 7,190 | 1,860 | (D) | 163,473 | 3,014 | 191,935 | 60,473 |
| Cropland on which all crops failed ....farms, 2012 | 106 | 52 | 27 | 3 | 23 | 39 | 20 | 74 |
| 2007 | 103 | 63 | 26 | 1 | 27 | 28 | 14 | 107 |
| acres, 2012 | 4,063 | 2,539 | 357 | 62 | 1,499 | 448 | 591 | 1,304 |
| 2007 | 4,024 | 1,353 | 169 | (D) | 1,148 | 365 | 361 | 1,408 |
| Cropland in cultivated summer fallow ....farms, 2012 | 147 | 79 | 7 | 1 | 138 | 21 | 267 | 32 |
| 2007 | 166 | 74 | 17 | 2 | 136 | 6 | 308 | 34 |
| acres, 2012 | 17,816 | 5,195 | 227 | (D) | 111,744 | 258 | 138,107 | 12,710 |
| 2007 | 24,195 | 4,164 | 107 | (D) | 107,788 | 25 | 159,779 | 7,161 |
| Total woodland ....farms, 2012 | 964 | 714 | 580 | 50 | 88 | 593 | 95 | 104 |
| 2007 | 997 | 725 | 540 | 60 | 88 | 519 | 91 | 110 |
| acres, 2012 | 71,323 | 268,662 | 19,015 | 2,404 | 4,683 | 13,283 | 12,264 | 7,724 |
| 2007 | 94,131 | 283,150 | 25,999 | 3,897 | 12,789 | 9,549 | 13,205 | 12,034 |
| Woodland pastured ....farms, 2012 | 445 | 379 | 275 | 16 | 31 | 229 | 30 | 36 |
| 2007 | 476 | 439 | 313 | 19 | 39 | 207 | 35 | 43 |
| acres, 2012 | 41,162 | 73,352 | 3,568 | 300 | 2,399 | 3,219 | 7,266 | 2,074 |
| 2007 | (D) | 236,092 | 8,979 | 287 | 8,984 | 2,367 | 9,225 | 4,670 |
| Woodland not pastured ....farms, 2012 | 631 | 457 | 372 | 39 | 62 | 410 | 68 | 75 |
| 2007 | 620 | 411 | 303 | 45 | 60 | 354 | 60 | 72 |
| acres, 2012 | 30,161 | 195,310 | 15,447 | 2,104 | 2,284 | 10,064 | 4,998 | 5,650 |
| 2007 | (D) | 47,058 | 17,020 | 3,610 | 3,805 | 7,182 | 3,980 | 7,364 |
| Permanent pasture and rangeland, other than cropland and woodland pastured (see text) ....farms, 2012 | 1,204 | 674 | 781 | 81 | 377 | 819 | 387 | 1,330 |
| 2007 | 1,109 | 721 | 782 | 66 | 375 | 666 | 471 | 1,308 |
| acres, 2012 | 75,349 | 160,370 | 21,113 | 3,923 | 44,903 | 13,887 | 219,847 | 1,429,157 |
| 2007 | (D) | 132,816 | 20,087 | 3,026 | 63,583 | 11,407 | 177,378 | 1,252,025 |
| Land in farmsteads, homes, buildings, livestock facilities, ponds, roads, wasteland, etc. ....farms, 2012 | 1,668 | 792 | 956 | 75 | 575 | 1,189 | 635 | 1,803 |
| 2007 | 1,290 | 723 | 754 | 75 | 473 | 862 | 502 | 1,672 |
| acres, 2012 | 21,093 | 9,306 | 13,439 | 529 | 29,743 | 9,917 | 23,048 | 36,766 |
| 2007 | (D) | 26,772 | 8,248 | 442 | 38,786 | 7,923 | 22,974 | 40,717 |
| Pastureland, all types ....farms, 2012 | 1,431 | 816 | 906 | 84 | 410 | 965 | 420 | 1,417 |
| 2007 | 1,551 | 978 | 977 | 99 | 467 | 959 | 599 | 1,728 |
| acres, 2012 | 121,124 | 245,926 | 26,843 | 4,437 | 49,006 | 21,648 | 230,402 | 1,433,196 |
| 2007 | 188,029 | 389,282 | 35,147 | 5,550 | 85,258 | 19,739 | 206,693 | 1,281,044 |
| **CONSERVATION AND CROP INSURANCE** | | | | | | | | |
| Land enrolled in Conservation Reserve, Wetlands Reserve, Farmable Wetlands, or Conservation Reserve Enhancement Programs ....farms, 2012 | 310 | 27 | 9 | 8 | 261 | 137 | 638 | 54 |
| 2007 | 333 | 53 | 17 | 13 | 234 | 142 | 598 | 59 |
| acres, 2012 | 39,504 | 2,740 | 447 | 122 | 143,491 | 1,824 | 188,953 | 49,276 |
| 2007 | 47,264 | 6,125 | 404 | 433 | 147,305 | 3,394 | 205,614 | 49,830 |
| Land enrolled in crop insurance programs ....farms, 2012 | 182 | 17 | 2 | - | 233 | 38 | 511 | 598 |
| 2007 | 160 | 15 | 9 | - | 199 | 34 | 489 | 987 |
| acres, 2012 | 189,978 | 5,556 | (D) | - | 236,147 | 5,612 | 623,140 | 101,570 |
| 2007 | 143,966 | 5,414 | 63 | - | 220,366 | 3,375 | 570,671 | 127,531 |

## Table 9. **Harvested Cropland by Size of Farm and Acres Harvested: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Farms ..... number, 2012 | 20,846 | 370 | 74 | 675 | 734 | 278 | 1,022 | 147 |
| 2007 | 20,091 | 375 | 64 | 700 | 842 | 256 | 1,037 | 126 |
| acres harvested, 2012 | 4,342,904 | 364,428 | 35,811 | 296,362 | 23,458 | 6,513 | 24,099 | 98,182 |
| 2007 | 4,387,169 | 368,235 | (D) | 251,332 | 25,790 | 6,995 | 25,423 | 105,501 |
| **HARVESTED CROPLAND BY SIZE OF FARM** | | | | | | | | |
| 2012 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 4,556 | 15 | 9 | 214 | 237 | 98 | 358 | 9 |
| acres harvested | 12,360 | 51 | (D) | 663 | 800 | 197 | 818 | 29 |
| 10 to 49 acres ..... farms | 7,043 | 28 | 6 | 221 | 288 | 111 | 457 | 22 |
| acres harvested | 90,418 | 354 | 24 | 3,357 | 4,936 | 982 | 5,193 | 284 |
| 50 to 69 acres ..... farms | 1,164 | 11 | 2 | 24 | 61 | 14 | 54 | 4 |
| acres harvested | 35,576 | 519 | (D) | 806 | 2,580 | 383 | 1,650 | 152 |
| 70 to 99 acres ..... farms | 1,348 | 12 | 6 | 43 | 43 | 16 | 54 | 10 |
| acres harvested | 59,237 | 770 | 391 | 2,117 | 2,334 | 664 | 1,818 | 362 |
| 100 to 139 acres ..... farms | 956 | 12 | - | 36 | 26 | 10 | 21 | 5 |
| acres harvested | 60,718 | 925 | - | 2,996 | 1,574 | 407 | 1,084 | 202 |
| 140 to 179 acres ..... farms | 673 | 16 | 3 | 13 | 18 | 2 | 24 | 5 |
| acres harvested | 59,017 | 2,135 | 34 | 1,553 | 1,256 | (D) | 1,567 | 546 |
| 180 to 219 acres ..... farms | 455 | 11 | - | 10 | 14 | 5 | 19 | 4 |
| acres harvested | 50,671 | 1,979 | - | 1,676 | 1,507 | 450 | 2,204 | 265 |
| 220 to 259 acres ..... farms | 352 | 5 | - | 16 | 5 | 5 | 11 | 7 |
| acres harvested | 50,700 | 1,033 | - | 3,447 | (D) | 583 | 1,421 | 734 |
| 260 to 499 acres ..... farms | 1,182 | 37 | 1 | 21 | 22 | 15 | 16 | 8 |
| acres harvested | 260,674 | 9,115 | (D) | 4,420 | 2,832 | 1,429 | 2,047 | 2,067 |
| 500 to 999 acres ..... farms | 1,001 | 46 | 14 | 14 | 10 | 2 | 5 | 21 |
| acres harvested | 429,988 | 21,348 | 3,201 | 7,307 | 1,697 | (D) | 883 | 5,774 |
| 1,000 to 1,999 acres ..... farms | 842 | 54 | 9 | 9 | 7 | - | 1 | 19 |
| acres harvested | 705,951 | 44,998 | 4,883 | 9,607 | 2,943 | - | (D) | 18,015 |
| 2,000 acres or more ..... farms | 1,274 | 123 | 24 | 54 | 3 | - | 2 | 33 |
| acres harvested | 2,527,594 | 281,201 | 27,231 | 258,413 | (D) | - | (D) | 69,752 |
| 2007 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 3,452 | 10 | 14 | 184 | 277 | 82 | 242 | 2 |
| acres harvested | 10,748 | 43 | 29 | 605 | 1,017 | 211 | (D) | (D) |
| 10 to 49 acres ..... farms | 7,008 | 29 | 3 | 255 | 321 | 103 | 541 | 26 |
| acres harvested | 95,942 | 480 | (D) | 3,712 | 5,503 | 1,035 | 6,630 | 433 |
| 50 to 69 acres ..... farms | 1,196 | 16 | - | 37 | 66 | 15 | 64 | 1 |
| acres harvested | 37,423 | 654 | - | 1,418 | 2,419 | 400 | 1,815 | (D) |
| 70 to 99 acres ..... farms | 1,342 | 20 | - | 46 | 55 | 8 | 81 | 1 |
| acres harvested | 59,099 | 1,371 | - | 2,691 | 2,517 | 311 | 3,400 | (D) |
| 100 to 139 acres ..... farms | 991 | 5 | 1 | 26 | 28 | 12 | 37 | 4 |
| acres harvested | 62,865 | 484 | (D) | 2,181 | 1,864 | 537 | 2,135 | 185 |
| 140 to 179 acres ..... farms | 733 | 8 | 5 | 27 | 30 | 9 | 24 | 3 |
| acres harvested | 62,860 | 1,131 | (D) | 3,209 | 1,858 | 542 | 2,065 | 343 |
| 180 to 219 acres ..... farms | 495 | 8 | - | 12 | 13 | 10 | 12 | 5 |
| acres harvested | 52,697 | 1,113 | - | 1,737 | 891 | 837 | 1,446 | 325 |
| 220 to 259 acres ..... farms | 376 | 11 | 1 | 11 | 7 | 2 | 11 | 5 |
| acres harvested | 50,017 | 1,754 | (D) | 2,191 | 528 | (D) | 1,006 | 269 |
| 260 to 499 acres ..... farms | 1,196 | 42 | 1 | 19 | 22 | 12 | 15 | 8 |
| acres harvested | 251,995 | 11,658 | (D) | 4,765 | 2,875 | 2,329 | 1,755 | 1,169 |
| 500 to 999 acres ..... farms | 1,094 | 44 | 5 | 19 | 10 | 2 | 9 | 15 |
| acres harvested | 478,158 | 21,693 | 1,166 | 9,999 | 1,208 | (D) | 3,176 | 3,533 |
| 1,000 to 1,999 acres ..... farms | 888 | 40 | 9 | 10 | 7 | 1 | - | 15 |
| acres harvested | 768,276 | 37,153 | 3,462 | 9,945 | 3,209 | (D) | - | 14,025 |
| 2,000 acres or more ..... farms | 1,320 | 142 | 25 | 54 | 6 | - | 1 | 41 |
| acres harvested | 2,457,089 | 290,701 | 27,968 | 208,879 | 1,901 | - | (D) | 85,103 |
| **HARVESTED CROPLAND BY ACRES HARVESTED** | | | | | | | | |
| 2012 acres harvested: | | | | | | | | |
| 1 to 9 acres ..... farms | 7,969 | 27 | 17 | 303 | 326 | 167 | 570 | 21 |
| acres | 27,859 | 93 | (D) | 1,162 | 1,224 | 531 | 1,733 | 82 |
| 10 to 19 acres ..... farms | 3,110 | 13 | 5 | 92 | 124 | 42 | 220 | 18 |
| acres | 41,132 | 151 | 75 | 1,239 | 1,671 | 534 | 2,885 | 259 |
| 20 to 29 acres ..... farms | 1,524 | 8 | 1 | 31 | 75 | 18 | 68 | 8 |
| acres | 34,610 | 178 | (D) | 786 | 1,750 | (D) | 1,528 | 178 |
| 30 to 49 acres ..... farms | 1,662 | 14 | 3 | 58 | 90 | 15 | 77 | 9 |
| acres | 60,845 | 575 | 117 | 2,052 | 3,294 | 520 | 2,847 | 333 |
| 50 to 99 acres ..... farms | 1,740 | 27 | 7 | 51 | 76 | 23 | 47 | 15 |
| acres | 117,692 | 1,861 | 512 | 3,536 | 4,969 | 1,435 | 2,920 | 923 |
| 100 to 199 acres ..... farms | 1,257 | 41 | 4 | 39 | 23 | 7 | 19 | 6 |
| acres | 173,817 | 6,145 | 600 | 5,481 | 3,082 | 1,067 | 2,316 | 799 |
| 200 to 499 acres ..... farms | 1,474 | 62 | 9 | 32 | 15 | 4 | 18 | 23 |
| acres | 468,318 | 22,420 | 2,910 | 8,671 | (D) | 811 | 4,456 | 7,614 |
| 500 to 999 acres ..... farms | 874 | 62 | 13 | 21 | 4 | 2 | - | 16 |
| acres | 622,510 | 43,640 | 9,459 | 15,962 | (D) | (D) | - | 12,263 |
| 1,000 acres or more ..... farms | 1,236 | 116 | 15 | 48 | 1 | - | 3 | 31 |
| acres | 2,796,121 | 289,365 | 22,086 | 257,473 | (D) | - | 5,414 | 75,731 |
| 2007 acres harvested: | | | | | | | | |
| 1 to 9 acres ..... farms | 6,536 | 21 | 21 | 294 | 393 | 150 | 478 | 13 |
| acres | 25,074 | 81 | 47 | 1,216 | (D) | 528 | (D) | 73 |
| 10 to 19 acres ..... farms | 3,150 | 16 | 1 | 95 | 137 | 26 | 249 | 15 |
| acres | 41,589 | 229 | (D) | 1,316 | 1,831 | 298 | 3,344 | 183 |
| 20 to 29 acres ..... farms | 1,708 | 10 | 4 | 44 | 80 | 28 | 86 | 13 |
| acres | 38,855 | 214 | (D) | 1,025 | 1,849 | 631 | 1,937 | 300 |
| 30 to 49 acres ..... farms | 1,857 | 12 | 1 | 56 | 98 | 11 | 116 | 6 |
| acres | 68,270 | 449 | (D) | 2,085 | 3,605 | 432 | 4,003 | 220 |
| 50 to 99 acres ..... farms | 1,813 | 37 | 1 | 62 | 89 | 25 | 63 | 6 |
| acres | 122,824 | 2,609 | (D) | 4,326 | 5,788 | 1,652 | 4,176 | 372 |
| 100 to 199 acres ..... farms | 1,366 | 31 | 10 | 51 | 29 | 8 | 32 | 11 |
| acres | 187,014 | 4,327 | 1,311 | 7,530 | 3,949 | 870 | 4,346 | 1,529 |
| 200 to 499 acres ..... farms | 1,406 | 65 | 3 | 30 | 10 | 8 | 8 | 16 |
| acres | 440,532 | 22,713 | 810 | 9,005 | 2,575 | 2,584 | 2,404 | 5,584 |
| 500 to 999 acres ..... farms | 964 | 61 | 12 | 20 | 4 | - | 4 | 10 |
| acres | 690,131 | 46,593 | 9,242 | 14,161 | 2,421 | - | 2,112 | 7,693 |
| 1,000 acres or more ..... farms | 1,291 | 122 | 11 | 48 | 2 | - | 1 | 36 |
| acres | 2,772,880 | 291,020 | 21,189 | 210,668 | (D) | - | (D) | 89,547 |

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Table 9. **Harvested Cropland by Size of Farm and Acres Harvested: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| Farms ....number, 2012 | 221 | 545 | 145 | 563 | 113 | 1,047 | 293 | 219 |
| 2007 | 186 | 581 | 105 | 597 | 98 | 1,158 | 311 | 237 |
| acres harvested, 2012 | 17,462 | 191,252 | 8,895 | 261,364 | 90,550 | 525,432 | 20,461 | 6,454 |
| 2007 | 9,091 | 183,242 | (D) | (D) | 83,518 | (D) | 17,391 | 7,019 |
| **HARVESTED CROPLAND BY SIZE OF FARM** | | | | | | | | |
| 2012 size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 54 | 112 | 13 | 73 | 5 | 65 | 47 | 63 |
| acres harvested | (D) | 450 | 48 | 212 | 25 | 223 | (D) | 152 |
| 10 to 49 acres ....farms | 72 | 166 | 24 | 72 | 9 | 162 | 109 | 97 |
| acres harvested | 826 | 3,277 | 291 | 1,220 | 83 | 2,790 | 1,424 | 1,045 |
| 50 to 69 acres ....farms | 11 | 17 | 13 | 14 | 1 | 71 | 35 | 16 |
| acres harvested | 231 | 901 | 307 | 558 | (D) | 2,922 | 923 | 301 |
| 70 to 99 acres ....farms | 16 | 31 | 8 | 33 | 6 | 86 | 27 | 12 |
| acres harvested | 306 | 2,160 | 310 | 2,599 | 252 | 5,707 | 977 | 399 |
| 100 to 139 acres ....farms | 9 | 15 | 14 | 40 | 3 | 61 | 14 | 8 |
| acres harvested | 194 | 1,046 | 443 | 3,762 | 250 | 6,363 | 834 | 337 |
| 140 to 179 acres ....farms | 14 | 23 | 9 | 14 | 4 | 59 | 14 | 7 |
| acres harvested | 851 | 2,480 | 273 | 1,833 | 174 | 7,566 | 788 | 396 |
| 180 to 219 acres ....farms | 9 | 4 | 12 | 16 | 2 | 37 | 6 | 3 |
| acres harvested | 240 | (D) | 640 | 2,254 | (D) | 6,322 | 425 | 234 |
| 220 to 259 acres ....farms | 4 | 2 | 4 | 18 | 1 | 29 | 4 | 5 |
| acres harvested | 138 | (D) | 332 | 3,855 | (D) | 6,030 | 340 | 460 |
| 260 to 499 acres ....farms | 18 | 17 | 16 | 100 | 6 | 142 | 15 | 5 |
| acres harvested | 3,163 | 3,602 | 922 | 31,203 | 963 | 44,945 | 1,407 | 1,356 |
| 500 to 999 acres ....farms | 3 | 17 | 7 | 78 | 17 | 141 | 15 | 3 |
| acres harvested | (D) | 5,342 | 910 | 46,897 | 5,606 | 82,025 | 7,342 | 1,774 |
| 1,000 to 1,999 acres ....farms | 11 | 30 | 17 | 37 | 12 | 94 | 6 | - |
| acres harvested | 10,912 | 11,540 | 2,334 | 42,528 | 8,736 | 108,596 | 5,628 | - |
| 2,000 acres or more ....farms | - | 111 | 8 | 68 | 47 | 100 | 1 | - |
| acres harvested | - | 159,708 | 2,085 | 124,443 | 74,233 | 251,943 | (D) | - |
| 2007 size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 31 | 180 | 1 | 59 | 2 | 76 | 40 | 50 |
| acres harvested | 82 | 689 | (D) | (D) | (D) | (D) | (D) | (D) |
| 10 to 49 acres ....farms | 65 | 170 | 13 | 84 | 6 | 188 | 114 | 120 |
| acres harvested | 662 | 3,105 | 126 | 1,310 | (D) | 3,197 | 1,437 | 1,197 |
| 50 to 69 acres ....farms | 18 | 28 | 8 | 13 | 1 | 54 | 20 | 19 |
| acres harvested | 528 | 1,307 | 158 | 643 | (D) | 2,224 | 696 | 441 |
| 70 to 99 acres ....farms | 21 | 17 | 16 | 28 | 3 | 85 | 37 | 13 |
| acres harvested | 554 | 1,077 | 547 | 2,156 | 142 | 5,624 | 1,102 | 383 |
| 100 to 139 acres ....farms | 17 | 14 | 11 | 43 | 2 | 57 | 26 | 8 |
| acres harvested | 419 | 1,042 | 352 | 3,712 | (D) | 5,060 | 1,625 | 453 |
| 140 to 179 acres ....farms | 8 | 14 | 4 | 37 | 2 | 57 | 14 | 11 |
| acres harvested | 767 | 1,507 | (D) | 5,004 | (D) | 7,415 | 987 | 877 |
| 180 to 219 acres ....farms | 2 | 4 | 7 | 24 | 2 | 47 | 15 | 6 |
| acres harvested | (D) | 358 | 178 | 3,548 | (D) | 7,624 | 864 | 484 |
| 220 to 259 acres ....farms | 4 | 5 | 1 | 21 | - | 32 | 3 | 1 |
| acres harvested | (D) | 501 | (D) | 4,559 | - | 5,887 | 286 | (D) |
| 260 to 499 acres ....farms | 12 | 12 | 17 | 91 | 4 | 154 | 30 | 7 |
| acres harvested | 1,421 | 2,021 | 1,108 | 28,438 | (D) | 44,049 | 3,463 | 1,955 |
| 500 to 999 acres ....farms | 6 | 16 | 10 | 92 | 13 | 185 | 10 | 2 |
| acres harvested | 2,504 | 5,771 | 855 | 52,098 | 4,361 | 111,431 | 5,828 | (D) |
| 1,000 to 1,999 acres ....farms | 2 | 22 | 8 | 43 | 20 | 109 | 2 | - |
| acres harvested | (D) | 14,539 | 2,351 | 50,755 | 13,342 | 126,312 | (D) | - |
| 2,000 acres or more ....farms | - | 99 | 9 | 62 | 43 | 114 | - | - |
| acres harvested | - | 151,325 | 2,294 | 123,690 | 64,444 | 232,093 | - | - |
| **HARVESTED CROPLAND BY ACRES HARVESTED** | | | | | | | | |
| 2012 acres harvested: | | | | | | | | |
| 1 to 9 acres ....farms | 105 | 150 | 30 | 97 | 15 | 118 | 93 | 113 |
| acres | 353 | 655 | (D) | 352 | 62 | 486 | 277 | 343 |
| 10 to 19 acres ....farms | 43 | 63 | 23 | 30 | 7 | 74 | 60 | 51 |
| acres | 570 | 863 | 265 | 396 | 92 | 975 | 789 | 686 |
| 20 to 29 acres ....farms | 23 | 40 | 7 | 13 | - | 41 | 40 | 14 |
| acres | 519 | 956 | 166 | 297 | - | 968 | 921 | 289 |
| 30 to 49 acres ....farms | 13 | 48 | 28 | 24 | 3 | 66 | 33 | 14 |
| acres | 490 | 1,792 | 1,015 | 932 | 115 | 2,527 | 1,121 | 518 |
| 50 to 99 acres ....farms | 10 | 63 | 29 | 59 | 9 | 132 | 31 | 16 |
| acres | 660 | 4,500 | 1,762 | 4,683 | 662 | 9,361 | 1,996 | 1,024 |
| 100 to 199 acres ....farms | 7 | 34 | 16 | 53 | 4 | 132 | 13 | 4 |
| acres | 862 | 4,725 | 2,031 | 7,435 | 576 | 18,789 | 1,530 | 474 |
| 200 to 499 acres ....farms | 9 | 43 | 11 | 139 | 20 | 211 | 9 | 4 |
| acres | 3,096 | 15,470 | 2,925 | 44,767 | 6,067 | 70,075 | 2,775 | 1,346 |
| 500 to 999 acres ....farms | 7 | 38 | 1 | 70 | 21 | 129 | 14 | 3 |
| acres | 6,152 | 27,838 | (D) | 47,163 | 15,874 | 92,822 | 11,052 | 1,774 |
| 1,000 acres or more ....farms | 4 | 66 | - | 78 | 34 | 144 | - | - |
| acres | 4,760 | 134,453 | - | 155,339 | 67,102 | 329,429 | - | - |
| 2007 acres harvested: | | | | | | | | |
| 1 to 9 acres ....farms | 76 | 221 | 14 | 86 | 7 | 141 | 92 | 121 |
| acres | (D) | 927 | 30 | 381 | 30 | (D) | 322 | (D) |
| 10 to 19 acres ....farms | 36 | 66 | 17 | 41 | 4 | 69 | 61 | 45 |
| acres | 462 | 898 | (D) | 508 | 46 | 948 | 848 | 590 |
| 20 to 29 acres ....farms | 18 | 43 | 13 | 11 | 2 | 54 | 35 | 20 |
| acres | 402 | 1,029 | (D) | (D) | (D) | 1,267 | 765 | 476 |
| 30 to 49 acres ....farms | 22 | 47 | 24 | 24 | 4 | 68 | 43 | 21 |
| acres | 740 | 1,698 | 902 | 979 | (D) | 2,660 | 1,577 | 758 |
| 50 to 99 acres ....farms | 17 | 48 | 16 | 60 | 3 | 129 | 41 | 16 |
| acres | 1,149 | 3,190 | 1,026 | 4,398 | 222 | 9,032 | 2,695 | 1,178 |
| 100 to 199 acres ....farms | 9 | 28 | 11 | 86 | 7 | 143 | 24 | 6 |
| acres | 1,072 | 3,978 | 1,435 | 12,093 | 919 | 20,531 | 2,896 | 655 |
| 200 to 499 acres ....farms | 3 | 24 | 8 | 138 | 17 | 208 | 7 | 6 |
| acres | 930 | 7,779 | 2,139 | 43,800 | 5,677 | 65,194 | 2,284 | 1,904 |
| 500 to 999 acres ....farms | 4 | 30 | 1 | 76 | 24 | 192 | 8 | 2 |
| acres | 2,984 | 22,672 | (D) | 53,664 | 16,978 | 137,914 | 6,004 | (D) |
| 1,000 acres or more ....farms | 1 | 74 | 1 | 75 | 30 | 154 | - | - |
| acres | (D) | 141,071 | (D) | 160,043 | 59,450 | 313,074 | - | - |

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Table 9. **Harvested Cropland by Size of Farm and Acres Harvested: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Farms ..... number, 2012 | 122 | 851 | 327 | 525 | 365 | 965 | 461 | 156 |
| 2007 | 119 | 621 | 269 | 505 | 358 | 889 | 437 | 157 |
| acres harvested, 2012 | 2,903 | 13,340 | 1,913 | 51,234 | 80,898 | 45,858 | 383,304 | 3,847 |
| 2007 | 1,999 | 9,459 | 2,211 | 53,117 | 87,324 | 37,388 | 386,081 | 3,374 |
| **HARVESTED CROPLAND BY SIZE OF FARM** | | | | | | | | |
| 2012 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 19 | 445 | 212 | 71 | 31 | 107 | 7 | 38 |
| acres harvested | (D) | 1,046 | 348 | 278 | 81 | (D) | 25 | 77 |
| 10 to 49 acres ..... farms | 49 | 316 | 93 | 242 | 121 | 393 | 28 | 80 |
| acres harvested | 522 | 3,310 | 602 | 2,975 | 1,653 | 4,847 | 336 | 724 |
| 50 to 69 acres ..... farms | 13 | 18 | 8 | 30 | 17 | 84 | 9 | 6 |
| acres harvested | 212 | 488 | 215 | 950 | 401 | 2,249 | 172 | 76 |
| 70 to 99 acres ..... farms | 15 | 15 | 4 | 25 | 17 | 109 | 13 | 12 |
| acres harvested | 396 | 683 | 195 | 1,346 | 601 | 3,660 | 478 | 254 |
| 100 to 139 acres ..... farms | 8 | 14 | 5 | 22 | 20 | 82 | 13 | 5 |
| acres harvested | 321 | 809 | 189 | 1,497 | 1,050 | 3,835 | 1,060 | 198 |
| 140 to 179 acres ..... farms | 3 | 8 | 4 | 22 | 11 | 47 | 16 | 3 |
| acres harvested | 51 | (D) | (D) | 2,155 | 666 | 3,534 | 825 | 110 |
| 180 to 219 acres ..... farms | 7 | 13 | - | 10 | 7 | 32 | 7 | - |
| acres harvested | 349 | 1,119 | - | 1,495 | 676 | 2,711 | 451 | - |
| 220 to 259 acres ..... farms | - | 4 | 1 | 8 | 9 | 29 | 9 | 2 |
| acres harvested | - | 602 | (D) | 1,245 | 835 | 3,434 | 1,193 | (D) |
| 260 to 499 acres ..... farms | 7 | 14 | - | 45 | 25 | 57 | 35 | 4 |
| acres harvested | 790 | 3,184 | - | 11,178 | 3,238 | 10,568 | 6,001 | (D) |
| 500 to 999 acres ..... farms | 1 | 3 | - | 25 | 33 | 20 | 47 | 3 |
| acres harvested | (D) | 792 | - | 10,761 | 6,661 | 8,880 | 14,385 | (D) |
| 1,000 to 1,999 acres ..... farms | - | 1 | - | 14 | 25 | 3 | 92 | - |
| acres harvested | - | (D) | - | 11,563 | 12,452 | (D) | 57,256 | - |
| 2,000 acres or more ..... farms | - | - | - | 11 | 49 | 2 | 185 | 3 |
| acres harvested | - | - | - | 5,791 | 52,584 | (D) | 301,122 | (D) |
| 2007 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 29 | 271 | 141 | 56 | 18 | 86 | 1 | 29 |
| acres harvested | 63 | 730 | 295 | 214 | 51 | (D) | (D) | 71 |
| 10 to 49 acres ..... farms | 45 | 267 | 99 | 201 | 133 | 363 | 19 | 85 |
| acres harvested | 439 | 2,352 | 831 | 2,861 | 1,607 | 5,157 | 256 | 768 |
| 50 to 69 acres ..... farms | 7 | 16 | 11 | 19 | 16 | 101 | 2 | 6 |
| acres harvested | 135 | 460 | 293 | 595 | 376 | 2,607 | (D) | 69 |
| 70 to 99 acres ..... farms | 11 | 17 | 6 | 55 | 16 | 114 | 5 | 17 |
| acres harvested | 244 | 655 | (D) | 2,504 | 487 | 4,378 | 280 | 515 |
| 100 to 139 acres ..... farms | 10 | 12 | 5 | 15 | 9 | 67 | 13 | 4 |
| acres harvested | 312 | 677 | 297 | 1,156 | 590 | 3,446 | 990 | 163 |
| 140 to 179 acres ..... farms | 1 | 4 | 5 | 23 | 10 | 38 | 12 | 1 |
| acres harvested | (D) | 215 | 211 | 2,233 | 767 | 2,624 | 760 | (D) |
| 180 to 219 acres ..... farms | 8 | 8 | 1 | 16 | 15 | 26 | 7 | 3 |
| acres harvested | 230 | 613 | (D) | 2,265 | 1,159 | 2,322 | 722 | 150 |
| 220 to 259 acres ..... farms | - | 12 | - | 19 | 5 | 33 | 3 | 2 |
| acres harvested | - | 932 | - | 3,032 | 405 | 3,463 | (D) | (D) |
| 260 to 499 acres ..... farms | 6 | 10 | 1 | 44 | 28 | 42 | 31 | 5 |
| acres harvested | 361 | 1,455 | (D) | 9,448 | 4,951 | 5,552 | 4,256 | 300 |
| 500 to 999 acres ..... farms | 2 | 4 | - | 31 | 30 | 12 | 65 | 3 |
| acres harvested | (D) | 1,370 | - | 14,722 | 8,370 | 5,143 | 19,465 | (D) |
| 1,000 to 1,999 acres ..... farms | - | - | - | 16 | 31 | 5 | 83 | - |
| acres harvested | - | - | - | 10,176 | 18,737 | 1,618 | 61,478 | - |
| 2,000 acres or more ..... farms | - | - | - | 10 | 47 | 2 | 196 | 2 |
| acres harvested | - | - | - | 3,911 | 49,824 | (D) | 297,682 | (D) |
| **HARVESTED CROPLAND BY ACRES HARVESTED** | | | | | | | | |
| 2012 acres harvested: | | | | | | | | |
| 1 to 9 acres ..... farms | 51 | 624 | 288 | 186 | 94 | 292 | 29 | 86 |
| acres | (D) | 1,793 | 602 | 847 | 373 | 1,232 | 89 | 233 |
| 10 to 19 acres ..... farms | 33 | 105 | 19 | 96 | 47 | 209 | 21 | 39 |
| acres | 470 | 1,419 | 261 | 1,292 | 668 | 2,723 | 283 | 457 |
| 20 to 29 acres ..... farms | 11 | 33 | 1 | 49 | 41 | 128 | 10 | 12 |
| acres | 227 | (D) | (D) | 1,116 | 929 | 2,886 | 226 | (D) |
| 30 to 49 acres ..... farms | 12 | 34 | 12 | 42 | 31 | 113 | 23 | 12 |
| acres | 393 | 1,217 | 448 | 1,521 | 1,133 | 4,035 | 847 | 430 |
| 50 to 99 acres ..... farms | 10 | 29 | 6 | 42 | 34 | 110 | 33 | 4 |
| acres | 677 | 2,048 | (D) | 2,716 | 2,300 | 7,365 | 2,221 | 268 |
| 100 to 199 acres ..... farms | 2 | 16 | - | 39 | 26 | 59 | 47 | - |
| acres | (D) | 2,430 | - | 5,544 | 3,708 | 7,669 | 6,614 | - |
| 200 to 499 acres ..... farms | 3 | 9 | 1 | 45 | 46 | 43 | 69 | 2 |
| acres | 725 | 2,857 | (D) | 14,445 | 14,074 | 12,810 | 23,436 | (D) |
| 500 to 999 acres ..... farms | - | 1 | - | 15 | 24 | 11 | 72 | - |
| acres | - | (D) | - | 10,574 | 17,096 | 7,138 | 54,186 | - |
| 1,000 acres or more ..... farms | - | - | - | 11 | 22 | - | 157 | 1 |
| acres | - | - | - | 13,179 | 40,617 | - | 295,402 | (D) |
| 2007 acres harvested: | | | | | | | | |
| 1 to 9 acres ..... farms | 65 | 425 | 204 | 136 | 78 | 220 | 17 | 89 |
| acres | 257 | 1,305 | 497 | 643 | 254 | 971 | 62 | 256 |
| 10 to 19 acres ..... farms | 16 | 105 | 38 | 86 | 67 | 205 | 17 | 19 |
| acres | (D) | 1,333 | 470 | 1,163 | 867 | 2,755 | 228 | (D) |
| 20 to 29 acres ..... farms | 16 | 27 | 3 | 50 | 31 | 141 | 10 | 20 |
| acres | 341 | (D) | 62 | 1,126 | 690 | 3,189 | 222 | 450 |
| 30 to 49 acres ..... farms | 13 | 23 | 15 | 53 | 19 | 120 | 22 | 10 |
| acres | 432 | 821 | 558 | 1,928 | 718 | 4,334 | 784 | 364 |
| 50 to 99 acres ..... farms | 7 | 17 | 9 | 56 | 38 | 112 | 22 | 14 |
| acres | 453 | 1,069 | 624 | 3,886 | 2,575 | 7,165 | 1,515 | 840 |
| 100 to 199 acres ..... farms | 2 | 16 | - | 44 | 28 | 59 | 41 | 3 |
| acres | (D) | 1,938 | - | 6,171 | 4,200 | 7,787 | 5,539 | 363 |
| 200 to 499 acres ..... farms | - | 7 | - | 54 | 36 | 27 | 65 | 2 |
| acres | - | 1,836 | - | 16,110 | 11,000 | 7,837 | 23,051 | (D) |
| 500 to 999 acres ..... farms | - | 1 | - | 19 | 33 | 5 | 87 | - |
| acres | - | (D) | - | 13,759 | 22,965 | 3,350 | 61,775 | - |
| 1,000 acres or more ..... farms | - | - | - | 7 | 28 | - | 156 | - |
| acres | - | - | - | 8,331 | 44,055 | - | 292,905 | - |

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Table 9. **Harvested Cropland by Size of Farm and Acres Harvested: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Farms .....number, 2012 | 941 | 226 | 173 | 603 | 180 | 612 | 81 | 609 |
| 2007 | 878 | 258 | 134 | 497 | 185 | 640 | 48 | 616 |
| acres harvested, 2012 | 78,819 | 6,529 | 12,433 | 9,643 | 4,332 | 57,055 | 972 | 23,425 |
| 2007 | 75,704 | 8,406 | 10,948 | 12,100 | 5,607 | 58,163 | 1,111 | 25,965 |
| **HARVESTED CROPLAND BY SIZE OF FARM** | | | | | | | | |
| 2012 size of farm: | | | | | | | | |
| 1 to 9 acres .....farms | 147 | 48 | 2 | 231 | 30 | 144 | 23 | 203 |
| acres harvested | 511 | 153 | (D) | 458 | 68 | 353 | (D) | (D) |
| 10 to 49 acres .....farms | 327 | 99 | 54 | 245 | 98 | 245 | 34 | 232 |
| acres harvested | 4,720 | 1,330 | 584 | 2,377 | 1,036 | 2,784 | 291 | 2,305 |
| 50 to 69 acres .....farms | 79 | 11 | 23 | 39 | 5 | 44 | 6 | 37 |
| acres harvested | 2,828 | 313 | 548 | 826 | 38 | 1,299 | 51 | 1,056 |
| 70 to 99 acres .....farms | 73 | 17 | 18 | 37 | 21 | 34 | 10 | 51 |
| acres harvested | 3,184 | 410 | 609 | 1,166 | 602 | 1,231 | 313 | 2,034 |
| 100 to 139 acres .....farms | 58 | 15 | 24 | 29 | 10 | 27 | 5 | 25 |
| acres harvested | 3,025 | 671 | 1,392 | 1,441 | 259 | 1,933 | 109 | 1,103 |
| 140 to 179 acres .....farms | 42 | 6 | 20 | 4 | 4 | 21 | 1 | 12 |
| acres harvested | 4,486 | 294 | 1,128 | 501 | 184 | 1,957 | (D) | (D) |
| 180 to 219 acres .....farms | 25 | 7 | 5 | 7 | 1 | 14 | - | 7 |
| acres harvested | 1,610 | 308 | (D) | 895 | (D) | 2,443 | - | (D) |
| 220 to 259 acres .....farms | 16 | 5 | 1 | 2 | 2 | 7 | - | 11 |
| acres harvested | 2,186 | 312 | (D) | (D) | (D) | 887 | - | 1,725 |
| 260 to 499 acres .....farms | 44 | 10 | 15 | 7 | 6 | 34 | 2 | 18 |
| acres harvested | 4,564 | 1,209 | 2,031 | 1,188 | 685 | 9,162 | (D) | 4,433 |
| 500 to 999 acres .....farms | 53 | 2 | 4 | - | 2 | 24 | - | 8 |
| acres harvested | 9,651 | (D) | 485 | - | (D) | 10,036 | - | 4,659 |
| 1,000 to 1,999 acres .....farms | 31 | 4 | 3 | 2 | 1 | 11 | - | 4 |
| acres harvested | 6,973 | 830 | 1,640 | (D) | (D) | 13,130 | - | 3,061 |
| 2,000 acres or more .....farms | 46 | 2 | 4 | - | - | 7 | - | 1 |
| acres harvested | 35,081 | (D) | 3,515 | - | - | 11,840 | - | (D) |
| 2007 size of farm: | | | | | | | | |
| 1 to 9 acres .....farms | 129 | 36 | 3 | 124 | 16 | 144 | 11 | 151 |
| acres harvested | 463 | (D) | 6 | (D) | 37 | 350 | 23 | 396 |
| 10 to 49 acres .....farms | 313 | 99 | 33 | 232 | 97 | 272 | 20 | 269 |
| acres harvested | 4,782 | 1,514 | 440 | 2,562 | 1,013 | 3,618 | 301 | 2,900 |
| 50 to 69 acres .....farms | 83 | 29 | 13 | 33 | 11 | 40 | 5 | 62 |
| acres harvested | 2,858 | 709 | (D) | 623 | (D) | 1,185 | 110 | 1,568 |
| 70 to 99 acres .....farms | 54 | 33 | 13 | 33 | 16 | 32 | 4 | 33 |
| acres harvested | 2,113 | 853 | 369 | 894 | 437 | 1,147 | 128 | 1,117 |
| 100 to 139 acres .....farms | 37 | 20 | 8 | 34 | 13 | 39 | 3 | 30 |
| acres harvested | 1,369 | 804 | 291 | 2,071 | 466 | 2,397 | (D) | 1,374 |
| 140 to 179 acres .....farms | 36 | 6 | 19 | 16 | 12 | 16 | 3 | 14 |
| acres harvested | 2,913 | (D) | 773 | 823 | 551 | 1,781 | 147 | 943 |
| 180 to 219 acres .....farms | 22 | 5 | 5 | 4 | 7 | 9 | - | 11 |
| acres harvested | 1,641 | 210 | 319 | 554 | 255 | 853 | - | 1,420 |
| 220 to 259 acres .....farms | 21 | 5 | 1 | 6 | 1 | 7 | 1 | 6 |
| acres harvested | 2,003 | 337 | (D) | 804 | (D) | 1,505 | (D) | 911 |
| 260 to 499 acres .....farms | 46 | 10 | 25 | 10 | 7 | 33 | - | 17 |
| acres harvested | 4,838 | 1,128 | 3,363 | 1,813 | 585 | 8,208 | - | 3,702 |
| 500 to 999 acres .....farms | 50 | 6 | 7 | 3 | 1 | 30 | 1 | 20 |
| acres harvested | 9,464 | 488 | 1,250 | 1,364 | (D) | 11,698 | (D) | 9,622 |
| 1,000 to 1,999 acres .....farms | 35 | 8 | 3 | 2 | 4 | 13 | - | 3 |
| acres harvested | 11,011 | 1,770 | 1,644 | (D) | 1,648 | 13,053 | - | 2,012 |
| 2,000 acres or more .....farms | 52 | 1 | 4 | - | - | 5 | - | - |
| acres harvested | 32,249 | (D) | 2,165 | - | - | 12,368 | - | - |
| **HARVESTED CROPLAND BY ACRES HARVESTED** | | | | | | | | |
| 2012 acres harvested: | | | | | | | | |
| 1 to 9 acres .....farms | 313 | 91 | 37 | 369 | 102 | 270 | 51 | 330 |
| acres | 1,204 | 378 | (D) | 1,032 | 365 | 851 | 151 | 1,000 |
| 10 to 19 acres .....farms | 160 | 50 | 34 | 106 | 23 | 95 | 12 | 116 |
| acres | 2,176 | 679 | 425 | 1,351 | 295 | 1,269 | 152 | 1,496 |
| 20 to 29 acres .....farms | 75 | 29 | 18 | 41 | 18 | 52 | 10 | 44 |
| acres | 1,705 | 689 | 392 | 909 | 412 | 1,169 | 231 | 985 |
| 30 to 49 acres .....farms | 109 | 29 | 28 | 47 | 24 | 44 | 5 | 32 |
| acres | 3,950 | 1,064 | 1,066 | 1,680 | 913 | 1,562 | 167 | 1,166 |
| 50 to 99 acres .....farms | 125 | 12 | 32 | 20 | 6 | 49 | 2 | 43 |
| acres | 8,345 | 798 | 2,191 | 1,176 | 404 | 3,453 | (D) | 2,892 |
| 100 to 199 acres .....farms | 81 | 9 | 9 | 15 | 3 | 33 | 1 | 16 |
| acres | 11,216 | 1,069 | 1,030 | 1,920 | 439 | 4,731 | (D) | 2,404 |
| 200 to 499 acres .....farms | 50 | 6 | 10 | 5 | 4 | 43 | - | 18 |
| acres | 13,779 | 1,852 | 2,657 | 1,575 | 1,504 | 12,943 | - | 5,011 |
| 500 to 999 acres .....farms | 15 | - | 2 | - | - | 13 | - | 7 |
| acres | 9,401 | - | (D) | - | - | 9,420 | - | 4,930 |
| 1,000 acres or more .....farms | 13 | - | 3 | - | - | 13 | - | 3 |
| acres | 27,043 | - | 3,250 | - | - | 21,657 | - | 3,541 |
| 2007 acres harvested: | | | | | | | | |
| 1 to 9 acres .....farms | 274 | 73 | 20 | 266 | 69 | 256 | 14 | 294 |
| acres | 1,092 | 367 | 82 | (D) | 209 | 796 | (D) | (D) |
| 10 to 19 acres .....farms | 160 | 68 | 24 | 77 | 47 | 112 | 17 | 121 |
| acres | 2,073 | 879 | (D) | 1,026 | 662 | 1,430 | 223 | 1,592 |
| 20 to 29 acres .....farms | 85 | 38 | 16 | 52 | 22 | 56 | 6 | 66 |
| acres | 1,966 | 869 | 368 | 1,167 | 499 | 1,290 | 139 | 1,409 |
| 30 to 49 acres .....farms | 102 | 41 | 27 | 46 | 26 | 73 | 7 | 44 |
| acres | 3,816 | 1,534 | 980 | 1,632 | 953 | 2,670 | 243 | 1,633 |
| 50 to 99 acres .....farms | 111 | 20 | 24 | 29 | 11 | 39 | 2 | 39 |
| acres | 7,778 | 1,186 | 1,590 | 1,936 | 665 | 2,580 | (D) | 2,606 |
| 100 to 199 acres .....farms | 68 | 7 | 5 | 18 | 5 | 29 | 1 | 18 |
| acres | 9,521 | 814 | 550 | 2,232 | 615 | 3,909 | (D) | 2,565 |
| 200 to 499 acres .....farms | 47 | 11 | 15 | 7 | 5 | 51 | 1 | 18 |
| acres | 13,403 | 2,757 | 4,359 | 1,916 | 2,004 | 14,793 | (D) | 5,362 |
| 500 to 999 acres .....farms | 21 | - | 2 | 2 | - | 10 | - | 15 |
| acres | 14,645 | - | (D) | (D) | - | 6,599 | - | 8,840 |
| 1,000 acres or more .....farms | 10 | - | 1 | - | - | 14 | - | 1 |
| acres | 21,410 | - | (D) | - | - | 24,096 | - | (D) |

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Table 9. **Harvested Cropland by Size of Farm and Acres Harvested: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Farms ..... number, 2012 | 1,402 | 687 | 647 | 68 | 532 | 1,110 | 709 | 2,048 |
| 2007 | 1,254 | 635 | 494 | 68 | 455 | 840 | 708 | 2,353 |
| acres harvested, 2012 | 289,301 | 57,638 | 18,357 | 2,201 | 280,934 | 69,731 | 659,460 | 218,054 |
| 2007 | 297,843 | 55,263 | 18,066 | 2,140 | 282,092 | 64,336 | 685,419 | 251,114 |
| **HARVESTED CROPLAND BY SIZE OF FARM** | | | | | | | | |
| 2012 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 195 | 37 | 248 | 5 | 95 | 284 | 26 | 536 |
| acres harvested | 608 | 73 | (D) | 7 | 283 | (D) | 78 | 1,745 |
| 10 to 49 acres ..... farms | 538 | 214 | 226 | 20 | 164 | 455 | 80 | 846 |
| acres harvested | 6,354 | 2,531 | 2,287 | 187 | 2,279 | 5,541 | 899 | 13,858 |
| 50 to 69 acres ..... farms | 84 | 43 | 31 | 15 | 20 | 79 | 17 | 98 |
| acres harvested | 2,047 | 646 | (D) | 228 | 954 | 2,338 | 510 | 4,172 |
| 70 to 99 acres ..... farms | 95 | 74 | 37 | 6 | 20 | 80 | 11 | 151 |
| acres harvested | 3,235 | 2,544 | 1,330 | 230 | 947 | 4,021 | 523 | 8,079 |
| 100 to 139 acres ..... farms | 69 | 61 | 28 | 6 | 9 | 55 | 13 | 79 |
| acres harvested | 4,503 | 3,199 | 1,072 | 167 | 599 | 3,870 | 818 | 7,181 |
| 140 to 179 acres ..... farms | 53 | 35 | 19 | 4 | 19 | 24 | 13 | 57 |
| acres harvested | 3,694 | 1,981 | 1,023 | (D) | 2,025 | 2,991 | 1,440 | 7,018 |
| 180 to 219 acres ..... farms | 39 | 30 | 9 | 3 | 6 | 19 | 10 | 45 |
| acres harvested | 3,808 | 2,516 | 1,204 | 118 | 632 | 2,604 | 899 | 6,959 |
| 220 to 259 acres ..... farms | 45 | 14 | 9 | - | 7 | 15 | 10 | 30 |
| acres harvested | 4,711 | 1,387 | 815 | - | 1,245 | 2,607 | 1,796 | 5,682 |
| 260 to 499 acres ..... farms | 82 | 71 | 24 | 7 | 28 | 61 | 73 | 74 |
| acres harvested | 14,767 | 9,554 | 3,371 | 360 | 6,162 | 17,810 | 19,143 | 21,750 |
| 500 to 999 acres ..... farms | 81 | 65 | 10 | 1 | 29 | 30 | 112 | 55 |
| acres harvested | 33,617 | 15,096 | 2,605 | (D) | 15,765 | 17,292 | 55,503 | 29,675 |
| 1,000 to 1,999 acres ..... farms | 52 | 28 | 5 | 1 | 53 | 6 | 150 | 50 |
| acres harvested | 44,878 | 12,192 | 3,375 | (D) | 47,515 | 7,093 | 153,057 | 55,490 |
| 2,000 acres or more ..... farms | 69 | 15 | 1 | - | 82 | 2 | 194 | 27 |
| acres harvested | 167,079 | 5,919 | (D) | - | 202,528 | (D) | 424,794 | 56,445 |
| 2007 size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 115 | 24 | 123 | 2 | 71 | 136 | 19 | 467 |
| acres harvested | 339 | 46 | (D) | (D) | 221 | 377 | 58 | 1,822 |
| 10 to 49 acres ..... farms | 487 | 140 | 203 | 19 | 117 | 344 | 77 | 1,036 |
| acres harvested | 6,429 | 1,909 | 2,285 | 164 | 1,620 | 5,121 | 861 | 17,221 |
| 50 to 69 acres ..... farms | 74 | 38 | 27 | 8 | 13 | 60 | 18 | 144 |
| acres harvested | 2,313 | 1,021 | 585 | 161 | 596 | 1,739 | 416 | 5,667 |
| 70 to 99 acres ..... farms | 96 | 59 | 39 | 8 | 16 | 68 | 10 | 156 |
| acres harvested | 3,874 | 2,002 | 1,533 | 248 | 897 | 3,338 | 651 | 8,326 |
| 100 to 139 acres ..... farms | 69 | 74 | 34 | 11 | 13 | 61 | 7 | 112 |
| acres harvested | 4,442 | 3,354 | 1,293 | 287 | 1,273 | 4,475 | 650 | 10,224 |
| 140 to 179 acres ..... farms | 55 | 59 | 14 | 5 | 11 | 29 | 17 | 74 |
| acres harvested | 3,201 | 4,117 | (D) | 165 | 1,248 | 3,252 | 1,448 | 7,536 |
| 180 to 219 acres ..... farms | 38 | 36 | 10 | 1 | 6 | 23 | 12 | 55 |
| acres harvested | 3,185 | 2,601 | 1,021 | (D) | 818 | 2,990 | 1,464 | 8,158 |
| 220 to 259 acres ..... farms | 29 | 23 | 9 | 4 | 7 | 14 | 10 | 43 |
| acres harvested | 3,447 | 1,838 | (D) | 284 | 1,069 | 2,536 | 1,140 | 7,583 |
| 260 to 499 acres ..... farms | 79 | 77 | 18 | 8 | 34 | 73 | 56 | 90 |
| acres harvested | 13,476 | 10,508 | 2,258 | 715 | 8,101 | 20,244 | 14,705 | 24,386 |
| 500 to 999 acres ..... farms | 68 | 61 | 9 | 2 | 28 | 26 | 102 | 95 |
| acres harvested | 26,852 | 13,427 | 2,220 | (D) | 15,113 | 13,697 | 49,974 | 47,224 |
| 1,000 to 1,999 acres ..... farms | 70 | 29 | 6 | - | 48 | 6 | 192 | 46 |
| acres harvested | 56,589 | 8,505 | 2,087 | - | 45,689 | 6,567 | 200,047 | 47,382 |
| 2,000 acres or more ..... farms | 74 | 15 | 2 | - | 91 | - | 188 | 35 |
| acres harvested | 173,696 | 5,935 | (D) | - | 205,447 | - | 414,005 | 65,585 |
| **HARVESTED CROPLAND BY ACRES HARVESTED** | | | | | | | | |
| 2012 acres harvested: | | | | | | | | |
| 1 to 9 acres ..... farms | 503 | 167 | 381 | 20 | 176 | 494 | 71 | 792 |
| acres | 2,076 | 549 | 1,124 | (D) | 710 | 1,937 | 325 | 3,102 |
| 10 to 19 acres ..... farms | 213 | 118 | 101 | 12 | 51 | 190 | 42 | 353 |
| acres | 2,701 | 1,538 | 1,280 | 144 | 740 | 2,570 | 547 | 4,746 |
| 20 to 29 acres ..... farms | 116 | 70 | 51 | 17 | 29 | 104 | 18 | 160 |
| acres | 2,594 | 1,574 | 1,134 | 393 | 676 | 2,289 | 399 | 3,688 |
| 30 to 49 acres ..... farms | 135 | 64 | 32 | 11 | 31 | 80 | 14 | 203 |
| acres | 5,038 | 2,363 | 1,155 | 368 | 1,194 | 3,000 | 472 | 7,415 |
| 50 to 99 acres ..... farms | 116 | 108 | 37 | 5 | 33 | 79 | 25 | 185 |
| acres | 7,867 | 7,282 | 2,414 | 310 | 2,068 | 5,441 | 1,624 | 12,548 |
| 100 to 199 acres ..... farms | 95 | 75 | 28 | 1 | 33 | 64 | 54 | 149 |
| acres | 12,710 | 9,983 | 3,823 | (D) | 4,433 | 8,757 | 8,072 | 20,883 |
| 200 to 499 acres ..... farms | 96 | 69 | 12 | 1 | 47 | 68 | 118 | 100 |
| acres | 30,990 | 21,539 | 3,162 | (D) | 15,460 | 21,292 | 40,105 | 29,693 |
| 500 to 999 acres ..... farms | 46 | 11 | 2 | 1 | 42 | 23 | 132 | 56 |
| acres | 32,031 | 6,626 | (D) | (D) | 29,491 | 14,652 | 95,850 | 38,838 |
| 1,000 acres or more ..... farms | 82 | 5 | 3 | - | 90 | 8 | 235 | 50 |
| acres | 193,294 | 6,184 | (D) | - | 226,162 | 9,793 | 512,066 | 97,141 |
| 2007 acres harvested: | | | | | | | | |
| 1 to 9 acres ..... farms | 351 | 95 | 231 | 18 | 117 | 264 | 65 | 767 |
| acres | 1,550 | (D) | 853 | 90 | 426 | 952 | 316 | 3,560 |
| 10 to 19 acres ..... farms | 204 | 92 | 94 | 13 | 46 | 145 | 43 | 456 |
| acres | 2,632 | 1,197 | 1,179 | 150 | 639 | 1,885 | 532 | 6,126 |
| 20 to 29 acres ..... farms | 106 | 84 | 50 | 10 | 25 | 90 | 13 | 230 |
| acres | 2,398 | 1,904 | 1,097 | 214 | 563 | 2,011 | 285 | 5,411 |
| 30 to 49 acres ..... farms | 155 | 86 | 37 | 8 | 21 | 93 | 19 | 244 |
| acres | 5,652 | 3,255 | 1,361 | 250 | 822 | 3,526 | 656 | 9,050 |
| 50 to 99 acres ..... farms | 126 | 111 | 46 | 14 | 30 | 77 | 23 | 223 |
| acres | 8,357 | 7,600 | 3,015 | 844 | 2,182 | 5,373 | 1,610 | 15,377 |
| 100 to 199 acres ..... farms | 83 | 93 | 20 | 5 | 34 | 70 | 42 | 189 |
| acres | 10,737 | 12,994 | 2,492 | 592 | 4,740 | 9,409 | 5,866 | 26,128 |
| 200 to 499 acres ..... farms | 83 | 62 | 13 | - | 37 | 79 | 108 | 127 |
| acres | 24,536 | 18,508 | 3,725 | - | 11,675 | 25,071 | 37,420 | 38,717 |
| 500 to 999 acres ..... farms | 57 | 10 | 2 | - | 43 | 19 | 121 | 69 |
| acres | 40,865 | 6,761 | (D) | - | 30,100 | 12,271 | 91,710 | 47,384 |
| 1,000 acres or more ..... farms | 89 | 2 | 1 | - | 102 | 3 | 274 | 48 |
| acres | 201,116 | (D) | (D) | - | 230,945 | 3,838 | 547,024 | 99,361 |

## Table 10. **Irrigation: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Farms ....number, 2012 | 14,736 | 261 | 29 | 1,177 | 783 | 210 | 438 | 65 |
| 2007 | 15,492 | 304 | 42 | 1,275 | 920 | 211 | 348 | 61 |
| Land in irrigated farms ....acres, 2012 | 6,323,980 | 462,400 | 18,006 | 458,410 | 67,748 | 8,816 | 13,830 | 122,397 |
| 2007 | 6,656,406 | 532,033 | 25,588 | 377,331 | 83,772 | 10,761 | 16,275 | 139,566 |
| Harvested cropland ....farms, 2012 | 12,135 | 230 | 21 | 644 | 714 | 172 | 417 | 56 |
| 2007 | 11,961 | 233 | 24 | 670 | 833 | 172 | 297 | 49 |
| acres, 2012 | 2,051,720 | 200,607 | 2,158 | 248,772 | 23,299 | 4,584 | 6,481 | 33,308 |
| 2007 | 2,087,567 | 208,527 | 691 | 199,241 | 25,414 | 4,821 | 7,712 | 49,103 |
| Other cropland, excluding cropland pastured ....farms, 2012 | 2,346 | 84 | 10 | 116 | 102 | 37 | 65 | 27 |
| 2007 | 2,675 | 94 | 6 | 171 | 118 | 34 | 68 | 22 |
| acres, 2012 | 579,485 | 128,496 | 4,729 | 81,888 | 3,159 | 254 | 336 | 19,902 |
| 2007 | 525,385 | 121,569 | (D) | 51,926 | 9,919 | 430 | 1,044 | 22,536 |
| Pastureland, excluding woodland pastured ....farms, 2012 | 6,543 | 96 | 18 | 721 | 175 | 112 | 184 | 50 |
| 2007 | 7,626 | 133 | 28 | 816 | 207 | 125 | 181 | 46 |
| acres, 2012 | 2,663,127 | 126,323 | 7,509 | (D) | 11,339 | 2,276 | 2,340 | 52,164 |
| 2007 | 2,771,751 | 192,137 | 3,100 | 55,472 | (D) | (D) | 3,655 | 49,353 |
| Irrigated land ....acres, 2012 | 1,633,571 | 127,046 | 482 | 197,305 | 22,778 | 4,164 | 3,721 | 4,083 |
| 2007 | 1,735,917 | 124,515 | 307 | 181,585 | 28,230 | 4,500 | 4,413 | 4,172 |
| Harvested cropland ....farms, 2012 | 12,021 | 227 | 20 | 644 | 714 | 164 | 413 | 52 |
| 2007 | 11,835 | 232 | 24 | 670 | 833 | 163 | 287 | 41 |
| acres, 2012 | 1,550,138 | 122,892 | 319 | 189,833 | 21,790 | 3,072 | 3,387 | 3,635 |
| 2007 | 1,589,538 | 120,873 | 151 | 170,308 | 24,925 | 3,164 | 3,631 | 3,486 |
| Pastureland and other land ....farms, 2012 | 4,269 | 64 | 13 | 659 | 116 | 85 | 40 | 24 |
| 2007 | 5,476 | 106 | 22 | 753 | 158 | 76 | 88 | 28 |
| acres, 2012 | 83,433 | 4,154 | 163 | 7,472 | 988 | 1,092 | 334 | 448 |
| 2007 | 146,379 | 3,642 | 156 | 11,277 | 3,305 | 1,336 | 782 | 686 |
| 2012 irrigated acres by size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 4,922 | 25 | 11 | 551 | 250 | 96 | 244 | 10 |
| acres irrigated | 13,406 | 93 | 15 | 1,946 | 851 | 211 | 377 | 39 |
| 10 to 49 acres ....farms | 4,858 | 30 | 5 | 375 | 309 | 80 | 135 | 17 |
| acres irrigated | 62,030 | 410 | 59 | 5,738 | 5,157 | 677 | 701 | 142 |
| 50 to 69 acres ....farms | 675 | 13 | 2 | 28 | 69 | 5 | 14 | 3 |
| acres irrigated | 22,994 | 541 | (D) | 999 | 2,770 | 108 | 175 | 96 |
| 70 to 99 acres ....farms | 761 | 12 | 1 | 51 | 46 | 7 | 14 | - |
| acres irrigated | 38,976 | 790 | (D) | 3,117 | 2,402 | 553 | 242 | - |
| 100 to 139 acres ....farms | 565 | 14 | - | 48 | 26 | 5 | 8 | 5 |
| acres irrigated | 38,543 | 993 | - | 4,073 | 1,606 | 195 | 345 | 202 |
| 140 to 179 acres ....farms | 387 | 13 | 1 | 15 | 19 | 3 | 7 | 2 |
| acres irrigated | 38,616 | 1,570 | (D) | 1,846 | 1,331 | 53 | 346 | (D) |
| 180 to 219 acres ....farms | 264 | 11 | - | 11 | 14 | 2 | 4 | 1 |
| acres irrigated | 34,402 | 1,979 | - | 1,716 | 1,476 | (D) | 400 | (D) |
| 220 to 259 acres ....farms | 190 | 5 | - | 17 | 7 | 4 | 2 | - |
| acres irrigated | 29,584 | 1,066 | - | 3,451 | 443 | 210 | (D) | - |
| 260 to 499 acres ....farms | 731 | 25 | 2 | 28 | 22 | 6 | 6 | - |
| acres irrigated | 166,387 | 6,105 | (D) | 5,392 | 2,167 | 932 | 693 | - |
| 500 to 999 acres ....farms | 571 | 37 | 3 | 15 | 10 | 2 | 3 | 11 |
| acres irrigated | 237,401 | 19,497 | 153 | 7,330 | 1,463 | (D) | (D) | 1,435 |
| 1,000 to 1,999 acres ....farms | 371 | 25 | 1 | 7 | 8 | - | 1 | 4 |
| acres irrigated | 291,349 | 21,147 | (D) | 8,020 | 2,910 | - | (D) | 327 |
| 2,000 acres or more ....farms | 441 | 51 | 3 | 31 | 3 | - | - | 12 |
| acres irrigated | 659,883 | 72,855 | (D) | 153,677 | 202 | - | - | 1,718 |
| 2007 irrigated acres by size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 4,146 | 37 | 20 | 489 | 305 | 77 | 140 | 6 |
| acres irrigated | 13,573 | 165 | 46 | 1,811 | 1,155 | 167 | 281 | 27 |
| 10 to 49 acres ....farms | 5,617 | 46 | 9 | 507 | 350 | 92 | 147 | 20 |
| acres irrigated | 77,078 | 709 | 83 | 7,643 | 5,944 | 662 | 770 | 256 |
| 50 to 69 acres ....farms | 795 | 22 | 2 | 44 | 70 | 8 | 17 | - |
| acres irrigated | 26,085 | 728 | (D) | 1,954 | 2,509 | (D) | 424 | - |
| 70 to 99 acres ....farms | 841 | 20 | - | 54 | 61 | 7 | 15 | - |
| acres irrigated | 41,339 | 1,336 | - | 3,353 | 2,675 | 328 | 376 | - |
| 100 to 139 acres ....farms | 624 | 7 | 2 | 34 | 31 | 7 | 9 | 2 |
| acres irrigated | 40,721 | 584 | (D) | 2,691 | 1,909 | 261 | 23 | (D) |
| 140 to 179 acres ....farms | 494 | 10 | 4 | 31 | 33 | 6 | 6 | 3 |
| acres irrigated | 45,718 | 994 | 7 | 3,790 | 1,919 | 348 | 234 | (D) |
| 180 to 219 acres ....farms | 305 | 8 | - | 15 | 12 | 5 | 5 | 3 |
| acres irrigated | 36,369 | 906 | - | 1,967 | 861 | 354 | 631 | (D) |
| 220 to 259 acres ....farms | 248 | 9 | 1 | 17 | 7 | - | 1 | - |
| acres irrigated | 36,556 | 1,755 | (D) | 2,594 | 531 | - | (D) | - |
| 260 to 499 acres ....farms | 808 | 32 | - | 23 | 26 | 6 | 2 | 2 |
| acres irrigated | 172,134 | 8,883 | - | 4,710 | 2,974 | 1,692 | (D) | (D) |
| 500 to 999 acres ....farms | 728 | 31 | 2 | 21 | 13 | 2 | 5 | 6 |
| acres irrigated | 301,647 | 16,171 | (D) | 10,597 | 1,305 | (D) | (D) | 87 |
| 1,000 to 1,999 acres ....farms | 404 | 21 | - | 10 | 7 | 1 | - | 3 |
| acres irrigated | 312,740 | 16,995 | - | 9,791 | 3,209 | (D) | - | (D) |
| 2,000 acres or more ....farms | 482 | 61 | 2 | 30 | 5 | - | 1 | 16 |
| acres irrigated | 631,957 | 75,289 | (D) | 130,684 | 3,239 | - | (D) | 2,407 |

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Table 10. **Irrigation: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| Farms ..... number, 2012 | 99 | 408 | 76 | 637 | 21 | 1,172 | 120 | 99 |
| 2007 | 78 | 478 | 63 | 702 | 20 | 1,403 | 124 | 116 |
| Land in irrigated farms ..... acres, 2012 | 17,845 | 152,465 | 40,343 | 301,052 | 69,690 | 675,615 | 22,055 | 5,635 |
| 2007 | 10,167 | 128,066 | (D) | 393,025 | 43,187 | 774,168 | 16,304 | 5,234 |
| Harvested cropland ..... farms, 2012 | 88 | 381 | 62 | 511 | 19 | 993 | 118 | 97 |
| 2007 | 56 | 449 | 54 | 566 | 11 | 1,103 | 116 | 102 |
| acres, 2012 | 14,113 | 25,809 | 3,948 | 213,960 | 14,223 | 466,089 | 14,198 | 3,365 |
| 2007 | 5,800 | 27,196 | 4,477 | 239,336 | 4,861 | 492,301 | 9,911 | 2,416 |
| Other cropland, excluding cropland pastured ..... farms, 2012 | 15 | 53 | 6 | 79 | 11 | 167 | 22 | 15 |
| 2007 | 9 | 54 | 21 | 98 | 8 | 233 | 19 | 22 |
| acres, 2012 | 326 | 27,151 | 109 | 34,031 | 12,526 | 59,444 | 431 | 369 |
| 2007 | (D) | 13,674 | 525 | 50,256 | 5,712 | 58,539 | 551 | 136 |
| Pastureland, excluding woodland pastured ..... farms, 2012 | 42 | 67 | 51 | 225 | 18 | 417 | 47 | 40 |
| 2007 | 46 | 92 | 46 | 282 | 18 | 623 | 53 | 56 |
| acres, 2012 | 1,226 | 93,027 | 26,548 | 30,371 | (D) | 115,380 | 2,137 | 1,031 |
| 2007 | 1,801 | 80,101 | (D) | 81,705 | (D) | 181,434 | 2,209 | 1,525 |
| Irrigated land ..... acres, 2012 | 7,556 | 18,311 | 2,823 | 207,151 | 795 | 428,200 | 8,635 | 1,586 |
| 2007 | 2,980 | 19,409 | 3,355 | 217,238 | 474 | 469,790 | 4,906 | 1,839 |
| Harvested cropland ..... farms, 2012 | 87 | 381 | 62 | 507 | 19 | 988 | 117 | 94 |
| 2007 | 56 | 448 | 53 | 566 | 10 | 1,101 | 112 | 101 |
| acres, 2012 | 7,199 | 17,845 | 2,739 | 203,297 | 771 | 415,595 | 8,268 | 1,229 |
| 2007 | 2,627 | 18,496 | 2,957 | 211,331 | 379 | 451,713 | 4,459 | 1,483 |
| Pastureland and other land ..... farms, 2012 | 16 | 44 | 19 | 179 | 5 | 303 | 17 | 9 |
| 2007 | 30 | 68 | 17 | 211 | 13 | 492 | 21 | 18 |
| acres, 2012 | 357 | 466 | 84 | 3,854 | 24 | 12,605 | 367 | 357 |
| 2007 | 353 | 913 | 398 | 5,907 | 95 | 18,077 | 447 | 356 |
| 2012 irrigated acres by size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 46 | 126 | 6 | 154 | 3 | 135 | 40 | 50 |
| acres irrigated | 72 | 500 | 20 | 528 | 13 | 479 | 57 | 89 |
| 10 to 49 acres ..... farms | 23 | 174 | 13 | 101 | 5 | 219 | 28 | 30 |
| acres irrigated | 127 | 3,344 | 97 | 1,703 | 25 | 3,614 | 293 | 72 |
| 50 to 69 acres ..... farms | 3 | 17 | 12 | 14 | - | 75 | 17 | 4 |
| acres irrigated | 14 | 901 | 195 | 574 | - | 3,124 | 239 | 21 |
| 70 to 99 acres ..... farms | 4 | 29 | 7 | 33 | 2 | 96 | 7 | 3 |
| acres irrigated | (D) | 2,100 | 112 | 2,552 | (D) | 6,324 | 162 | (D) |
| 100 to 139 acres ..... farms | 2 | 15 | 5 | 41 | 1 | 64 | 3 | 3 |
| acres irrigated | (D) | 1,043 | 12 | 3,673 | (D) | 6,769 | 200 | 55 |
| 140 to 179 acres ..... farms | 2 | 16 | 2 | 14 | - | 68 | 3 | 1 |
| acres irrigated | (D) | 1,783 | (D) | 1,873 | - | 8,759 | (D) | (D) |
| 180 to 219 acres ..... farms | 1 | 4 | 9 | 17 | - | 41 | 1 | - |
| acres irrigated | (D) | 374 | 324 | 2,606 | - | 7,440 | (D) | - |
| 220 to 259 acres ..... farms | - | 1 | 2 | 17 | - | 29 | - | 2 |
| acres irrigated | - | (D) | (D) | 3,665 | - | 6,161 | - | (D) |
| 260 to 499 acres ..... farms | 6 | 9 | 7 | 100 | 1 | 142 | 2 | 3 |
| acres irrigated | 1,746 | 2,453 | 219 | 30,874 | (D) | 43,445 | (D) | (D) |
| 500 to 999 acres ..... farms | 1 | 2 | 3 | 76 | - | 139 | 12 | 3 |
| acres irrigated | (D) | (D) | 260 | 43,676 | - | 78,534 | 1,562 | (D) |
| 1,000 to 1,999 acres ..... farms | 11 | - | 4 | 30 | - | 90 | 6 | - |
| acres irrigated | 4,912 | - | 151 | 38,316 | - | 97,854 | 5,676 | - |
| 2,000 acres or more ..... farms | - | 15 | 6 | 40 | 9 | 74 | 1 | - |
| acres irrigated | - | 5,420 | 1,405 | 77,111 | 585 | 165,697 | (D) | - |
| 2007 irrigated acres by size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 28 | 187 | 1 | 147 | 1 | 185 | 32 | 47 |
| acres irrigated | 57 | 764 | (D) | 559 | (D) | 665 | 72 | (D) |
| 10 to 49 acres ..... farms | 16 | 174 | 11 | 117 | 10 | 298 | 41 | 46 |
| acres irrigated | 128 | 3,298 | 65 | 1,819 | 48 | 5,047 | 370 | 207 |
| 50 to 69 acres ..... farms | 7 | 30 | 3 | 12 | - | 78 | 8 | 4 |
| acres irrigated | 88 | 1,456 | (D) | 598 | - | 2,946 | 136 | 30 |
| 70 to 99 acres ..... farms | 4 | 20 | 8 | 30 | 3 | 98 | 7 | 7 |
| acres irrigated | (D) | 1,097 | 308 | 2,286 | 48 | 6,591 | 115 | (D) |
| 100 to 139 acres ..... farms | 7 | 15 | 4 | 45 | 1 | 68 | 5 | - |
| acres irrigated | 21 | 1,032 | 52 | 4,038 | (D) | 5,831 | 435 | - |
| 140 to 179 acres ..... farms | 4 | 10 | 4 | 41 | - | 61 | 6 | 4 |
| acres irrigated | 307 | 1,062 | (D) | 5,556 | - | 7,758 | (D) | 122 |
| 180 to 219 acres ..... farms | 1 | 4 | 6 | 26 | - | 52 | 3 | - |
| acres irrigated | (D) | 358 | 183 | 3,597 | - | 8,266 | (D) | - |
| 220 to 259 acres ..... farms | - | 3 | 1 | 21 | - | 34 | 2 | - |
| acres irrigated | - | (D) | (D) | 4,440 | - | 6,509 | (D) | - |
| 260 to 499 acres ..... farms | 6 | 8 | 9 | 91 | - | 158 | 10 | 7 |
| acres irrigated | 740 | 1,006 | 447 | 28,974 | - | 45,258 | 739 | 804 |
| 500 to 999 acres ..... farms | 3 | 12 | 4 | 91 | - | 180 | 9 | 1 |
| acres irrigated | 1,228 | 3,654 | 455 | 47,311 | - | 108,053 | 1,873 | (D) |
| 1,000 to 1,999 acres ..... farms | 2 | 2 | 5 | 42 | 1 | 103 | 1 | - |
| acres irrigated | (D) | (D) | 231 | 49,000 | (D) | 114,969 | (D) | - |
| 2,000 acres or more ..... farms | - | 13 | 7 | 39 | 4 | 88 | - | - |
| acres irrigated | - | 4,281 | 1,319 | 69,060 | 347 | 157,897 | - | - |

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Table 10. **Irrigation: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Farms ....number, 2012 | 65 | 482 | 248 | 741 | 259 | 240 | 131 | 75 |
| 2007 | 63 | 366 | 226 | 855 | 228 | 220 | 125 | 102 |
| Land in irrigated farms ....acres, 2012 | 5,231 | 9,278 | 2,180 | 152,365 | 145,160 | 31,555 | 304,677 | 7,109 |
| 2007 | 2,603 | 9,461 | 2,900 | 167,903 | 184,429 | 25,346 | 296,756 | 6,131 |
| Harvested cropland ....farms, 2012 | 57 | 450 | 227 | 480 | 202 | 227 | 118 | 67 |
| 2007 | 58 | 317 | 170 | 499 | 174 | 177 | 106 | 71 |
| acres, 2012 | 1,449 | 4,397 | 557 | 50,342 | 31,478 | 15,014 | 87,482 | 2,120 |
| 2007 | 572 | 3,401 | 702 | 53,073 | 28,264 | 9,092 | 83,155 | 1,725 |
| Other cropland, excluding cropland pastured ....farms, 2012 | 21 | 69 | 25 | 56 | 84 | 46 | 84 | 10 |
| 2007 | 11 | 51 | 35 | 105 | 60 | 39 | 73 | 24 |
| acres, 2012 | 182 | 536 | 134 | 968 | 21,886 | 3,375 | 77,619 | 38 |
| 2007 | 137 | 716 | 185 | 2,607 | 17,562 | 1,497 | 68,565 | 279 |
| Pastureland, excluding woodland pastured ....farms, 2012 | 35 | 158 | 90 | 517 | 146 | 125 | 88 | 32 |
| 2007 | 28 | 141 | 119 | 604 | 143 | 131 | 83 | 64 |
| acres, 2012 | 1,257 | 1,811 | 377 | 85,253 | 75,813 | 7,227 | 128,292 | 2,050 |
| 2007 | 695 | 3,087 | 706 | 91,724 | 109,146 | 8,386 | 133,016 | 2,389 |
| Irrigated land ....acres, 2012 | 1,179 | 4,122 | 495 | 66,908 | 21,748 | 8,235 | 34,655 | 777 |
| 2007 | 628 | 3,339 | 926 | 82,147 | 21,349 | 7,292 | 32,071 | 1,196 |
| Harvested cropland ....farms, 2012 | 57 | 443 | 225 | 475 | 200 | 222 | 117 | 67 |
| 2007 | 54 | 313 | 169 | 499 | 165 | 175 | 102 | 68 |
| acres, 2012 | 937 | 3,306 | 389 | 49,654 | 18,413 | 7,387 | 33,836 | 290 |
| 2007 | 440 | 2,236 | 562 | 52,422 | 15,573 | 5,491 | 30,503 | 438 |
| Pastureland and other land ....farms, 2012 | 17 | 45 | 42 | 446 | 86 | 47 | 22 | 10 |
| 2007 | 13 | 59 | 68 | 535 | 90 | 72 | 28 | 42 |
| acres, 2012 | 242 | 816 | 106 | 17,254 | 3,335 | 848 | 819 | 487 |
| 2007 | 188 | 1,103 | 364 | 29,725 | 5,776 | 1,801 | 1,568 | 758 |
| 2012 irrigated acres by size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 18 | 324 | 190 | 144 | 37 | 57 | 2 | 34 |
| acres irrigated | 32 | 538 | 287 | 533 | (D) | (D) | (D) | 55 |
| 10 to 49 acres ....farms | 19 | 131 | 54 | 343 | 119 | 92 | 18 | 33 |
| acres irrigated | 92 | 881 | 204 | 5,314 | 1,128 | 579 | 65 | 94 |
| 50 to 69 acres ....farms | 3 | 5 | 1 | 33 | 8 | 13 | 2 | 3 |
| acres irrigated | (D) | 109 | (D) | 1,375 | 188 | 223 | (D) | 33 |
| 70 to 99 acres ....farms | 9 | 1 | - | 32 | 9 | 11 | 5 | 2 |
| acres irrigated | 67 | (D) | - | 2,149 | 128 | 187 | (D) | (D) |
| 100 to 139 acres ....farms | 7 | 8 | - | 30 | 10 | 16 | 8 | - |
| acres irrigated | 137 | 517 | - | 2,568 | 184 | 738 | 695 | - |
| 140 to 179 acres ....farms | - | 4 | 3 | 30 | 6 | 6 | 4 | 1 |
| acres irrigated | - | 284 | (D) | 2,877 | 239 | 500 | (D) | (D) |
| 180 to 219 acres ....farms | 1 | 2 | - | 14 | 6 | 8 | - | - |
| acres irrigated | (D) | (D) | - | 2,460 | 630 | 644 | - | - |
| 220 to 259 acres ....farms | 3 | 1 | - | 10 | 2 | 4 | 2 | - |
| acres irrigated | 41 | (D) | - | 1,685 | (D) | 520 | (D) | - |
| 260 to 499 acres ....farms | 4 | 4 | - | 50 | 18 | 20 | 6 | - |
| acres irrigated | 624 | 1,302 | - | 13,016 | 2,173 | 2,760 | 1,130 | - |
| 500 to 999 acres ....farms | 1 | 2 | - | 29 | 15 | 11 | 12 | - |
| acres irrigated | (D) | (D) | - | 13,419 | 4,135 | 1,811 | 1,733 | - |
| 1,000 to 1,999 acres ....farms | - | - | - | 14 | 15 | - | 24 | - |
| acres irrigated | - | - | - | 12,952 | 6,531 | - | 6,980 | - |
| 2,000 acres or more ....farms | - | - | - | 12 | 14 | 2 | 48 | 2 |
| acres irrigated | - | - | - | 8,560 | 6,056 | (D) | 23,429 | (D) |
| 2007 irrigated acres by size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 25 | 211 | 135 | 112 | 17 | 34 | 5 | 29 |
| acres irrigated | (D) | 456 | (D) | 523 | 47 | (D) | 11 | 79 |
| 10 to 49 acres ....farms | 24 | 124 | 80 | 413 | 99 | 94 | 14 | 56 |
| acres irrigated | 90 | 671 | 423 | 6,886 | 1,050 | 1,013 | 96 | 380 |
| 50 to 69 acres ....farms | 2 | 9 | 9 | 28 | 10 | 18 | - | 3 |
| acres irrigated | (D) | 198 | 233 | 998 | 159 | 279 | - | 48 |
| 70 to 99 acres ....farms | 4 | 4 | 1 | 67 | 16 | 17 | 2 | 6 |
| acres irrigated | 73 | 75 | (D) | 4,015 | 308 | 375 | (D) | 180 |
| 100 to 139 acres ....farms | 6 | 5 | - | 31 | 8 | 14 | 5 | 1 |
| acres irrigated | 310 | 88 | - | 2,179 | 165 | 809 | 430 | (D) |
| 140 to 179 acres ....farms | - | 2 | 1 | 33 | 11 | 15 | - | 1 |
| acres irrigated | - | (D) | (D) | 3,467 | 398 | 1,001 | - | (D) |
| 180 to 219 acres ....farms | - | 1 | - | 18 | 8 | 6 | 2 | 3 |
| acres irrigated | - | (D) | - | 3,061 | 631 | 411 | (D) | (D) |
| 220 to 259 acres ....farms | 1 | 3 | - | 20 | 5 | 6 | - | 1 |
| acres irrigated | (D) | 362 | - | 3,567 | 407 | 511 | - | (D) |
| 260 to 499 acres ....farms | 1 | 5 | - | 57 | 13 | 8 | 8 | - |
| acres irrigated | (D) | 969 | - | 11,913 | 2,149 | 436 | 1,088 | - |
| 500 to 999 acres ....farms | - | 2 | - | 37 | 12 | 4 | 17 | 1 |
| acres irrigated | - | (D) | - | 18,787 | 3,443 | 1,150 | 2,653 | (D) |
| 1,000 to 1,999 acres ....farms | - | - | - | 26 | 14 | 3 | 21 | - |
| acres irrigated | - | - | - | 20,969 | 4,806 | 1,014 | 7,628 | - |
| 2,000 acres or more ....farms | - | - | - | 13 | 15 | 1 | 51 | 1 |
| acres irrigated | - | - | - | 5,782 | 7,786 | (D) | 19,865 | (D) |

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Table 10. **Irrigation: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Farms ..... number, 2012 | 952 | 103 | 45 | 330 | 99 | 303 | 50 | 285 |
| 2007 | 952 | 109 | 62 | 272 | 96 | 273 | 21 | 284 |
| Land in irrigated farms ..... acres, 2012 | 1,008,017 | 5,208 | 8,324 | 7,125 | 2,913 | 53,427 | 1,159 | 13,584 |
| 2007 | 439,087 | 5,193 | 9,623 | 12,592 | 4,745 | (D) | 746 | 19,840 |
| Harvested cropland ..... farms, 2012 | 819 | 103 | 35 | 295 | 94 | 291 | 48 | 267 |
| 2007 | 776 | 105 | 33 | 204 | 88 | 262 | 15 | 249 |
| acres, 2012 | 55,056 | 2,841 | 3,041 | 3,319 | 766 | 38,196 | 431 | 8,037 |
| 2007 | 50,228 | 2,575 | 1,747 | 5,399 | 1,379 | 37,971 | 419 | 12,861 |
| Other cropland, excluding cropland pastured ..... farms, 2012 | 166 | 13 | 9 | 38 | 27 | 69 | 5 | 46 |
| 2007 | 194 | 7 | 18 | 41 | 18 | 73 | 1 | 46 |
| acres, 2012 | 19,780 | 66 | 338 | 316 | 102 | 3,082 | 93 | 360 |
| 2007 | 7,702 | 13 | 557 | 448 | 96 | 788 | (D) | 888 |
| Pastureland, excluding woodland pastured ..... farms, 2012 | 487 | 13 | 33 | 126 | 55 | 102 | 14 | 116 |
| 2007 | 513 | 24 | 44 | 137 | 68 | 105 | 11 | 130 |
| acres, 2012 | 282,600 | 282 | 2,711 | 1,141 | 988 | 7,693 | 168 | 1,481 |
| 2007 | 269,535 | 637 | 2,936 | 2,617 | 1,903 | 7,280 | 109 | 4,087 |
| Irrigated land ..... acres, 2012 | 51,723 | 2,487 | 903 | 2,834 | 343 | 19,239 | 352 | 5,331 |
| 2007 | 51,582 | 2,299 | 1,113 | 4,453 | 393 | 16,286 | 277 | 5,474 |
| Harvested cropland ..... farms, 2012 | 808 | 103 | 34 | 293 | 93 | 287 | 48 | 267 |
| 2007 | 770 | 103 | 31 | 197 | 86 | 261 | 15 | 247 |
| acres, 2012 | 47,740 | (D) | 782 | 2,438 | (D) | 18,683 | 332 | 5,134 |
| 2007 | 44,711 | 2,170 | 627 | 3,451 | 311 | 15,821 | 249 | 5,076 |
| Pastureland and other land ..... farms, 2012 | 316 | 2 | 17 | 52 | 9 | 20 | 4 | 29 |
| 2007 | 351 | 9 | 34 | 91 | 13 | 27 | 7 | 45 |
| acres, 2012 | 3,983 | (D) | 121 | 396 | (D) | 556 | 20 | 197 |
| 2007 | 6,871 | 129 | 486 | 1,002 | 82 | 465 | 28 | 398 |
| 2012 irrigated acres by size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 191 | 34 | - | 203 | 25 | 115 | 22 | 154 |
| acres irrigated | 703 | 104 | - | 359 | 36 | (D) | 52 | (D) |
| 10 to 49 acres ..... farms | 358 | 54 | 26 | 88 | 60 | 91 | 21 | 86 |
| acres irrigated | 5,442 | 884 | 153 | 385 | 188 | 471 | 115 | 374 |
| 50 to 69 acres ..... farms | 78 | 5 | 3 | 17 | 5 | 13 | 3 | 9 |
| acres irrigated | 2,945 | 135 | 3 | 302 | 30 | 314 | 3 | 241 |
| 70 to 99 acres ..... farms | 68 | 2 | 5 | 6 | 5 | 8 | 2 | 10 |
| acres irrigated | 3,054 | (D) | (D) | 169 | 51 | 306 | (D) | (D) |
| 100 to 139 acres ..... farms | 54 | - | 3 | 8 | 2 | 10 | 1 | 6 |
| acres irrigated | 2,779 | - | 3 | 259 | (D) | 351 | (D) | 143 |
| 140 to 179 acres ..... farms | 39 | - | - | 2 | - | 10 | 1 | - |
| acres irrigated | 4,057 | - | - | (D) | - | 281 | (D) | - |
| 180 to 219 acres ..... farms | 20 | - | - | 1 | - | 8 | - | 2 |
| acres irrigated | 1,295 | - | - | (D) | - | 897 | - | (D) |
| 220 to 259 acres ..... farms | 16 | 1 | - | 1 | 1 | 2 | - | 5 |
| acres irrigated | 2,104 | (D) | - | (D) | (D) | (D) | - | 292 |
| 260 to 499 acres ..... farms | 35 | 5 | 4 | 4 | 1 | 18 | - | 8 |
| acres irrigated | 3,039 | 739 | 277 | 836 | (D) | 2,577 | - | 1,367 |
| 500 to 999 acres ..... farms | 42 | 2 | 1 | - | - | 13 | - | 3 |
| acres irrigated | 6,274 | (D) | (D) | - | - | 3,081 | - | 1,284 |
| 1,000 to 1,999 acres ..... farms | 19 | - | 3 | - | - | 9 | - | 2 |
| acres irrigated | 2,852 | - | 285 | - | - | 5,059 | - | (D) |
| 2,000 acres or more ..... farms | 32 | - | - | - | - | 6 | - | - |
| acres irrigated | 17,179 | - | - | - | - | 5,609 | - | - |
| 2007 irrigated acres by size of farm: | | | | | | | | |
| 1 to 9 acres ..... farms | 166 | 18 | 7 | 121 | 11 | 100 | 9 | 109 |
| acres irrigated | 715 | (D) | 8 | 287 | 16 | (D) | 9 | 208 |
| 10 to 49 acres ..... farms | 364 | 63 | 24 | 88 | 66 | 80 | 5 | 112 |
| acres irrigated | 5,998 | 1,006 | 102 | 596 | 229 | 624 | 70 | 588 |
| 50 to 69 acres ..... farms | 86 | 16 | 6 | 11 | 9 | 15 | 3 | 21 |
| acres irrigated | 3,103 | 273 | 42 | 98 | 43 | 392 | (D) | 408 |
| 70 to 99 acres ..... farms | 59 | 4 | 2 | 17 | 2 | 8 | 2 | 5 |
| acres irrigated | 2,350 | 94 | (D) | 400 | (D) | 376 | (D) | (D) |
| 100 to 139 acres ..... farms | 41 | - | 1 | 14 | 4 | 12 | 2 | 7 |
| acres irrigated | 1,370 | - | (D) | 866 | 8 | 623 | (D) | 192 |
| 140 to 179 acres ..... farms | 32 | 1 | 10 | 11 | - | 9 | - | 3 |
| acres irrigated | 2,352 | (D) | 220 | 207 | - | 785 | - | (D) |
| 180 to 219 acres ..... farms | 22 | - | - | 1 | - | 2 | - | 5 |
| acres irrigated | 1,527 | - | - | (D) | - | (D) | - | 262 |
| 220 to 259 acres ..... farms | 25 | 1 | 2 | 2 | 1 | 3 | - | 2 |
| acres irrigated | 2,156 | (D) | (D) | (D) | (D) | 203 | - | (D) |
| 260 to 499 acres ..... farms | 52 | 6 | 3 | 4 | 2 | 12 | - | 5 |
| acres irrigated | 4,607 | 647 | (D) | 907 | (D) | 1,195 | - | 537 |
| 500 to 999 acres ..... farms | 46 | - | 6 | 2 | - | 15 | - | 13 |
| acres irrigated | 8,206 | - | 390 | (D) | - | 3,149 | - | 2,267 |
| 1,000 to 1,999 acres ..... farms | 21 | - | 1 | 1 | 1 | 13 | - | 2 |
| acres irrigated | 4,587 | - | (D) | (D) | (D) | 5,785 | - | (D) |
| 2,000 acres or more ..... farms | 38 | - | - | - | - | 4 | - | - |
| acres irrigated | 14,611 | - | - | - | - | 2,838 | - | - |

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Table 10. **Irrigation: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Farms ....number, 2012 | 494 | 221 | 331 | 16 | 494 | 570 | 55 | 2,552 |
| 2007 | 455 | 252 | 265 | 17 | 491 | 496 | 97 | 3,020 |
| Land in irrigated farms ....acres, 2012 | 48,661 | 71,357 | 17,882 | 652 | 200,776 | 62,035 | 159,840 | 1,569,158 |
| 2007 | 61,829 | 144,328 | 23,610 | 1,485 | 217,075 | 61,195 | 148,295 | 1,508,599 |
| Harvested cropland ....farms, 2012 | 401 | 204 | 287 | 16 | 347 | 541 | 53 | 1,983 |
| 2007 | 321 | 216 | 195 | 17 | 310 | 467 | 71 | 2,325 |
| acres, 2012 | 23,768 | 13,738 | 5,919 | 182 | 127,112 | 48,910 | 40,092 | 212,559 |
| 2007 | 27,439 | 18,646 | 8,185 | 395 | 116,135 | 48,249 | 52,184 | 241,964 |
| Other cropland, excluding cropland pastured ....farms, 2012 | 108 | 45 | 37 | 3 | 111 | 102 | 20 | 343 |
| 2007 | 102 | 60 | 42 | 4 | 117 | 78 | 33 | 466 |
| acres, 2012 | 4,493 | 2,166 | 863 | 34 | 36,311 | 2,625 | 16,761 | 14,206 |
| 2007 | 6,602 | 1,750 | 896 | 14 | 30,171 | 917 | 24,635 | 18,767 |
| Pastureland, excluding woodland pastured ....farms, 2012 | 247 | 127 | 149 | 8 | 261 | 195 | 36 | 1,120 |
| 2007 | 251 | 164 | 145 | 15 | 295 | 211 | 71 | 1,377 |
| acres, 2012 | 10,573 | 15,185 | 4,460 | 229 | 24,298 | 4,594 | 100,689 | (D) |
| 2007 | 14,799 | 33,097 | 5,297 | 898 | 42,890 | 5,101 | 68,064 | 1,210,250 |
| Irrigated land ....acres, 2012 | 10,286 | 6,690 | 5,309 | 48 | 91,108 | 35,484 | 4,293 | 224,386 |
| 2007 | 13,458 | 14,950 | 6,907 | 207 | 92,438 | 34,987 | 6,866 | 267,566 |
| Harvested cropland ....farms, 2012 | 395 | 202 | 270 | 16 | 344 | 538 | 53 | 1,975 |
| 2007 | 320 | 206 | 190 | 16 | 307 | 457 | 66 | 2,321 |
| acres, 2012 | 9,748 | 5,639 | 3,944 | 48 | 88,077 | 34,299 | 4,158 | 210,313 |
| 2007 | 11,714 | 8,601 | 5,459 | 99 | 87,162 | 33,398 | 4,191 | 238,850 |
| Pastureland and other land ....farms, 2012 | 123 | 49 | 84 | - | 216 | 62 | 5 | 973 |
| 2007 | 169 | 84 | 101 | 3 | 254 | 90 | 43 | 1,147 |
| acres, 2012 | 538 | 1,051 | 1,365 | - | 3,031 | 1,185 | 135 | 14,073 |
| 2007 | 1,744 | 6,349 | 1,448 | 108 | 5,276 | 1,589 | 2,675 | 28,716 |
| 2012 irrigated acres by size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 174 | 35 | 184 | 5 | 169 | 190 | 12 | 856 |
| acres irrigated | 416 | 63 | 334 | (D) | 515 | (D) | 14 | 2,991 |
| 10 to 49 acres ....farms | 211 | 66 | 86 | 7 | 177 | 163 | 7 | 1,004 |
| acres irrigated | 1,074 | 368 | 544 | 8 | 2,570 | 1,605 | 11 | 17,322 |
| 50 to 69 acres ....farms | 22 | 14 | 10 | 1 | 15 | 29 | 5 | 102 |
| acres irrigated | 286 | 26 | (D) | (D) | (D) | 1,246 | 119 | 4,839 |
| 70 to 99 acres ....farms | 21 | 23 | 10 | - | 14 | 47 | - | 159 |
| acres irrigated | 239 | 435 | 285 | - | 617 | 2,467 | - | 9,693 |
| 100 to 139 acres ....farms | 11 | 20 | 7 | 2 | 7 | 28 | 5 | 82 |
| acres irrigated | 551 | 490 | 143 | (D) | 352 | 1,936 | 20 | 7,451 |
| 140 to 179 acres ....farms | 11 | 4 | 12 | - | 15 | 14 | 1 | 58 |
| acres irrigated | (D) | 120 | 646 | - | 1,756 | 1,555 | (D) | 7,245 |
| 180 to 219 acres ....farms | 4 | 10 | 1 | - | 6 | 16 | - | 49 |
| acres irrigated | (D) | 531 | (D) | - | 668 | 1,664 | - | 7,863 |
| 220 to 259 acres ....farms | 8 | 4 | 4 | - | 1 | 8 | 1 | 30 |
| acres irrigated | 67 | 377 | 460 | - | (D) | 1,275 | (D) | 5,721 |
| 260 to 499 acres ....farms | 16 | 20 | 9 | 1 | 24 | 45 | - | 80 |
| acres irrigated | 1,188 | 1,539 | 860 | (D) | 5,008 | 9,907 | - | 23,200 |
| 500 to 999 acres ....farms | 8 | 9 | 5 | - | 14 | 24 | 4 | 59 |
| acres irrigated | 949 | 1,014 | 1,620 | - | 5,730 | 9,071 | (D) | 29,833 |
| 1,000 to 1,999 acres ....farms | 5 | 6 | 3 | - | 26 | 4 | 3 | 51 |
| acres irrigated | 758 | 735 | 175 | - | 16,371 | 2,888 | (D) | 54,947 |
| 2,000 acres or more ....farms | 3 | 10 | - | - | 26 | 2 | 17 | 22 |
| acres irrigated | (D) | 992 | - | - | 56,593 | (D) | 3,253 | 53,281 |
| 2007 irrigated acres by size of farm: | | | | | | | | |
| 1 to 9 acres ....farms | 145 | 24 | 107 | 2 | 152 | 101 | 21 | 783 |
| acres irrigated | 429 | 48 | 242 | (D) | 513 | 224 | 46 | 3,243 |
| 10 to 49 acres ....farms | 197 | 55 | 73 | 5 | 166 | 179 | 19 | 1,333 |
| acres irrigated | 1,243 | 392 | 508 | 7 | 2,362 | 2,353 | 64 | 23,278 |
| 50 to 69 acres ....farms | 16 | 11 | 13 | 1 | 16 | 21 | 3 | 163 |
| acres irrigated | 156 | 165 | (D) | (D) | 601 | 753 | 60 | 6,763 |
| 70 to 99 acres ....farms | 24 | 24 | 21 | 1 | 20 | 31 | 1 | 169 |
| acres irrigated | 276 | 491 | 564 | (D) | 1,088 | 1,679 | (D) | 10,056 |
| 100 to 139 acres ....farms | 12 | 31 | 16 | 5 | 16 | 38 | 2 | 116 |
| acres irrigated | 423 | 608 | 605 | 15 | 1,316 | 2,712 | (D) | 10,779 |
| 140 to 179 acres ....farms | 6 | 20 | 7 | - | 12 | 16 | 4 | 77 |
| acres irrigated | 445 | 1,150 | 390 | - | 1,554 | 1,766 | 120 | 9,113 |
| 180 to 219 acres ....farms | 6 | 9 | 2 | 1 | 7 | 13 | 5 | 54 |
| acres irrigated | 690 | 706 | (D) | (D) | 841 | 1,516 | (D) | 8,354 |
| 220 to 259 acres ....farms | 3 | 10 | 4 | 2 | 6 | 10 | - | 45 |
| acres irrigated | (D) | 1,113 | 235 | (D) | 1,220 | 1,139 | - | 8,651 |
| 260 to 499 acres ....farms | 15 | 27 | 10 | - | 31 | 60 | 4 | 105 |
| acres irrigated | 1,329 | 1,459 | 1,161 | - | 6,186 | 12,269 | 348 | 28,318 |
| 500 to 999 acres ....farms | 21 | 21 | 5 | - | 19 | 22 | 8 | 97 |
| acres irrigated | 2,464 | 2,038 | 1,550 | - | 5,370 | 6,175 | 1,718 | 48,766 |
| 1,000 to 1,999 acres ....farms | 4 | 10 | 7 | - | 20 | 5 | 10 | 47 |
| acres irrigated | 1,066 | 852 | 1,258 | - | 13,156 | 4,401 | 782 | 47,585 |
| 2,000 acres or more ....farms | 6 | 10 | - | - | 26 | - | 20 | 31 |
| acres irrigated | (D) | 5,928 | - | - | 58,231 | - | 3,645 | 62,660 |

Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Cattle and calves ..... farms, 2012 | 11,861 | 131 | 78 | 573 | 51 | 207 | 733 | 71 |
| 2007 | 12,731 | 158 | 63 | 575 | 59 | 191 | 795 | 62 |
| number, 2012 | 1,162,792 | 46,445 | 10,348 | 86,294 | 586 | 5,063 | 16,169 | 5,896 |
| 2007 | 1,088,846 | 43,537 | 8,615 | 39,324 | 2,699 | 6,078 | 15,799 | 5,762 |
| Farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms, 2012 | 6,205 | 48 | 23 | 328 | 34 | 121 | 497 | 20 |
| 2007 | 6,031 | 49 | 9 | 269 | 36 | 98 | 541 | 12 |
| number, 2012 | 26,375 | 241 | 75 | 1,411 | 96 | 508 | 2,071 | 93 |
| 2007 | 27,369 | 227 | 39 | 1,354 | 140 | 455 | 2,299 | 69 |
| 10 to 19 ..... farms, 2012 | 2,137 | 22 | 11 | 112 | 6 | 35 | 130 | 8 |
| 2007 | 2,375 | 22 | 8 | 138 | 10 | 34 | 155 | 12 |
| number, 2012 | 28,484 | 285 | 145 | 1,551 | 81 | 435 | 1,766 | 117 |
| 2007 | 31,838 | 257 | 113 | 1,885 | 140 | 471 | 2,081 | 196 |
| 20 to 49 ..... farms, 2012 | 1,732 | 16 | 11 | 92 | 8 | 30 | 74 | 19 |
| 2007 | 2,117 | 35 | 12 | 112 | 6 | 36 | 69 | 18 |
| number, 2012 | 52,542 | 400 | 331 | (D) | 207 | (D) | 2,120 | (D) |
| 2007 | 63,782 | 1,041 | 387 | 3,044 | (D) | 1,167 | 1,947 | 477 |
| 50 to 99 ..... farms, 2012 | 662 | 10 | 11 | 26 | 3 | 12 | 11 | 13 |
| 2007 | 783 | 10 | 10 | 28 | 4 | 11 | 12 | 7 |
| number, 2012 | 44,893 | 612 | 743 | (D) | 202 | 942 | 770 | 863 |
| 2007 | 53,069 | 793 | 711 | 1,872 | 266 | 737 | 753 | 419 |
| 100 to 199 ..... farms, 2012 | 430 | 13 | 6 | 11 | - | 7 | 12 | 5 |
| 2007 | 542 | 16 | 9 | 13 | - | 7 | 7 | 7 |
| number, 2012 | 58,955 | 1,913 | 770 | (D) | - | 978 | 1,547 | 693 |
| 2007 | 75,256 | 2,373 | 1,259 | 1,762 | - | (D) | 805 | 1,078 |
| 200 to 499 ..... farms, 2012 | 352 | 6 | 9 | - | - | 1 | 5 | 4 |
| 2007 | 485 | 7 | 10 | 13 | 1 | 3 | 7 | 3 |
| number, 2012 | 107,666 | 2,309 | 2,391 | - | - | (D) | 1,580 | 1,496 |
| 2007 | 144,031 | 2,369 | 2,923 | (D) | (D) | 1,075 | 1,850 | 1,120 |
| 500 or more ..... farms, 2012 | 343 | 16 | 7 | 4 | - | 1 | 4 | 2 |
| 2007 | 398 | 19 | 5 | 2 | 2 | 2 | 4 | 3 |
| number, 2012 | 843,877 | 40,685 | 5,893 | (D) | - | (D) | 6,315 | (D) |
| 2007 | 693,501 | 36,477 | 3,183 | (D) | (D) | (D) | 6,064 | 2,403 |
| Cows and heifers that calved ..... farms, 2012 | 9,816 | 119 | 59 | 470 | 27 | 174 | 616 | 61 |
| 2007 | 10,595 | 137 | 59 | 465 | 36 | 170 | 656 | 59 |
| number, 2012 | 478,841 | 18,313 | 3,963 | (D) | 314 | 2,490 | 8,272 | 3,491 |
| 2007 | 517,133 | 19,259 | 6,070 | 10,011 | 1,332 | 3,448 | 8,627 | 3,364 |
| Beef cows ..... farms, 2012 | 9,285 | 114 | 56 | 464 | 26 | 170 | 592 | 61 |
| 2007 | 10,065 | 132 | 59 | 455 | 34 | 167 | 647 | 59 |
| number, 2012 | 211,852 | 11,341 | 3,960 | 5,779 | (D) | (D) | 4,698 | (D) |
| 2007 | 274,001 | 13,088 | 6,070 | (D) | (D) | 2,657 | 4,952 | (D) |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms | 5,938 | 54 | 15 | 305 | 14 | 114 | 476 | 22 |
| number | 22,198 | (D) | 53 | 1,144 | (D) | 390 | 1,708 | (D) |
| 10 to 19 ..... farms | 1,338 | 16 | 6 | 71 | 7 | 27 | 74 | 10 |
| number | 17,453 | 214 | 62 | 962 | 81 | 347 | 943 | 128 |
| 20 to 49 ..... farms | 1,170 | 11 | 13 | 75 | 4 | 22 | 33 | 13 |
| number | 33,549 | 290 | 434 | 2,163 | (D) | 661 | 872 | 373 |
| 50 to 99 ..... farms | 435 | 18 | 9 | 9 | 1 | 6 | 5 | 6 |
| number | 29,120 | 1,235 | 601 | 572 | (D) | 372 | (D) | 360 |
| 100 to 199 ..... farms | 213 | 1 | 6 | 2 | - | - | 3 | 5 |
| number | 27,629 | (D) | 843 | (D) | - | - | 355 | 611 |
| 200 to 499 ..... farms | 146 | 6 | 7 | 2 | - | 1 | 1 | 4 |
| number | 43,442 | 2,040 | 1,967 | (D) | - | (D) | (D) | 1,359 |
| 500 or more ..... farms | 45 | 8 | - | - | - | - | - | 1 |
| number | 38,461 | 7,181 | - | - | - | - | - | (D) |
| Milk cows ..... farms, 2012 | 798 | 7 | 3 | 23 | 1 | 9 | 45 | 2 |
| 2007 | 817 | 9 | - | 17 | 2 | 18 | 25 | 2 |
| number, 2012 | 266,989 | 6,972 | 3 | (D) | (D) | (D) | 3,574 | (D) |
| 2007 | 243,132 | 6,171 | - | (D) | (D) | 791 | 3,675 | (D) |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms | 407 | 3 | 3 | 21 | 1 | 7 | 38 | 2 |
| number | 912 | (D) | 3 | 53 | (D) | 10 | 57 | (D) |
| 10 to 19 ..... farms | 18 | - | - | - | - | - | - | - |
| number | 225 | - | - | - | - | - | - | - |
| 20 to 49 ..... farms | 42 | - | - | - | - | - | - | - |
| number | 1,236 | - | - | - | - | - | - | - |
| 50 to 99 ..... farms | 31 | 1 | - | - | - | 1 | - | - |
| number | 2,151 | (D) | - | - | - | (D) | - | - |
| 100 to 199 ..... farms | 65 | - | - | - | - | - | 3 | - |
| number | 9,492 | - | - | - | - | - | 425 | - |
| 200 to 499 ..... farms | 99 | - | - | - | - | 1 | 2 | - |
| number | 33,437 | - | - | - | - | (D) | (D) | - |
| 500 or more ..... farms | 136 | 3 | - | 2 | - | - | 2 | - |
| number | 219,536 | 6,862 | - | (D) | - | - | (D) | - |
| Other cattle (see text) ..... farms, 2012 | 8,581 | 100 | 67 | 380 | 40 | 137 | 490 | 66 |
| 2007 | 9,505 | 128 | 57 | 409 | 43 | 135 | 516 | 52 |
| number, 2012 | 683,951 | 28,132 | 6,385 | (D) | 272 | 2,573 | 7,897 | 2,405 |
| 2007 | 571,713 | 24,278 | 2,545 | 29,313 | 1,367 | 2,630 | 7,172 | 2,398 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms | 5,507 | 50 | 31 | 265 | 28 | 89 | 376 | 32 |
| number | 21,295 | 199 | 115 | (D) | 69 | 324 | 1,385 | 118 |
| 10 to 19 ..... farms | 1,228 | 14 | 12 | 70 | 8 | 19 | 65 | 13 |
| number | 16,010 | (D) | 169 | (D) | 91 | 241 | 844 | (D) |
| 20 to 49 ..... farms | 871 | 6 | 8 | 30 | 4 | 14 | 31 | 14 |
| number | 25,759 | 195 | 242 | (D) | 112 | 423 | 859 | 430 |
| 50 to 99 ..... farms | 362 | 13 | 7 | 12 | - | 11 | 5 | 3 |
| number | 24,939 | 952 | 497 | (D) | - | 735 | (D) | 244 |
| 100 to 199 ..... farms | 237 | 1 | 2 | 1 | - | 2 | 8 | 2 |
| number | 31,662 | (D) | (D) | (D) | - | (D) | 945 | (D) |
| 200 to 499 ..... farms | 190 | 5 | 1 | - | - | 2 | 2 | 1 |
| number | 55,971 | 1,610 | (D) | - | - | (D) | (D) | (D) |
| 500 or more ..... farms | 186 | 11 | 6 | 2 | - | - | 3 | 1 |
| number | 508,315 | 24,882 | 4,626 | (D) | - | - | 2,933 | (D) |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Cattle and calves ....farms, 2012 | 211 | 79 | 104 | 193 | 60 | 375 | 243 | 130 |
| 2007 | 223 | 77 | 98 | 217 | 84 | 537 | 284 | 154 |
| number, 2012 | 3,651 | 7,496 | 4,344 | 93,038 | 8,050 | 159,552 | 5,958 | 6,032 |
| 2007 | 4,393 | 11,081 | 4,126 | 58,295 | 7,073 | 165,069 | 8,645 | 6,985 |
| Farms by inventory: | | | | | | | | |
| 1 to 9 .... farms, 2012 | 137 | 32 | 44 | 63 | 9 | 131 | 128 | 66 |
| 2007 | 105 | 22 | 37 | 70 | 25 | 198 | 127 | 75 |
| number, 2012 | 613 | 109 | 166 | 314 | 49 | 552 | 634 | 279 |
| 2007 | 440 | 111 | 182 | 271 | 100 | 984 | 672 | 400 |
| 10 to 19 .... farms, 2012 | 44 | 8 | 21 | 34 | 9 | 50 | 61 | 32 |
| 2007 | 72 | 8 | 27 | 35 | 11 | 78 | 66 | 36 |
| number, 2012 | 595 | 117 | 283 | 427 | 124 | 691 | 823 | 426 |
| 2007 | 913 | 104 | 362 | 523 | 143 | 1,054 | 888 | 483 |
| 20 to 49 .... farms, 2012 | 18 | 19 | 21 | 29 | 19 | 77 | 34 | 20 |
| 2007 | 36 | 16 | 14 | 30 | 20 | 105 | 55 | 28 |
| number, 2012 | 471 | 655 | 635 | 937 | 563 | 2,460 | (D) | 658 |
| 2007 | 1,021 | 598 | 555 | 941 | 639 | 3,237 | 1,694 | 803 |
| 50 to 99 .... farms, 2012 | 7 | 1 | 3 | 21 | 5 | 32 | 6 | 4 |
| 2007 | 4 | 11 | 8 | 22 | 12 | 39 | 18 | 7 |
| number, 2012 | 393 | (D) | 201 | 1,365 | 292 | 2,164 | 435 | (D) |
| 2007 | (D) | 793 | 596 | 1,426 | 815 | 2,669 | 1,204 | 475 |
| 100 to 199 .... farms, 2012 | 2 | 8 | 10 | 11 | 8 | 25 | 10 | 3 |
| 2007 | 2 | 7 | 7 | 17 | 6 | 39 | 9 | 2 |
| number, 2012 | (D) | (D) | 1,476 | 1,583 | 970 | 3,620 | 1,345 | 387 |
| 2007 | (D) | 951 | 958 | 2,465 | 944 | 5,753 | (D) | (D) |
| 200 to 499 .... farms, 2012 | 2 | 7 | 5 | 11 | 5 | 24 | 3 | 1 |
| 2007 | 3 | 10 | 5 | 17 | 7 | 32 | 7 | 1 |
| number, 2012 | (D) | 2,217 | 1,583 | 3,525 | 1,310 | 7,221 | 856 | (D) |
| 2007 | 939 | 3,212 | 1,473 | 5,090 | 2,021 | 9,287 | 1,754 | (D) |
| 500 or more .... farms, 2012 | 1 | 4 | - | 24 | 5 | 36 | 1 | 4 |
| 2007 | 1 | 3 | - | 26 | 3 | 46 | 2 | 5 |
| number, 2012 | (D) | (D) | - | 84,887 | 4,742 | 142,844 | (D) | 3,600 |
| 2007 | (D) | 5,312 | - | 47,579 | 2,411 | 142,085 | (D) | 4,395 |
| Cows and heifers that calved ....farms, 2012 | 172 | 64 | 94 | 145 | 59 | 299 | 219 | 115 |
| 2007 | 200 | 63 | 89 | 163 | 81 | 446 | 245 | 132 |
| number, 2012 | 2,067 | 4,254 | 2,972 | 33,998 | (D) | 41,800 | 3,269 | 1,835 |
| 2007 | 2,357 | 6,747 | 2,831 | 24,189 | 5,136 | 45,213 | 4,326 | 2,171 |
| Beef cows .... farms, 2012 | 170 | 62 | 94 | 131 | 59 | 276 | 211 | 110 |
| 2007 | 197 | 62 | 89 | 151 | 81 | 422 | 238 | 128 |
| number, 2012 | (D) | (D) | (D) | 9,494 | (D) | 13,697 | 2,087 | (D) |
| 2007 | 1,683 | (D) | 2,831 | 12,484 | 5,136 | 21,482 | 2,864 | (D) |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 .... farms | 132 | 21 | 51 | 51 | 15 | 115 | 147 | 70 |
| number | 512 | (D) | 184 | 227 | 67 | 447 | 576 | 269 |
| 10 to 19 .... farms | 24 | 14 | 7 | 19 | 12 | 35 | 39 | 24 |
| number | 300 | 206 | (D) | 237 | 147 | 478 | 512 | 312 |
| 20 to 49 .... farms | 11 | 9 | 20 | 21 | 14 | 70 | 15 | 13 |
| number | 309 | 271 | 498 | 685 | 396 | 2,068 | 405 | 412 |
| 50 to 99 .... farms | 1 | 3 | 6 | 18 | 8 | 16 | 10 | 1 |
| number | (D) | 210 | 482 | 1,180 | 559 | 978 | 594 | (D) |
| 100 to 199 .... farms | 1 | 6 | 7 | 10 | 4 | 19 | - | 1 |
| number | (D) | 707 | 1,006 | 1,162 | 563 | 2,598 | - | (D) |
| 200 to 499 .... farms | 1 | 9 | 3 | 6 | 4 | 17 | - | 1 |
| number | (D) | 2,790 | 700 | 1,655 | 1,434 | 4,989 | - | (D) |
| 500 or more .... farms | - | - | - | 6 | 2 | 4 | - | - |
| number | - | - | - | 4,348 | (D) | 2,139 | - | - |
| Milk cows .... farms, 2012 | 2 | 2 | 1 | 16 | - | 26 | 13 | 5 |
| 2007 | 7 | 1 | - | 14 | - | 29 | 13 | 5 |
| number, 2012 | (D) | (D) | (D) | 24,504 | - | 28,103 | 1,182 | (D) |
| 2007 | 674 | (D) | - | 11,705 | - | 23,731 | 1,462 | (D) |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 .... farms | - | 2 | 1 | 2 | - | 6 | 6 | 4 |
| number | - | (D) | (D) | (D) | - | 20 | 33 | 6 |
| 10 to 19 .... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| 20 to 49 .... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| 50 to 99 .... farms | - | - | - | - | - | - | 1 | - |
| number | - | - | - | - | - | - | (D) | - |
| 100 to 199 .... farms | - | - | - | - | - | - | 5 | - |
| number | - | - | - | - | - | - | (D) | - |
| 200 to 499 .... farms | 2 | - | - | 3 | - | 4 | 1 | 1 |
| number | (D) | - | - | (D) | - | 1,688 | (D) | (D) |
| 500 or more .... farms | - | - | - | 11 | - | 16 | - | - |
| number | - | - | - | 23,480 | - | 26,395 | - | - |
| Other cattle (see text) .... farms, 2012 | 156 | 60 | 76 | 163 | 50 | 289 | 176 | 95 |
| 2007 | 169 | 62 | 68 | 172 | 65 | 417 | 218 | 109 |
| number, 2012 | 1,584 | 3,242 | 1,372 | 59,040 | (D) | 117,752 | 2,689 | 4,197 |
| 2007 | 2,036 | 4,334 | 1,295 | 34,106 | 1,937 | 119,856 | 4,319 | 4,814 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 .... farms | 124 | 33 | 52 | 82 | 14 | 135 | 121 | 63 |
| number | 466 | 113 | 241 | 346 | 77 | 555 | 554 | 221 |
| 10 to 19 .... farms | 19 | 8 | 10 | 16 | 14 | 46 | 29 | 17 |
| number | 238 | (D) | 144 | 208 | (D) | 595 | 351 | 216 |
| 20 to 49 .... farms | 9 | 5 | 7 | 25 | 5 | 38 | 15 | 6 |
| number | 250 | 210 | 189 | 759 | (D) | 1,272 | 446 | 134 |
| 50 to 99 .... farms | 2 | 6 | 3 | 6 | 9 | 14 | 8 | 3 |
| number | (D) | 367 | 253 | 438 | (D) | 945 | 586 | 181 |
| 100 to 199 .... farms | - | 3 | 4 | 7 | 3 | 16 | 2 | 1 |
| number | - | 439 | 545 | 914 | (D) | 2,191 | (D) | (D) |
| 200 to 499 .... farms | 2 | 4 | - | 7 | 3 | 16 | 1 | 2 |
| number | (D) | 1,269 | - | 2,253 | (D) | 5,177 | (D) | (D) |
| 500 or more .... farms | - | 1 | - | 20 | 2 | 24 | - | 3 |
| number | - | (D) | - | 54,122 | (D) | 107,017 | - | 2,700 |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Cattle and calves ..... farms, 2012 | 87 | 513 | 176 | 362 | 247 | 814 | 182 | 90 |
| 2007 | 64 | 549 | 153 | 380 | 337 | 812 | 175 | 148 |
| number, 2012 | 2,415 | 22,274 | 1,323 | 21,126 | 18,733 | 26,669 | 14,933 | 2,218 |
| 2007 | 1,697 | 24,524 | 1,517 | 28,447 | 23,223 | 26,233 | 16,881 | 2,002 |
| Farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms, 2012 | 38 | 312 | 136 | 133 | 94 | 408 | 54 | 64 |
| 2007 | 16 | 336 | 103 | 142 | 136 | 360 | 43 | 96 |
| number, 2012 | 203 | 1,264 | 519 | 567 | 441 | 1,926 | 228 | 212 |
| 2007 | 80 | 1,508 | 399 | 625 | 480 | 1,617 | 197 | 386 |
| 10 to 19 ..... farms, 2012 | 21 | 90 | 26 | 72 | 35 | 190 | 15 | 17 |
| 2007 | 23 | 100 | 33 | 59 | 57 | 209 | 26 | 30 |
| number, 2012 | 282 | 1,168 | 327 | 908 | 524 | 2,494 | 189 | 251 |
| 2007 | 331 | 1,305 | 396 | 843 | 747 | 2,875 | 339 | 363 |
| 20 to 49 ..... farms, 2012 | 16 | 60 | 11 | 77 | 37 | 123 | 45 | 4 |
| 2007 | 18 | 57 | 11 | 78 | 62 | 143 | 32 | 13 |
| number, 2012 | 482 | 1,857 | 313 | 2,282 | 1,188 | 3,820 | 1,463 | 116 |
| 2007 | 521 | 1,711 | (D) | 2,440 | 2,044 | 4,087 | 1,033 | 308 |
| 50 to 99 ..... farms, 2012 | 7 | 23 | 3 | 38 | 29 | 42 | 29 | - |
| 2007 | 4 | 16 | 5 | 36 | 25 | 43 | 29 | 6 |
| number, 2012 | 375 | 1,594 | 164 | 2,832 | 1,996 | 2,815 | 2,072 | - |
| 2007 | 305 | 1,126 | 269 | 2,451 | 1,588 | 2,930 | 2,048 | 411 |
| 100 to 199 ..... farms, 2012 | - | 5 | - | 21 | 27 | 30 | 15 | 4 |
| 2007 | 3 | 9 | 1 | 32 | 18 | 36 | 25 | 2 |
| number, 2012 | - | 592 | - | 2,693 | 3,910 | 3,993 | 2,105 | (D) |
| 2007 | 460 | 1,196 | (D) | 4,148 | 2,675 | 4,908 | 3,298 | (D) |
| 200 to 499 ..... farms, 2012 | 5 | 11 | - | 13 | 19 | 14 | 21 | - |
| 2007 | - | 14 | - | 22 | 29 | 16 | 14 | 1 |
| number, 2012 | 1,073 | 3,827 | - | 3,021 | 6,746 | 4,491 | 6,406 | - |
| 2007 | - | 4,441 | - | 7,215 | 8,796 | 4,581 | 3,759 | (D) |
| 500 or more ..... farms, 2012 | - | 12 | - | 8 | 6 | 7 | 3 | 1 |
| 2007 | - | 17 | - | 11 | 10 | 5 | 6 | - |
| number, 2012 | - | 11,972 | - | 8,823 | 3,928 | 7,130 | 2,470 | (D) |
| 2007 | - | 13,237 | - | 10,725 | 6,893 | 5,235 | 6,207 | - |
| Cows and heifers that calved ..... farms, 2012 | 71 | 421 | 144 | 291 | 207 | 713 | 159 | 72 |
| 2007 | 55 | 476 | 118 | 289 | 266 | 699 | 157 | 108 |
| number, 2012 | 1,136 | 11,295 | 631 | 11,318 | 11,828 | 14,280 | 10,316 | 812 |
| 2007 | 940 | 13,034 | (D) | 15,057 | 13,547 | 14,736 | 9,973 | 1,176 |
| Beef cows ..... farms, 2012 | 70 | 384 | 137 | 289 | 198 | 680 | 159 | 65 |
| 2007 | 54 | 430 | 114 | 288 | 260 | 664 | 157 | 108 |
| number, 2012 | 976 | 3,247 | 575 | (D) | 10,903 | 8,065 | (D) | 791 |
| 2007 | (D) | 3,009 | (D) | (D) | 12,665 | 8,623 | (D) | 1,133 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms | 37 | 278 | 129 | 125 | 83 | 460 | 42 | 51 |
| number | 158 | 980 | 420 | 485 | 348 | 1,834 | (D) | (D) |
| 10 to 19 ..... farms | 16 | 65 | 6 | 45 | 23 | 118 | 23 | 12 |
| number | 206 | 861 | (D) | 549 | 296 | 1,559 | 327 | 149 |
| 20 to 49 ..... farms | 13 | 35 | 1 | 61 | 29 | 62 | 37 | - |
| number | 347 | 989 | (D) | 1,816 | 793 | 1,638 | 1,115 | - |
| 50 to 99 ..... farms | 4 | 5 | 1 | 34 | 27 | 34 | 24 | - |
| number | 265 | (D) | (D) | 2,310 | 1,800 | 2,189 | 1,585 | - |
| 100 to 199 ..... farms | - | 1 | - | 13 | 22 | 5 | 21 | 1 |
| number | - | (D) | - | 1,804 | 3,046 | (D) | 2,699 | (D) |
| 200 to 499 ..... farms | - | - | - | 9 | 11 | 1 | 10 | 1 |
| number | - | - | - | 2,675 | 3,060 | (D) | 2,975 | (D) |
| 500 or more ..... farms | - | - | - | 2 | 3 | - | 2 | - |
| number | - | - | - | (D) | 1,560 | - | (D) | - |
| Milk cows ..... farms, 2012 | 9 | 46 | 11 | 5 | 13 | 56 | 2 | 11 |
| 2007 | 2 | 60 | 7 | 2 | 6 | 51 | 3 | 6 |
| number, 2012 | 160 | 8,048 | 56 | (D) | 925 | 6,215 | (D) | 21 |
| 2007 | (D) | 10,025 | 20 | (D) | 882 | 6,113 | (D) | 43 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms | 8 | 22 | 9 | 4 | 10 | 24 | 1 | 11 |
| number | (D) | 67 | (D) | 4 | 17 | (D) | (D) | 21 |
| 10 to 19 ..... farms | - | 1 | 2 | - | - | 2 | - | - |
| number | - | (D) | (D) | - | - | (D) | - | - |
| 20 to 49 ..... farms | - | 1 | - | - | - | 7 | - | - |
| number | - | (D) | - | - | - | 219 | - | - |
| 50 to 99 ..... farms | - | 1 | - | - | - | 7 | 1 | - |
| number | - | (D) | - | - | - | 465 | (D) | - |
| 100 to 199 ..... farms | 1 | 4 | - | 1 | - | 6 | - | - |
| number | (D) | 695 | - | (D) | - | 876 | - | - |
| 200 to 499 ..... farms | - | 12 | - | - | 3 | 7 | - | - |
| number | - | 3,976 | - | - | 908 | 2,040 | - | - |
| 500 or more ..... farms | - | 5 | - | - | - | 3 | - | - |
| number | - | 3,218 | - | - | - | 2,540 | - | - |
| Other cattle (see text) ..... farms, 2012 | 66 | 343 | 125 | 262 | 208 | 621 | 147 | 56 |
| 2007 | 51 | 386 | 106 | 306 | 245 | 625 | 165 | 108 |
| number, 2012 | 1,279 | 10,979 | 692 | 9,808 | 6,905 | 12,389 | 4,617 | 1,406 |
| 2007 | 757 | 11,490 | (D) | 13,390 | 9,676 | 11,497 | 6,908 | 826 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms | 43 | 241 | 106 | 143 | 99 | 424 | 72 | 47 |
| number | 200 | 832 | 324 | 558 | 370 | 1,741 | 295 | 159 |
| 10 to 19 ..... farms | 13 | 29 | 12 | 56 | 39 | 89 | 18 | 4 |
| number | 170 | 372 | 174 | 724 | 560 | 1,145 | (D) | (D) |
| 20 to 49 ..... farms | 5 | 40 | 7 | 28 | 29 | 61 | 34 | 1 |
| number | 136 | 1,172 | 194 | 745 | 859 | 1,651 | (D) | (D) |
| 50 to 99 ..... farms | 1 | 12 | - | 22 | 19 | 21 | 9 | - |
| number | (D) | 758 | - | 1,496 | 1,254 | 1,325 | 674 | - |
| 100 to 199 ..... farms | 2 | 10 | - | 7 | 14 | 15 | 12 | 3 |
| number | (D) | 1,359 | - | 873 | 1,819 | 1,830 | 1,701 | 511 |
| 200 to 499 ..... farms | 2 | 8 | - | 3 | 8 | 8 | 1 | - |
| number | (D) | 2,661 | - | 1,065 | 2,043 | 2,258 | (D) | - |
| 500 or more ..... farms | - | 3 | - | 3 | - | 3 | 1 | 1 |
| number | - | 3,825 | - | 4,347 | - | 2,439 | (D) | (D) |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Cattle and calves ....farms, 2012 | 466 | 119 | 90 | 612 | 66 | 407 | 47 | 517 |
| 2007 | 518 | 147 | 118 | 609 | 92 | 516 | 36 | 580 |
| number, 2012 | 35,471 | 5,837 | 2,752 | 11,555 | 1,795 | 30,783 | 558 | 23,888 |
| 2007 | 44,551 | 8,978 | 4,572 | 10,022 | 2,451 | 36,544 | 449 | 36,889 |
| Farms by inventory: | | | | | | | | |
| 1 to 9 .... farms, 2012 | 196 | 54 | 58 | 418 | 35 | 229 | 29 | 329 |
| 2007 | 174 | 52 | 67 | 377 | 40 | 248 | 28 | 353 |
| number, 2012 | 790 | 254 | 223 | 1,730 | 156 | 1,017 | 122 | 1,380 |
| 2007 | 719 | 231 | 270 | 1,751 | 192 | 1,055 | 147 | 1,742 |
| 10 to 19 .... farms, 2012 | 80 | 23 | 10 | 107 | 15 | 61 | 12 | 84 |
| 2007 | 90 | 30 | 14 | 119 | 27 | 104 | 3 | 96 |
| number, 2012 | 1,034 | 316 | 119 | 1,401 | 194 | 819 | 169 | 1,144 |
| 2007 | 1,219 | 417 | 227 | 1,556 | 389 | 1,346 | 40 | 1,215 |
| 20 to 49 .... farms, 2012 | 85 | 27 | 13 | 69 | 10 | 36 | 5 | 56 |
| 2007 | 122 | 37 | 19 | 80 | 15 | 72 | 3 | 69 |
| number, 2012 | 2,490 | 860 | 370 | (D) | (D) | 1,104 | (D) | 1,736 |
| 2007 | 3,767 | 1,046 | 492 | 2,398 | 439 | 2,291 | (D) | 2,086 |
| 50 to 99 .... farms, 2012 | 40 | 4 | 3 | 6 | 1 | 30 | 1 | 16 |
| 2007 | 56 | 7 | 9 | 16 | 5 | 27 | 2 | 21 |
| number, 2012 | 2,813 | 273 | 177 | 394 | (D) | 1,923 | (D) | 1,159 |
| 2007 | 3,837 | 449 | 551 | 1,033 | 338 | 1,671 | (D) | 1,299 |
| 100 to 199 .... farms, 2012 | 27 | 3 | 3 | 5 | 4 | 14 | - | 10 |
| 2007 | 31 | 10 | 3 | 13 | 2 | 20 | - | 11 |
| number, 2012 | 3,425 | 350 | 374 | 641 | 537 | 1,771 | - | 1,532 |
| 2007 | 4,536 | 1,329 | (D) | 1,669 | (D) | 2,996 | - | 1,613 |
| 200 to 499 .... farms, 2012 | 26 | 5 | 1 | 1 | 1 | 20 | - | 11 |
| 2007 | 28 | 8 | 4 | 3 | 3 | 28 | - | 11 |
| number, 2012 | 7,972 | 1,421 | (D) | (D) | (D) | 5,646 | - | 3,216 |
| 2007 | 8,461 | 2,995 | 1,561 | (D) | (D) | 8,054 | - | 3,556 |
| 500 or more .... farms, 2012 | 12 | 3 | 2 | 6 | - | 17 | - | 11 |
| 2007 | 17 | 3 | 2 | 1 | - | 17 | - | 19 |
| number, 2012 | 16,947 | 2,363 | (D) | 5,100 | - | 18,503 | - | 13,721 |
| 2007 | 22,012 | 2,511 | (D) | (D) | - | 19,131 | - | 25,378 |
| Cows and heifers that calved ....farms, 2012 | 381 | 100 | 68 | 523 | 55 | 332 | 40 | 445 |
| 2007 | 437 | 127 | 97 | 531 | 81 | 446 | 35 | 494 |
| number, 2012 | 19,364 | 3,230 | 1,438 | 4,782 | 1,047 | 17,357 | 304 | 14,538 |
| 2007 | 24,655 | 5,243 | 2,011 | 5,945 | 1,562 | 20,169 | 314 | 18,471 |
| Beef cows .... farms, 2012 | 376 | 93 | 68 | 508 | 47 | 298 | 38 | 416 |
| 2007 | 433 | 119 | 97 | 512 | 77 | 404 | 35 | 458 |
| number, 2012 | 19,316 | 1,806 | (D) | 3,621 | 999 | 4,073 | (D) | 3,357 |
| 2007 | 24,622 | 3,499 | 2,011 | 4,061 | 1,547 | 6,406 | 314 | 7,840 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 .... farms | 186 | 48 | 47 | 405 | 29 | 214 | 27 | 333 |
| number | 675 | (D) | 156 | 1,429 | 127 | 713 | 99 | 1,097 |
| 10 to 19 .... farms | 49 | 27 | 8 | 67 | 8 | 34 | 8 | 36 |
| number | 614 | 367 | 109 | 922 | 118 | 442 | (D) | 450 |
| 20 to 49 .... farms | 66 | 14 | 7 | 29 | 4 | 24 | 3 | 41 |
| number | 1,947 | 409 | 190 | 820 | 119 | 637 | 105 | 1,178 |
| 50 to 99 .... farms | 33 | 1 | 3 | 6 | 3 | 23 | - | 2 |
| number | 2,326 | (D) | 206 | (D) | 205 | 1,564 | - | (D) |
| 100 to 199 .... farms | 22 | - | 1 | 1 | 2 | 2 | - | 3 |
| number | 2,829 | - | (D) | (D) | (D) | (D) | - | 300 |
| 200 to 499 .... farms | 12 | 3 | 2 | - | 1 | 1 | - | 1 |
| number | 3,975 | 766 | (D) | - | (D) | (D) | - | (D) |
| 500 or more .... farms | 8 | - | - | - | - | - | - | - |
| number | 6,950 | - | - | - | - | - | - | - |
| Milk cows .... farms, 2012 | 16 | 10 | 2 | 23 | 13 | 47 | 2 | 50 |
| 2007 | 24 | 10 | - | 29 | 8 | 52 | - | 52 |
| number, 2012 | 48 | 1,424 | (D) | 1,161 | 48 | 13,284 | (D) | 11,181 |
| 2007 | 33 | 1,744 | - | 1,884 | 15 | 13,763 | - | 10,631 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 .... farms | 15 | 3 | 2 | 18 | 11 | 21 | 2 | 24 |
| number | (D) | 5 | (D) | 39 | (D) | (D) | (D) | (D) |
| 10 to 19 .... farms | 1 | - | - | 1 | 2 | - | - | 2 |
| number | (D) | - | - | (D) | (D) | - | - | (D) |
| 20 to 49 .... farms | - | - | - | 2 | - | 1 | - | 4 |
| number | - | - | - | (D) | - | (D) | - | 103 |
| 50 to 99 .... farms | - | 2 | - | - | - | - | - | 1 |
| number | - | (D) | - | - | - | - | - | (D) |
| 100 to 199 .... farms | - | 3 | - | - | - | 4 | - | 6 |
| number | - | 410 | - | - | - | 626 | - | 893 |
| 200 to 499 .... farms | - | 1 | - | 1 | - | 13 | - | 7 |
| number | - | (D) | - | (D) | - | 4,779 | - | 2,161 |
| 500 or more .... farms | - | 1 | - | 1 | - | 8 | - | 6 |
| number | - | (D) | - | (D) | - | 7,821 | - | 7,883 |
| Other cattle (see text) .... farms, 2012 | 354 | 85 | 73 | 378 | 52 | 305 | 38 | 363 |
| 2007 | 406 | 118 | 97 | 425 | 81 | 360 | 23 | 410 |
| number, 2012 | 16,107 | 2,607 | 1,314 | 6,773 | 748 | 13,426 | 254 | 9,350 |
| 2007 | 19,896 | 3,735 | 2,561 | 4,077 | 889 | 16,375 | 135 | 18,418 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 .... farms | 191 | 49 | 54 | 307 | 40 | 182 | 32 | 260 |
| number | 761 | 167 | 178 | 1,160 | 162 | 700 | 110 | 1,049 |
| 10 to 19 .... farms | 68 | 21 | 6 | 47 | 3 | 38 | 4 | 40 |
| number | 871 | (D) | 77 | 598 | 46 | 492 | (D) | 522 |
| 20 to 49 .... farms | 48 | 5 | 8 | 15 | 6 | 33 | 2 | 30 |
| number | 1,325 | 192 | 220 | 427 | 172 | 1,009 | (D) | 872 |
| 50 to 99 .... farms | 13 | 2 | 2 | - | 2 | 20 | - | 12 |
| number | 986 | (D) | (D) | - | (D) | 1,409 | - | 872 |
| 100 to 199 .... farms | 20 | 5 | 1 | 3 | - | 12 | - | 10 |
| number | 2,668 | 577 | (D) | (D) | - | 1,455 | - | 1,304 |
| 200 to 499 .... farms | 8 | 1 | 2 | 1 | 1 | 15 | - | 8 |
| number | 2,165 | (D) | (D) | (D) | (D) | 3,900 | - | 2,367 |
| 500 or more .... farms | 6 | 2 | - | 5 | - | 5 | - | 3 |
| number | 7,331 | (D) | - | 4,050 | - | 4,461 | - | 2,364 |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Cattle and calves ..... farms, 2012 | 713 | 473 | 504 | 65 | 187 | 688 | 219 | 978 |
| 2007 | 652 | 542 | 535 | 77 | 208 | 668 | 229 | 1,009 |
| number, 2012 | 19,218 | 19,291 | 16,631 | 2,369 | 57,400 | 87,756 | 20,212 | 258,663 |
| 2007 | 22,443 | 23,012 | 17,225 | 3,026 | 43,301 | 95,500 | 15,116 | 212,762 |
| Farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms, 2012 | 372 | 210 | 297 | 23 | 92 | 313 | 81 | 549 |
| 2007 | 318 | 213 | 325 | 25 | 116 | 265 | 84 | 441 |
| number, 2012 | 1,588 | 897 | 1,184 | 125 | 365 | 1,289 | 358 | 2,326 |
| 2007 | 1,461 | 986 | 1,648 | 111 | 519 | 1,214 | 369 | 1,919 |
| 10 to 19 ..... farms, 2012 | 144 | 83 | 109 | 11 | 42 | 113 | 38 | 156 |
| 2007 | 121 | 93 | 91 | 15 | 30 | 102 | 33 | 158 |
| number, 2012 | 1,924 | 1,128 | 1,557 | 124 | 565 | 1,454 | 482 | 2,045 |
| 2007 | 1,578 | 1,310 | 1,210 | 218 | 398 | 1,334 | 427 | 2,142 |
| 20 to 49 ..... farms, 2012 | 104 | 91 | 54 | 18 | 22 | 110 | 44 | 128 |
| 2007 | 110 | 136 | 74 | 21 | 32 | 111 | 40 | 170 |
| number, 2012 | 3,050 | (D) | 1,666 | 526 | 551 | 3,310 | 1,442 | 3,902 |
| 2007 | 3,079 | 4,168 | 2,220 | 636 | 940 | 3,448 | 1,308 | 5,173 |
| 50 to 99 ..... farms, 2012 | 60 | 48 | 13 | 5 | 10 | 20 | 29 | 40 |
| 2007 | 52 | 55 | 15 | 8 | 12 | 31 | 36 | 64 |
| number, 2012 | 3,995 | 3,279 | 860 | (D) | 683 | 1,332 | 1,922 | 2,714 |
| 2007 | 3,481 | 3,647 | 1,002 | 657 | 849 | 2,244 | 2,387 | 4,556 |
| 100 to 199 ..... farms, 2012 | 18 | 29 | 17 | 7 | 7 | 30 | 6 | 17 |
| 2007 | 28 | 26 | 17 | 5 | 6 | 37 | 18 | 41 |
| number, 2012 | 2,422 | (D) | 2,172 | 1,059 | 997 | 4,366 | 879 | 2,359 |
| 2007 | 3,836 | 3,526 | 2,341 | 752 | (D) | 5,320 | 2,331 | 5,517 |
| 200 to 499 ..... farms, 2012 | 11 | 11 | 9 | 1 | 6 | 47 | 13 | 23 |
| 2007 | 17 | 15 | 8 | 3 | 10 | 62 | 12 | 51 |
| number, 2012 | 3,221 | 3,875 | 2,232 | (D) | 1,440 | 15,740 | 3,834 | 6,211 |
| 2007 | 5,187 | 4,035 | 2,408 | 652 | (D) | 19,185 | 3,234 | 13,580 |
| 500 or more ..... farms, 2012 | 4 | 1 | 5 | - | 8 | 55 | 8 | 65 |
| 2007 | 6 | 4 | 5 | - | 2 | 60 | 6 | 84 |
| number, 2012 | 3,018 | (D) | 6,960 | - | 52,799 | 60,265 | 11,295 | 239,106 |
| 2007 | 3,821 | 5,340 | 6,396 | - | (D) | 62,755 | 5,060 | 179,875 |
| Cows and heifers that calved ..... farms, 2012 | 569 | 399 | 426 | 65 | 143 | 563 | 195 | 741 |
| 2007 | 535 | 438 | 474 | 72 | 141 | 530 | 197 | 791 |
| number, 2012 | 10,204 | 11,066 | 10,543 | 1,437 | 2,849 | 49,863 | 11,268 | 114,946 |
| 2007 | 12,826 | 13,275 | 10,616 | 1,731 | (D) | 54,644 | 9,324 | 118,169 |
| Beef cows ..... farms, 2012 | 553 | 382 | 411 | 57 | 141 | 451 | 193 | 675 |
| 2007 | 517 | 429 | 462 | 66 | 137 | 402 | 195 | 726 |
| number, 2012 | 9,286 | 10,521 | 5,269 | 955 | 2,842 | 4,301 | 10,931 | 15,414 |
| 2007 | 11,312 | 12,433 | 5,451 | 1,159 | (D) | 5,680 | (D) | 28,594 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms | 355 | 185 | 301 | 33 | 85 | 329 | 89 | 465 |
| number | 1,379 | (D) | 1,112 | (D) | 294 | 1,261 | 400 | 1,792 |
| 10 to 19 ..... farms | 80 | 69 | 54 | 4 | 23 | 68 | 25 | 85 |
| number | 1,048 | 925 | 702 | (D) | 305 | 862 | 328 | 1,072 |
| 20 to 49 ..... farms | 86 | 76 | 38 | 18 | 17 | 46 | 39 | 80 |
| number | 2,530 | 2,154 | 1,207 | 524 | 463 | 1,258 | 1,150 | 2,195 |
| 50 to 99 ..... farms | 17 | 31 | 12 | 1 | 13 | 5 | 16 | 23 |
| number | 1,048 | 2,164 | 898 | (D) | 1,040 | 280 | 1,085 | 1,495 |
| 100 to 199 ..... farms | 8 | 14 | 5 | 1 | 1 | 2 | 11 | 12 |
| number | (D) | 1,697 | (D) | (D) | (D) | (D) | 1,467 | 1,584 |
| 200 to 499 ..... farms | 6 | 6 | - | - | 2 | 1 | 10 | 7 |
| number | 1,609 | 1,342 | - | - | (D) | (D) | 3,364 | 1,940 |
| 500 or more ..... farms | 1 | 1 | 1 | - | - | - | 3 | 3 |
| number | (D) | (D) | (D) | - | - | - | 3,137 | 5,336 |
| Milk cows ..... farms, 2012 | 24 | 33 | 20 | 10 | 7 | 120 | 16 | 97 |
| 2007 | 33 | 34 | 28 | 9 | 4 | 151 | 3 | 101 |
| number, 2012 | 918 | 545 | 5,274 | 482 | 7 | 45,562 | 337 | 99,532 |
| 2007 | 1,514 | 842 | 5,165 | 572 | 7 | 48,964 | (D) | 89,575 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms | 16 | 26 | 7 | 3 | 7 | 8 | 12 | 47 |
| number | 46 | 50 | 20 | 6 | 7 | 38 | 27 | 90 |
| 10 to 19 ..... farms | - | 2 | 3 | - | - | - | - | 2 |
| number | - | (D) | 46 | - | - | - | - | (D) |
| 20 to 49 ..... farms | 2 | 1 | 2 | 4 | - | 13 | 3 | 2 |
| number | (D) | (D) | (D) | 126 | - | 400 | (D) | (D) |
| 50 to 99 ..... farms | 2 | 2 | 1 | 1 | - | 10 | - | - |
| number | (D) | (D) | (D) | (D) | - | 711 | - | - |
| 100 to 199 ..... farms | 3 | 1 | 2 | 2 | - | 23 | - | 1 |
| number | 370 | (D) | (D) | (D) | - | 3,514 | - | (D) |
| 200 to 499 ..... farms | 1 | 1 | 1 | - | - | 33 | 1 | 4 |
| number | (D) | (D) | (D) | - | - | 11,086 | (D) | 1,546 |
| 500 or more ..... farms | - | - | 4 | - | - | 33 | - | 41 |
| number | - | - | 4,525 | - | - | 29,813 | - | 97,718 |
| Other cattle (see text) ..... farms, 2012 | 525 | 362 | 347 | 38 | 131 | 479 | 172 | 706 |
| 2007 | 514 | 424 | 349 | 56 | 166 | 539 | 186 | 739 |
| number, 2012 | 9,014 | 8,225 | 6,088 | 932 | 54,551 | 37,893 | 8,944 | 143,717 |
| 2007 | 9,617 | 9,737 | 6,609 | 1,295 | (D) | 40,856 | 5,792 | 94,593 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 9 ..... farms | 343 | 208 | 247 | 19 | 80 | 253 | 98 | 474 |
| number | 1,395 | 754 | (D) | 97 | (D) | 1,023 | (D) | 1,913 |
| 10 to 19 ..... farms | 73 | 69 | 52 | 8 | 17 | 55 | 27 | 80 |
| number | 986 | 924 | 604 | 100 | (D) | 729 | 338 | 1,005 |
| 20 to 49 ..... farms | 73 | 51 | 21 | 5 | 11 | 57 | 28 | 56 |
| number | 2,278 | (D) | 635 | 135 | 279 | 1,724 | 701 | 1,774 |
| 50 to 99 ..... farms | 26 | 26 | 13 | 3 | 10 | 21 | 7 | 19 |
| number | 1,832 | (D) | 862 | 180 | 592 | 1,556 | 545 | 1,327 |
| 100 to 199 ..... farms | 4 | 3 | 11 | 3 | 1 | 33 | 6 | 10 |
| number | 675 | 333 | 1,516 | 420 | (D) | 4,562 | 847 | 1,509 |
| 200 to 499 ..... farms | 6 | 4 | 2 | - | 5 | 41 | 2 | 18 |
| number | 1,848 | 1,164 | (D) | - | 1,150 | (D) | (D) | 4,781 |
| 500 or more ..... farms | - | 1 | 1 | - | 7 | 19 | 4 | 49 |
| number | - | (D) | (D) | - | (D) | (D) | 5,607 | 131,408 |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** - Con. | | | | | | | | |
| Cattle and calves - Con. | | | | | | | | |
| Cattle on feed (see text) ..... farms, 2012 | 71 | 1 | 1 | 3 | - | - | 4 | 3 |
| 2007 | 313 | 4 | - | 10 | 1 | - | 16 | 2 |
| number, 2012 | 246,170 | (D) | (D) | (D) | - | - | (D) | (D) |
| 2007 | 163,683 | (D) | - | (D) | (D) | - | 249 | (D) |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 19 ..... farms | 21 | - | - | - | - | - | 2 | 1 |
| number | 286 | - | - | - | - | - | (D) | (D) |
| 20 to 49 ..... farms | 23 | - | 1 | 2 | - | - | - | - |
| number | 707 | - | (D) | (D) | - | - | - | - |
| 50 to 99 ..... farms | 4 | - | - | - | - | - | 1 | - |
| number | 285 | - | - | - | - | - | (D) | - |
| 100 to 199 ..... farms | 7 | - | - | - | - | - | - | 1 |
| number | 975 | - | - | - | - | - | - | (D) |
| 200 to 499 ..... farms | 5 | - | - | - | - | - | 1 | 1 |
| number | 1,609 | - | - | - | - | - | (D) | (D) |
| 500 or more ..... farms | 11 | 1 | - | 1 | - | - | - | - |
| number | 242,308 | (D) | - | (D) | - | - | - | - |
| **SALES** | | | | | | | | |
| Milk from cows (see text) ..... farms, 2012 | 427 | 6 | - | 2 | - | 2 | 9 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 1,136,856 | (D) | - | (D) | - | (D) | 14,525 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Cattle and calves sold ..... farms, 2012 | 8,420 | 104 | 58 | 421 | 45 | 119 | 476 | 64 |
| 2007 | 9,521 | 133 | 66 | 391 | 39 | 123 | 547 | 60 |
| number, 2012 | 877,290 | 29,482 | 3,939 | (D) | 329 | 1,784 | 8,184 | 2,909 |
| 2007 | 912,299 | 36,854 | 7,520 | 57,807 | 1,450 | 1,878 | (D) | 3,428 |
| $1,000, 2012 | 994,835 | (D) | 3,881 | (D) | 338 | (D) | 8,002 | 2,511 |
| 2007 | 716,720 | 32,270 | (D) | 48,151 | 1,365 | 1,504 | 5,439 | 2,414 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 5,229 | 37 | 22 | 274 | 31 | 82 | 390 | 24 |
| number | 19,232 | 127 | 94 | 1,057 | 75 | 263 | 1,295 | 100 |
| 10 to 19 ..... farms | 1,119 | 16 | 2 | 84 | 12 | 18 | 46 | 15 |
| number | 14,928 | 208 | (D) | 1,111 | (D) | 232 | 601 | (D) |
| 20 to 49 ..... farms | 910 | 13 | 16 | 43 | 1 | 12 | 24 | 9 |
| number | 27,148 | 452 | 444 | 1,299 | (D) | 394 | 616 | 268 |
| 50 to 99 ..... farms | 441 | 13 | 7 | 11 | 1 | 3 | 3 | 10 |
| number | 30,661 | 850 | (D) | 771 | (D) | 189 | 223 | 695 |
| 100 to 199 ..... farms | 287 | 4 | 6 | 6 | - | 2 | 6 | 4 |
| number | 39,055 | 556 | 787 | 600 | - | (D) | 1,010 | 532 |
| 200 to 499 ..... farms | 255 | 8 | 3 | 1 | - | 2 | 4 | 1 |
| number | 75,967 | 2,331 | 832 | (D) | - | (D) | 1,189 | (D) |
| 500 or more ..... farms | 179 | 13 | 2 | 2 | - | - | 3 | 1 |
| number | 670,299 | 24,958 | (D) | (D) | - | - | 3,250 | (D) |
| Calves weighing less than 500 pounds, sold ..... farms, 2012 | 2,632 | 26 | 22 | 105 | 3 | 37 | 151 | 21 |
| 2007 | 3,434 | 43 | 33 | 132 | 7 | 37 | 188 | 21 |
| number, 2012 | 151,116 | 2,384 | 436 | 2,937 | 4 | 280 | 2,139 | 1,072 |
| 2007 | 185,142 | 3,741 | 1,359 | (D) | (D) | 437 | (D) | 1,212 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 1,761 | 15 | 11 | 83 | 3 | 30 | 128 | 10 |
| number | 5,717 | 49 | 43 | (D) | 4 | 94 | 380 | 41 |
| 10 to 19 ..... farms | 273 | 1 | 5 | 16 | - | 5 | 6 | 1 |
| number | 3,420 | (D) | 64 | 174 | - | (D) | 76 | (D) |
| 20 to 49 ..... farms | 228 | 3 | 3 | 4 | - | 1 | 8 | 5 |
| number | 6,696 | 89 | 100 | 131 | - | (D) | 247 | (D) |
| 50 to 99 ..... farms | 126 | 2 | 2 | 1 | - | - | 5 | 4 |
| number | 8,130 | (D) | (D) | (D) | - | - | 285 | 290 |
| 100 to 199 ..... farms | 95 | 2 | 1 | - | - | 1 | 2 | - |
| number | 12,355 | (D) | (D) | - | - | (D) | (D) | - |
| 200 to 499 ..... farms | 84 | 2 | - | - | - | - | 1 | - |
| number | 23,960 | (D) | - | - | - | - | (D) | - |
| 500 or more ..... farms | 65 | 1 | - | 1 | - | - | 1 | 1 |
| number | 90,838 | (D) | - | (D) | - | - | (D) | (D) |
| Cattle, including calves weighing 500 pounds or more, sold ..... farms, 2012 | 7,588 | 100 | 51 | 386 | 43 | 102 | 415 | 59 |
| 2007 | 8,490 | 127 | 64 | 349 | 35 | 110 | 468 | 58 |
| number, 2012 | 726,174 | 27,098 | 3,503 | (D) | 325 | 1,504 | 6,045 | 1,837 |
| 2007 | 727,157 | 33,113 | 6,161 | (D) | (D) | 1,441 | 5,643 | 2,216 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 4,879 | 36 | 17 | 262 | 29 | 75 | 357 | 26 |
| number | 17,163 | 117 | 81 | 982 | 71 | 252 | 1,137 | 104 |
| 10 to 19 ..... farms | 947 | 16 | 5 | 68 | 12 | 11 | 29 | 14 |
| number | 12,666 | 210 | (D) | 883 | (D) | (D) | (D) | (D) |
| 20 to 49 ..... farms | 804 | 12 | 13 | 39 | 1 | 9 | 16 | 10 |
| number | 24,114 | 373 | 381 | 1,132 | (D) | 301 | 385 | 289 |
| 50 to 99 ..... farms | 396 | 12 | 7 | 15 | 1 | 3 | 2 | 4 |
| number | 27,376 | 783 | 549 | 1,157 | (D) | 189 | (D) | 275 |
| 100 to 199 ..... farms | 255 | 4 | 4 | - | - | 3 | 5 | 4 |
| number | 34,664 | 557 | 552 | - | - | 406 | 675 | 519 |
| 200 to 499 ..... farms | 203 | 7 | 3 | 1 | - | 1 | 4 | 1 |
| number | 58,969 | 2,124 | 752 | (D) | - | (D) | 1,325 | (D) |
| 500 or more ..... farms | 104 | 13 | 2 | 1 | - | - | 2 | - |
| number | 551,222 | 22,934 | (D) | (D) | - | - | (D) | - |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** - Con. | | | | | | | | |
| Cattle and calves - Con. | | | | | | | | |
| Cattle on feed (see text) ..... farms, 2012 | 1 | 1 | - | 4 | 3 | 6 | 3 | 1 |
| 2007 | 5 | 1 | 1 | 11 | 1 | 5 | - | 3 |
| number, 2012 | (D) | (D) | - | 28,920 | 277 | 75,974 | 60 | (D) |
| 2007 | 17 | (D) | (D) | 11,951 | (D) | 71,083 | - | 6 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 19 ..... farms | - | - | - | - | 1 | 1 | - | - |
| number | - | - | - | - | (D) | (D) | - | - |
| 20 to 49 ..... farms | 1 | 1 | - | - | - | 1 | 3 | - |
| number | (D) | (D) | - | - | - | (D) | 60 | - |
| 50 to 99 ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| 100 to 199 ..... farms | - | - | - | - | 2 | - | - | 1 |
| number | - | - | - | - | (D) | - | - | (D) |
| 200 to 499 ..... farms | - | - | - | 1 | - | - | - | - |
| number | - | - | - | (D) | - | - | - | - |
| 500 or more ..... farms | - | - | - | 3 | - | 4 | - | - |
| number | - | - | - | (D) | - | (D) | - | - |
| **SALES** | | | | | | | | |
| Milk from cows (see text) ..... farms, 2012 | 2 | - | - | 14 | - | 20 | 7 | 1 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | - | - | 113,341 | - | (D) | 4,504 | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Cattle and calves sold ..... farms, 2012 | 134 | 62 | 75 | 158 | 49 | 280 | 162 | 83 |
| 2007 | 167 | 78 | 71 | 174 | 67 | 403 | 224 | 101 |
| number, 2012 | 1,384 | 3,835 | 2,143 | 65,610 | 4,077 | 194,896 | 2,212 | 2,778 |
| 2007 | 1,602 | 8,600 | 2,461 | 49,948 | 4,177 | 251,191 | 4,439 | 5,289 |
| $1,000, 2012 | 1,204 | 2,959 | 1,914 | (D) | 3,748 | 294,086 | 2,073 | 2,948 |
| 2007 | 883 | 5,898 | 1,649 | 32,676 | (D) | 251,337 | 3,179 | (D) |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 98 | 19 | 36 | 72 | 11 | 106 | 120 | 65 |
| number | 358 | 65 | 130 | 271 | 53 | 449 | 495 | 231 |
| 10 to 19 ..... farms | 19 | 12 | 18 | 10 | 10 | 43 | 21 | 8 |
| number | 242 | 148 | (D) | 153 | (D) | 586 | (D) | (D) |
| 20 to 49 ..... farms | 12 | 13 | 8 | 26 | 11 | 48 | 14 | 5 |
| number | 300 | 424 | (D) | 764 | 288 | 1,379 | 383 | 174 |
| 50 to 99 ..... farms | 3 | 6 | 5 | 12 | 8 | 16 | 5 | 1 |
| number | (D) | 516 | 281 | 942 | 492 | 1,073 | 321 | (D) |
| 100 to 199 ..... farms | 2 | 5 | 7 | 11 | 4 | 27 | 1 | 1 |
| number | (D) | 680 | 1,028 | 1,477 | 507 | 3,501 | (D) | (D) |
| 200 to 499 ..... farms | - | 7 | 1 | 10 | 3 | 22 | - | - |
| number | - | 2,002 | (D) | 3,100 | 1,329 | 6,564 | - | - |
| 500 or more ..... farms | - | - | - | 17 | 2 | 18 | 1 | 3 |
| number | - | - | - | 58,903 | (D) | 181,344 | (D) | 2,000 |
| Calves weighing less than 500 pounds, sold ..... farms, 2012 | 34 | 14 | 24 | 63 | 20 | 81 | 52 | 22 |
| 2007 | 64 | 25 | 23 | 55 | 22 | 125 | 83 | 38 |
| number, 2012 | 355 | 548 | 100 | 9,827 | 282 | 10,442 | 298 | 88 |
| 2007 | 626 | 1,345 | 338 | 5,759 | 533 | 14,462 | 1,115 | 3,438 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 27 | 8 | 20 | 34 | 11 | 36 | 45 | 21 |
| number | 71 | (D) | 50 | 131 | 49 | 175 | 115 | (D) |
| 10 to 19 ..... farms | 3 | 1 | 3 | 2 | 6 | 10 | 1 | 1 |
| number | 34 | (D) | (D) | (D) | 78 | 120 | (D) | (D) |
| 20 to 49 ..... farms | 1 | - | 1 | 9 | 2 | 11 | 5 | - |
| number | (D) | - | (D) | 295 | (D) | 309 | (D) | - |
| 50 to 99 ..... farms | 2 | 3 | - | 5 | 1 | 4 | 1 | - |
| number | (D) | 270 | - | 306 | (D) | 210 | (D) | - |
| 100 to 199 ..... farms | 1 | 2 | - | 2 | - | 8 | - | - |
| number | (D) | (D) | - | (D) | - | 980 | - | - |
| 200 to 499 ..... farms | - | - | - | 6 | - | 7 | - | - |
| number | - | - | - | 1,959 | - | 1,948 | - | - |
| 500 or more ..... farms | - | - | - | 5 | - | 5 | - | - |
| number | - | - | - | 6,870 | - | 6,700 | - | - |
| Cattle, including calves weighing 500 pounds or more, sold ..... farms, 2012 | 121 | 60 | 74 | 133 | 46 | 261 | 145 | 74 |
| 2007 | 150 | 69 | 65 | 155 | 60 | 386 | 191 | 89 |
| number, 2012 | 1,029 | 3,287 | 2,043 | 55,783 | 3,795 | 184,454 | 1,914 | 2,690 |
| 2007 | 976 | 7,255 | 2,123 | 44,189 | 3,644 | 236,729 | 3,324 | 1,851 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 88 | 19 | 41 | 56 | 12 | 108 | 109 | 59 |
| number | 323 | 68 | 144 | 197 | 59 | 461 | 420 | 187 |
| 10 to 19 ..... farms | 20 | 11 | 15 | 9 | 10 | 36 | 20 | 5 |
| number | (D) | 142 | 230 | 130 | (D) | 488 | (D) | (D) |
| 20 to 49 ..... farms | 12 | 13 | 5 | 25 | 9 | 41 | 10 | 5 |
| number | 344 | 410 | 163 | 774 | 255 | 1,229 | 290 | 164 |
| 50 to 99 ..... farms | - | 5 | 5 | 8 | 6 | 18 | 5 | 1 |
| number | - | 421 | 280 | 572 | 384 | 1,171 | 326 | (D) |
| 100 to 199 ..... farms | 1 | 7 | 8 | 12 | 4 | 27 | - | 1 |
| number | (D) | 955 | 1,226 | 1,642 | 463 | 3,558 | - | (D) |
| 200 to 499 ..... farms | - | 5 | - | 12 | 3 | 16 | - | - |
| number | - | 1,291 | - | 3,751 | 1,224 | 4,223 | - | - |
| 500 or more ..... farms | - | - | - | 11 | 2 | 15 | 1 | 3 |
| number | - | - | - | 48,717 | (D) | 173,324 | (D) | 2,000 |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** - Con. | | | | | | | | |
| Cattle and calves - Con. | | | | | | | | |
| Cattle on feed (see text) ..... farms, 2012 | - | 1 | - | 1 | 1 | 4 | 1 | 1 |
| 2007 | - | 12 | 11 | 1 | 6 | 31 | 6 | 2 |
| number, 2012 | - | (D) | - | (D) | (D) | 129 | (D) | (D) |
| 2007 | - | 233 | 50 | (D) | 582 | 143 | 27 | (D) |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 19 ..... farms | - | - | - | - | - | 3 | - | - |
| number | - | - | - | - | - | (D) | - | - |
| 20 to 49 ..... farms | - | - | - | 1 | - | - | 1 | - |
| number | - | - | - | (D) | - | - | (D) | - |
| 50 to 99 ..... farms | - | 1 | - | - | - | 1 | - | - |
| number | - | (D) | - | - | - | (D) | - | - |
| 100 to 199 ..... farms | - | - | - | - | 1 | - | - | 1 |
| number | - | - | - | - | (D) | - | - | (D) |
| 200 to 499 ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| 500 or more ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| **SALES** | | | | | | | | |
| Milk from cows (see text) ..... farms, 2012 | 1 | 30 | 6 | 1 | 5 | 35 | 1 | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | 32,100 | 178 | (D) | (D) | 25,772 | (D) | - |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Cattle and calves sold ..... farms, 2012 | 67 | 320 | 97 | 273 | 203 | 574 | 151 | 48 |
| 2007 | 55 | 409 | 100 | 285 | 245 | 562 | 148 | 90 |
| number, 2012 | 1,216 | 7,817 | 539 | 18,372 | 10,246 | 11,799 | 10,247 | 1,043 |
| 2007 | 549 | 11,133 | 491 | 26,638 | 13,712 | 12,375 | 11,841 | 1,278 |
| $1,000, 2012 | 1,188 | (D) | 555 | 18,971 | 9,076 | 10,135 | 8,701 | 899 |
| 2007 | 420 | (D) | 381 | 18,921 | 8,976 | (D) | 7,567 | 848 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 39 | 236 | 84 | 111 | 95 | 405 | 39 | 40 |
| number | 149 | 815 | 303 | 477 | 377 | 1,522 | 165 | 147 |
| 10 to 19 ..... farms | 14 | 34 | 11 | 58 | 22 | 78 | 27 | 5 |
| number | (D) | (D) | (D) | 761 | (D) | 1,035 | (D) | 54 |
| 20 to 49 ..... farms | 9 | 17 | 2 | 47 | 29 | 48 | 28 | - |
| number | 271 | 550 | (D) | 1,399 | 980 | 1,331 | 851 | - |
| 50 to 99 ..... farms | 3 | 9 | - | 26 | 28 | 24 | 24 | - |
| number | 196 | 645 | - | 1,770 | 1,914 | 1,665 | (D) | - |
| 100 to 199 ..... farms | - | 13 | - | 15 | 18 | 12 | 22 | 1 |
| number | - | 1,928 | - | 1,975 | 2,562 | 1,433 | 3,060 | (D) |
| 200 to 499 ..... farms | 2 | 10 | - | 11 | 9 | 4 | 9 | 2 |
| number | (D) | 2,890 | - | 3,174 | 2,926 | 990 | 2,725 | (D) |
| 500 or more ..... farms | - | 1 | - | 5 | 2 | 3 | 2 | - |
| number | - | (D) | - | 8,816 | (D) | 3,823 | (D) | - |
| Calves weighing less than 500 pounds, sold ..... farms, 2012 | 23 | 91 | 34 | 80 | 75 | 197 | 58 | 18 |
| 2007 | 21 | 154 | 24 | 93 | 68 | 225 | 43 | 45 |
| number, 2012 | 258 | 2,754 | 128 | 1,863 | 1,642 | 2,882 | 1,512 | 238 |
| 2007 | 178 | 4,676 | 149 | 3,533 | 3,092 | 3,866 | 1,779 | 446 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 17 | 60 | 32 | 44 | 43 | 153 | 26 | 14 |
| number | 69 | 188 | (D) | 185 | 165 | 481 | 92 | 50 |
| 10 to 19 ..... farms | 2 | 6 | 2 | 15 | 6 | 18 | 14 | 3 |
| number | (D) | 74 | (D) | 180 | (D) | (D) | 172 | (D) |
| 20 to 49 ..... farms | 3 | 6 | - | 10 | 14 | 12 | 6 | - |
| number | 106 | 178 | - | 317 | 331 | 355 | 188 | - |
| 50 to 99 ..... farms | 1 | 8 | - | 5 | 10 | 9 | 8 | - |
| number | (D) | 588 | - | 312 | 652 | 524 | 517 | - |
| 100 to 199 ..... farms | - | 8 | - | 6 | 1 | 3 | 4 | 1 |
| number | - | 951 | - | 869 | (D) | 430 | 543 | (D) |
| 200 to 499 ..... farms | - | 3 | - | - | 1 | 1 | - | - |
| number | - | 775 | - | - | (D) | (D) | - | - |
| 500 or more ..... farms | - | - | - | - | - | 1 | - | - |
| number | - | - | - | - | - | (D) | - | - |
| Cattle, including calves weighing 500 pounds or more, sold ..... farms, 2012 | 56 | 285 | 83 | 254 | 189 | 518 | 139 | 39 |
| 2007 | 50 | 350 | 90 | 255 | 230 | 489 | 145 | 64 |
| number, 2012 | 958 | 5,063 | 411 | 16,509 | 8,604 | 8,917 | 8,735 | 805 |
| 2007 | 371 | 6,457 | 342 | 23,105 | 10,620 | 8,509 | 10,062 | 832 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 33 | 217 | 73 | 112 | 89 | 377 | 38 | 35 |
| number | 98 | 750 | 222 | 461 | 312 | 1,321 | 184 | 111 |
| 10 to 19 ..... farms | 15 | 25 | 8 | 54 | 25 | 70 | 25 | 1 |
| number | 198 | 326 | (D) | 705 | 361 | (D) | (D) | (D) |
| 20 to 49 ..... farms | 4 | 17 | 2 | 36 | 26 | 40 | 24 | - |
| number | 114 | 479 | (D) | 1,097 | 875 | 1,120 | 744 | - |
| 50 to 99 ..... farms | 2 | 11 | - | 28 | 24 | 17 | 25 | - |
| number | (D) | 730 | - | 1,832 | 1,634 | 1,236 | 1,609 | - |
| 100 to 199 ..... farms | - | 10 | - | 11 | 15 | 10 | 19 | 1 |
| number | - | 1,467 | - | 1,547 | 2,087 | 1,087 | 2,670 | (D) |
| 200 to 499 ..... farms | 2 | 5 | - | 8 | 10 | 1 | 6 | 2 |
| number | (D) | 1,311 | - | 2,095 | 3,335 | (D) | 1,871 | (D) |
| 500 or more ..... farms | - | - | - | 5 | - | 3 | 2 | - |
| number | - | - | - | 8,772 | - | 2,970 | (D) | - |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** - Con. | | | | | | | | |
| Cattle and calves - Con. | | | | | | | | |
| Cattle on feed (see text) ..... farms, 2012 | 3 | - | - | 4 | - | 3 | - | 2 |
| 2007 | 9 | 2 | 4 | 16 | - | 12 | 1 | 14 |
| number, 2012 | 80 | - | - | 146 | - | 36 | - | (D) |
| 2007 | 369 | (D) | (D) | 28 | - | 137 | (D) | 104 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 19 ..... farms | - | - | - | - | - | 3 | - | 2 |
| number | - | - | - | - | - | 36 | - | (D) |
| 20 to 49 ..... farms | 3 | - | - | 4 | - | - | - | - |
| number | 80 | - | - | 146 | - | - | - | - |
| 50 to 99 ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| 100 to 199 ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| 200 to 499 ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| 500 or more ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| **SALES** | | | | | | | | |
| Milk from cows (see text) ..... farms, 2012 | 1 | 8 | - | 7 | 8 | 26 | 2 | 26 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | (D) | 4,782 | - | 3,788 | 160 | 52,550 | (D) | 46,182 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Cattle and calves sold ..... farms, 2012 | 330 | 81 | 65 | 373 | 49 | 320 | 27 | 328 |
| 2007 | 383 | 112 | 102 | 397 | 56 | 357 | 32 | 402 |
| number, 2012 | (D) | 2,667 | 1,375 | 10,492 | 924 | 11,685 | 194 | 9,006 |
| 2007 | 27,509 | 4,067 | 1,760 | 4,926 | 1,233 | 14,765 | 268 | 20,624 |
| $1,000, 2012 | 20,136 | 2,130 | 1,262 | (D) | 739 | 9,342 | 187 | 7,568 |
| 2007 | 20,560 | 2,387 | 1,332 | 3,989 | 845 | 10,969 | 153 | 9,972 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 167 | 50 | 46 | 309 | 36 | 218 | 19 | 225 |
| number | 666 | 190 | 168 | 959 | 126 | 733 | 64 | 737 |
| 10 to 19 ..... farms | 59 | 13 | 4 | 32 | 3 | 26 | 5 | 32 |
| number | 800 | 178 | (D) | 419 | (D) | 344 | 63 | 439 |
| 20 to 49 ..... farms | 39 | 9 | 9 | 17 | 5 | 25 | 3 | 40 |
| number | 1,311 | 245 | 273 | 456 | 169 | 782 | 67 | 1,148 |
| 50 to 99 ..... farms | 19 | 4 | 4 | 7 | 3 | 20 | - | 13 |
| number | 1,310 | 236 | 244 | 455 | 221 | 1,248 | - | 960 |
| 100 to 199 ..... farms | 15 | 1 | - | 1 | 1 | 16 | - | 9 |
| number | 2,084 | (D) | - | (D) | (D) | 2,447 | - | 1,203 |
| 200 to 499 ..... farms | 22 | 2 | 2 | 2 | 1 | 11 | - | 6 |
| number | 6,409 | (D) | (D) | (D) | (D) | 3,562 | - | 1,567 |
| 500 or more ..... farms | 9 | 2 | - | 5 | - | 4 | - | 3 |
| number | (D) | (D) | - | 7,500 | - | 2,569 | - | 2,952 |
| Calves weighing less than 500 pounds, sold ..... farms, 2012 | 88 | 24 | 23 | 119 | 16 | 107 | 7 | 99 |
| 2007 | 127 | 45 | 41 | 123 | 12 | 133 | 10 | 136 |
| number, 2012 | 3,559 | 610 | 322 | 8,149 | 152 | 4,382 | 43 | 2,985 |
| 2007 | 2,976 | 897 | 339 | 1,209 | 293 | 5,595 | 87 | 3,878 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 52 | 17 | 18 | 95 | 11 | 64 | 5 | 65 |
| number | (D) | 72 | (D) | 249 | 39 | 164 | (D) | 175 |
| 10 to 19 ..... farms | 9 | 2 | 3 | 10 | 3 | 14 | 2 | 10 |
| number | 106 | (D) | 51 | (D) | (D) | 195 | (D) | 117 |
| 20 to 49 ..... farms | 10 | 1 | 1 | 8 | 2 | 5 | - | 8 |
| number | 309 | (D) | (D) | 222 | (D) | (D) | - | 185 |
| 50 to 99 ..... farms | 6 | 3 | - | 1 | - | 7 | - | 6 |
| number | 412 | 171 | - | (D) | - | 472 | - | 381 |
| 100 to 199 ..... farms | 7 | - | 1 | - | - | 9 | - | 6 |
| number | 934 | - | (D) | - | - | 1,243 | - | 737 |
| 200 to 499 ..... farms | 3 | 1 | - | - | - | 7 | - | 4 |
| number | 654 | (D) | - | - | - | 1,708 | - | 1,390 |
| 500 or more ..... farms | 1 | - | - | 5 | - | 1 | - | - |
| number | (D) | - | - | 7,500 | - | (D) | - | - |
| Cattle, including calves weighing 500 pounds or more, sold ..... farms, 2012 | 302 | 74 | 61 | 318 | 46 | 283 | 24 | 304 |
| 2007 | 355 | 98 | 87 | 357 | 53 | 311 | 29 | 358 |
| number, 2012 | (D) | 2,057 | 1,053 | 2,343 | 772 | 7,303 | 151 | 6,021 |
| 2007 | 24,533 | 3,170 | 1,421 | 3,717 | 940 | 9,170 | 181 | 16,746 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 156 | 50 | 45 | 275 | 35 | 191 | 18 | 219 |
| number | 588 | 193 | 150 | 793 | 98 | 612 | 63 | 682 |
| 10 to 19 ..... farms | 49 | 12 | 4 | 25 | 2 | 26 | 5 | 32 |
| number | 682 | 171 | (D) | (D) | (D) | (D) | (D) | 458 |
| 20 to 49 ..... farms | 44 | 5 | 6 | 10 | 4 | 22 | 1 | 31 |
| number | 1,458 | 143 | 168 | 300 | (D) | 650 | (D) | 952 |
| 50 to 99 ..... farms | 15 | 2 | 4 | 6 | 3 | 29 | - | 10 |
| number | 1,107 | (D) | 242 | 355 | 165 | 1,896 | - | 764 |
| 100 to 199 ..... farms | 12 | 2 | - | - | 1 | 7 | - | 9 |
| number | 1,539 | (D) | - | - | (D) | 1,032 | - | 997 |
| 200 to 499 ..... farms | 18 | 2 | 2 | 2 | 1 | 6 | - | 2 |
| number | 4,975 | (D) | (D) | (D) | (D) | 1,725 | - | (D) |
| 500 or more ..... farms | 8 | 1 | - | - | - | 2 | - | 1 |
| number | (D) | (D) | - | - | - | (D) | - | (D) |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** - Con. | | | | | | | | |
| Cattle and calves - Con. | | | | | | | | |
| Cattle on feed (see text) ..... farms, 2012 | 5 | 4 | 1 | - | 3 | 2 | 3 | 1 |
| 2007 | 27 | 22 | 12 | 4 | 12 | 23 | 9 | 17 |
| number, 2012 | 456 | 562 | (D) | - | (D) | (D) | 66 | (D) |
| 2007 | 796 | 227 | 48 | 390 | (D) | 270 | 185 | 12,985 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 19 ..... farms | 4 | - | - | - | 2 | - | 2 | - |
| number | (D) | - | - | - | (D) | - | (D) | - |
| 20 to 49 ..... farms | - | 2 | 1 | - | - | 1 | 1 | - |
| number | - | (D) | (D) | - | - | (D) | (D) | - |
| 50 to 99 ..... farms | - | - | - | - | - | 1 | - | - |
| number | - | - | - | - | - | (D) | - | - |
| 100 to 199 ..... farms | - | 1 | - | - | - | - | - | - |
| number | - | (D) | - | - | - | - | - | - |
| 200 to 499 ..... farms | 1 | 1 | - | - | - | - | - | - |
| number | (D) | (D) | - | - | - | - | - | - |
| 500 or more ..... farms | - | - | - | - | 1 | - | - | 1 |
| number | - | - | - | - | (D) | - | - | (D) |
| **SALES** | | | | | | | | |
| Milk from cows (see text) ..... farms, 2012 | 13 | 6 | 14 | 7 | - | 114 | 4 | 49 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| $1,000, 2012 | 3,249 | 1,639 | 21,762 | 2,179 | - | 193,042 | 1,154 | 436,745 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Cattle and calves sold ..... farms, 2012 | 560 | 374 | 311 | 48 | 137 | 520 | 185 | 689 |
| 2007 | 533 | 427 | 373 | 59 | 143 | 562 | 192 | 853 |
| number, 2012 | 10,616 | 12,327 | 10,007 | 1,000 | (D) | 40,960 | 15,715 | 148,839 |
| 2007 | 12,636 | (D) | 11,398 | 1,082 | (D) | 48,206 | (D) | 147,635 |
| $1,000, 2012 | 10,384 | 11,774 | 8,494 | 855 | (D) | 26,535 | 15,287 | 128,577 |
| 2007 | 9,076 | 7,685 | 5,659 | 678 | (D) | 24,135 | 7,078 | 81,962 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 380 | 202 | 240 | 22 | 87 | 285 | 91 | 416 |
| number | 1,517 | 749 | 932 | 83 | 262 | 975 | 403 | 1,650 |
| 10 to 19 ..... farms | 73 | 58 | 27 | 10 | 23 | 58 | 28 | 85 |
| number | (D) | 798 | 344 | (D) | 328 | 768 | 384 | 1,066 |
| 20 to 49 ..... farms | 61 | 68 | 23 | 11 | 7 | 59 | 36 | 63 |
| number | 1,743 | 1,950 | 723 | 323 | 193 | 1,761 | 1,165 | 1,941 |
| 50 to 99 ..... farms | 29 | 20 | 14 | 4 | 10 | 27 | 8 | 41 |
| number | 2,165 | 1,449 | 1,033 | 312 | 704 | 1,892 | 557 | 2,833 |
| 100 to 199 ..... farms | 11 | 10 | 2 | 1 | 4 | 27 | 8 | 14 |
| number | 1,507 | 1,421 | (D) | (D) | 526 | 3,586 | 1,043 | 1,888 |
| 200 to 499 ..... farms | 4 | 13 | 1 | - | 5 | 44 | 10 | 23 |
| number | 1,419 | 3,242 | (D) | - | 1,220 | 13,778 | 2,881 | 6,755 |
| 500 or more ..... farms | 2 | 3 | 4 | - | 1 | 20 | 4 | 47 |
| number | (D) | 2,718 | 6,350 | - | (D) | 18,200 | 9,282 | 132,706 |
| Calves weighing less than 500 pounds, sold ..... farms, 2012 | 141 | 95 | 106 | 14 | 34 | 194 | 52 | 262 |
| 2007 | 161 | 179 | 156 | 26 | 45 | 244 | 68 | 359 |
| number, 2012 | 934 | 1,548 | 3,240 | 198 | 577 | 21,007 | 725 | 60,216 |
| 2007 | 1,904 | (D) | 4,316 | 314 | 512 | 27,098 | (D) | 70,327 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 114 | 60 | 81 | 7 | 22 | 89 | 31 | 159 |
| number | 339 | 221 | (D) | 23 | 59 | 291 | 107 | 526 |
| 10 to 19 ..... farms | 17 | 14 | 13 | 3 | 3 | 8 | 10 | 25 |
| number | 222 | 184 | 165 | 30 | (D) | 98 | 117 | 324 |
| 20 to 49 ..... farms | 7 | 12 | 7 | 4 | 7 | 29 | 8 | 15 |
| number | 168 | 297 | 180 | 145 | 235 | 921 | 266 | 439 |
| 50 to 99 ..... farms | 2 | 6 | 1 | - | - | 14 | 2 | 7 |
| number | (D) | 416 | (D) | - | - | 912 | (D) | 471 |
| 100 to 199 ..... farms | 1 | 2 | 1 | - | 2 | 17 | 1 | 6 |
| number | (D) | (D) | (D) | - | (D) | 2,252 | (D) | 800 |
| 200 to 499 ..... farms | - | 1 | 1 | - | - | 27 | - | 19 |
| number | - | (D) | (D) | - | - | 7,400 | - | 5,427 |
| 500 or more ..... farms | - | - | 2 | - | - | 10 | - | 31 |
| number | - | - | (D) | - | - | 9,133 | - | 52,229 |
| Cattle, including calves weighing 500 pounds or more, sold ..... farms, 2012 | 509 | 348 | 278 | 46 | 126 | 471 | 168 | 597 |
| 2007 | 493 | 387 | 328 | 46 | 124 | 503 | 179 | 733 |
| number, 2012 | 9,682 | 10,779 | 6,767 | 802 | (D) | 19,953 | 14,990 | 88,623 |
| 2007 | 10,732 | 9,024 | 7,082 | 768 | (D) | 21,108 | 8,328 | 77,308 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 9 ..... farms | 346 | 201 | 221 | 22 | 84 | 269 | 85 | 394 |
| number | 1,337 | 757 | 766 | 81 | 257 | 871 | 348 | 1,505 |
| 10 to 19 ..... farms | 63 | 48 | 23 | 11 | 20 | 47 | 21 | 55 |
| number | (D) | 649 | 303 | 135 | 299 | 615 | 300 | 699 |
| 20 to 49 ..... farms | 57 | 55 | 16 | 10 | 11 | 73 | 34 | 56 |
| number | 1,589 | 1,567 | 464 | 309 | 393 | 2,120 | 1,073 | 1,772 |
| 50 to 99 ..... farms | 27 | 19 | 11 | 2 | 3 | 22 | 10 | 34 |
| number | 1,906 | 1,421 | 844 | (D) | 203 | 1,603 | 733 | 2,340 |
| 100 to 199 ..... farms | 10 | 15 | 2 | 1 | 2 | 30 | 4 | 14 |
| number | 1,315 | 2,152 | (D) | (D) | (D) | 4,215 | 563 | 1,883 |
| 200 to 499 ..... farms | 4 | 7 | 3 | - | 5 | 25 | 10 | 29 |
| number | 1,415 | 1,520 | 1,215 | - | 1,220 | 7,508 | 2,730 | 8,622 |
| 500 or more ..... farms | 2 | 3 | 2 | - | 1 | 5 | 4 | 15 |
| number | (D) | 2,713 | (D) | - | (D) | 3,021 | 9,243 | 71,802 |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **SALES** - Con. | | | | | | | | |
| Cattle and calves sold - Con. | | | | | | | | |
| Cattle, including calves weighing 500 pounds or more, sold - Con. | | | | | | | | |
| Cattle on feed sold (see text) ..... farms, 2012 | 164 | 3 | 4 | 11 | 2 | - | 8 | 3 |
| 2007 | 871 | 13 | 5 | 30 | 3 | 6 | 56 | 3 |
| number, 2012 | 431,976 | (D) | 480 | (D) | (D) | - | (D) | (D) |
| 2007 | 388,785 | (D) | (D) | (D) | (D) | 18 | 1,638 | 25 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 19 ..... farms | 69 | - | - | 7 | 2 | - | 4 | 1 |
| number | 800 | - | - | 76 | (D) | - | 26 | (D) |
| 20 to 49 ..... farms | 38 | - | 1 | 3 | - | - | 2 | - |
| number | 1,152 | - | (D) | 125 | - | - | (D) | - |
| 50 to 99 ..... farms | 20 | - | 1 | - | - | - | 1 | - |
| number | 1,433 | - | (D) | - | - | - | (D) | - |
| 100 to 199 ..... farms | 14 | 2 | 2 | - | - | - | - | 2 |
| number | 2,005 | (D) | (D) | - | - | - | - | (D) |
| 200 to 499 ..... farms | 10 | - | - | - | - | - | - | - |
| number | 3,441 | - | - | - | - | - | - | - |
| 500 or more ..... farms | 13 | 1 | - | 1 | - | - | 1 | - |
| number | 423,145 | (D) | - | (D) | - | - | (D) | - |

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **SALES** - Con. | | | | | | | | |
| Cattle and calves sold - Con. | | | | | | | | |
| Cattle, including calves weighing 500 pounds or more, sold - Con. | | | | | | | | |
| Cattle on feed sold (see text) ..... farms, 2012 | 5 | 2 | 6 | 6 | 3 | 8 | 4 | 1 |
| 2007 | 23 | 7 | 2 | 28 | 7 | 9 | - | 8 |
| number, 2012 | 65 | (D) | 122 | 34,432 | (D) | 158,971 | 78 | (D) |
| 2007 | 104 | 86 | (D) | (D) | 263 | 194,501 | - | 47 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 19 ..... farms | 4 | - | 4 | - | - | - | 1 | - |
| number | (D) | - | (D) | - | - | - | (D) | - |
| 20 to 49 ..... farms | 1 | 1 | 2 | 1 | 1 | 2 | 3 | - |
| number | (D) | (D) | (D) | (D) | (D) | (D) | (D) | - |
| 50 to 99 ..... farms | - | - | - | - | - | - | - | 1 |
| number | - | - | - | - | - | - | - | (D) |
| 100 to 199 ..... farms | - | 1 | - | 1 | - | - | - | - |
| number | - | (D) | - | (D) | - | - | - | - |
| 200 to 499 ..... farms | - | - | - | 1 | 2 | 1 | - | - |
| number | - | - | - | (D) | (D) | (D) | - | - |
| 500 or more ..... farms | - | - | - | 3 | - | 5 | - | - |
| number | - | - | - | (D) | - | 158,621 | - | - |

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **SALES** - Con. | | | | | | | | |
| Cattle and calves sold - Con. | | | | | | | | |
| Cattle, including calves weighing 500 pounds or more, sold - Con. | | | | | | | | |
| Cattle on feed sold (see text) ..... farms, 2012 | - | 6 | - | 7 | 6 | 9 | 5 | 1 |
| 2007 | 6 | 39 | 18 | 3 | 25 | 77 | 11 | 10 |
| number, 2012 | - | 158 | - | 274 | 359 | 561 | 291 | (D) |
| 2007 | 6 | 330 | 78 | 605 | 1,277 | 859 | 177 | 58 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 19 ..... farms | - | 1 | - | 1 | 3 | 6 | 1 | - |
| number | - | (D) | - | (D) | 25 | (D) | (D) | - |
| 20 to 49 ..... farms | - | 5 | - | 5 | - | 2 | - | - |
| number | - | (D) | - | (D) | - | (D) | - | - |
| 50 to 99 ..... farms | - | - | - | - | 2 | - | 4 | - |
| number | - | - | - | - | (D) | - | (D) | - |
| 100 to 199 ..... farms | - | - | - | 1 | 1 | - | - | 1 |
| number | - | - | - | (D) | (D) | - | - | (D) |
| 200 to 499 ..... farms | - | - | - | - | - | 1 | - | - |
| number | - | - | - | - | - | (D) | - | - |
| 500 or more ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |

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Table 11. **Cattle and Calves – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **SALES** - Con. | | | | | | | | |
| Cattle and calves sold - Con. | | | | | | | | |
| Cattle, including calves weighing 500 pounds or more, sold - Con. | | | | | | | | |
| Cattle on feed sold (see text) ....farms, 2012 | 6 | - | - | 5 | - | 13 | 1 | 8 |
| 2007 | 38 | 5 | 10 | 40 | 8 | 42 | 4 | 51 |
| number, 2012 | 483 | - | - | 234 | - | 534 | (D) | 98 |
| 2007 | 1,223 | 42 | 75 | 196 | 44 | 647 | 24 | 242 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 19 .... farms | 1 | - | - | - | - | 7 | 1 | 8 |
| number | (D) | - | - | - | - | (D) | (D) | 98 |
| 20 to 49 .... farms | 3 | - | - | 3 | - | - | - | - |
| number | (D) | - | - | (D) | - | - | - | - |
| 50 to 99 .... farms | 1 | - | - | 2 | - | 5 | - | - |
| number | (D) | - | - | (D) | - | 337 | - | - |
| 100 to 199 .... farms | - | - | - | - | - | 1 | - | - |
| number | - | - | - | - | - | (D) | - | - |
| 200 to 499 .... farms | 1 | - | - | - | - | - | - | - |
| number | (D) | - | - | - | - | - | - | - |
| 500 or more .... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **SALES** - Con. | | | | | | | | |
| Cattle and calves sold - Con. | | | | | | | | |
| Cattle, including calves weighing 500 pounds or more, sold - Con. | | | | | | | | |
| Cattle on feed sold (see text) ....farms, 2012 | 4 | 5 | 1 | - | 8 | 4 | 3 | 6 |
| 2007 | 64 | 44 | 34 | 7 | 19 | 42 | 22 | 52 |
| number, 2012 | (D) | 644 | (D) | - | (D) | 256 | (D) | (D) |
| 2007 | 888 | 928 | 112 | 48 | (D) | 269 | 300 | 29,017 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 19 .... farms | 3 | - | - | - | 7 | 1 | 1 | 5 |
| number | 39 | - | - | - | 85 | (D) | (D) | 53 |
| 20 to 49 .... farms | - | 1 | - | - | - | 1 | 1 | - |
| number | - | (D) | - | - | - | (D) | (D) | - |
| 50 to 99 .... farms | - | 2 | - | - | - | 1 | - | - |
| number | - | (D) | - | - | - | (D) | - | - |
| 100 to 199 .... farms | - | - | 1 | - | - | 1 | - | - |
| number | - | - | (D) | - | - | (D) | - | - |
| 200 to 499 .... farms | 1 | 2 | - | - | - | - | 1 | - |
| number | (D) | (D) | - | - | - | - | (D) | - |
| 500 or more .... farms | - | - | - | - | 1 | - | - | 1 |
| number | - | - | - | - | (D) | - | - | (D) |

Table 12. **Hogs and Pigs – Inventory and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Total hogs and pigs ..... farms, 2012 | 934 | 5 | 10 | 39 | 9 | 19 | 36 | 5 |
| 2007 | 1,463 | 24 | 11 | 46 | 5 | 22 | 46 | 7 |
| number, 2012 | 19,861 | (D) | 107 | (D) | 55 | 318 | 636 | 10 |
| 2007 | 28,545 | 365 | 134 | 2,273 | 665 | 227 | 982 | 116 |
| Farms by inventory: | | | | | | | | |
| 1 to 24 ..... farms, 2012 | 855 | 3 | 9 | 38 | 8 | 16 | 34 | 5 |
| 2007 | 1,339 | 19 | 9 | 42 | 1 | 19 | 44 | 7 |
| number, 2012 | 3,986 | 9 | (D) | 161 | (D) | 72 | (D) | 10 |
| 2007 | 6,966 | (D) | (D) | (D) | (D) | 83 | (D) | 116 |
| 25 to 49 ..... farms, 2012 | 44 | - | 1 | - | 1 | 1 | 1 | - |
| 2007 | 82 | 4 | 2 | 2 | 2 | 3 | 1 | - |
| number, 2012 | 1,428 | - | (D) | - | (D) | (D) | (D) | - |
| 2007 | 2,754 | 112 | (D) | (D) | (D) | 144 | (D) | - |
| 50 to 99 ..... farms, 2012 | 17 | - | - | - | - | 1 | - | - |
| 2007 | 18 | - | - | 1 | - | - | - | - |
| number, 2012 | 1,273 | - | - | - | - | (D) | - | - |
| 2007 | 1,179 | - | - | (D) | - | - | - | - |
| 100 to 199 ..... farms, 2012 | 6 | 1 | - | - | - | 1 | - | - |
| 2007 | 11 | 1 | - | - | 1 | - | - | - |
| number, 2012 | (D) | (D) | - | - | - | (D) | - | - |
| 2007 | 1,511 | (D) | - | - | (D) | - | - | - |
| 200 to 499 ..... farms, 2012 | 6 | - | - | - | - | - | 1 | - |
| 2007 | 3 | - | - | - | 1 | - | - | - |
| number, 2012 | 1,838 | - | - | - | - | - | (D) | - |
| 2007 | 1,187 | - | - | - | (D) | - | - | - |
| 500 to 999 ..... farms, 2012 | 1 | - | - | - | - | - | - | - |
| 2007 | 4 | - | - | - | - | - | 1 | - |
| number, 2012 | (D) | - | - | - | - | - | - | - |
| 2007 | 3,005 | - | - | - | - | - | (D) | - |
| 1,000 or more ..... farms, 2012 | 5 | 1 | - | 1 | - | - | - | - |
| 2007 | 6 | - | - | 1 | - | - | - | - |
| number, 2012 | 9,960 | (D) | - | (D) | - | - | - | - |
| 2007 | 11,943 | - | - | (D) | - | - | - | - |
| Hogs and pigs used or to be used for breeding ..... farms, 2012 | 376 | 2 | 3 | 21 | 2 | 8 | 14 | 1 |
| 2007 | 601 | 9 | 2 | 25 | 5 | 12 | 17 | 2 |
| number, 2012 | 2,926 | (D) | 19 | 129 | (D) | 52 | 58 | (D) |
| 2007 | 4,522 | 115 | (D) | (D) | (D) | 53 | 72 | (D) |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 24 ..... | 360 | - | 3 | 20 | 2 | 8 | 14 | 1 |
| 25 to 49 ..... | 8 | 1 | - | - | - | - | - | - |
| 50 to 99 ..... | 4 | - | - | 1 | - | - | - | - |
| 100 or more ..... | 4 | 1 | - | - | - | - | - | - |
| Other hogs and pigs ..... farms, 2012 | 760 | 5 | 10 | 28 | 8 | 16 | 29 | 5 |
| 2007 | 1,215 | 21 | 11 | 36 | 4 | 21 | 35 | 6 |
| number, 2012 | 16,935 | (D) | 88 | (D) | (D) | 266 | 578 | (D) |
| 2007 | 24,023 | 250 | (D) | (D) | (D) | 174 | 910 | (D) |
| **SALES** | | | | | | | | |
| Hogs and pigs sold ..... farms, 2012 | 1,303 | 5 | 7 | 39 | 21 | 27 | 68 | 9 |
| 2007 | 1,596 | 21 | 11 | 68 | 15 | 30 | 62 | 7 |
| number, 2012 | 27,141 | (D) | 51 | 1,929 | 144 | 396 | 777 | 44 |
| 2007 | 58,917 | 2,035 | 95 | 3,286 | 1,304 | 227 | 1,011 | 1,014 |
| $1,000, 2012 | 4,542 | (D) | 4 | 345 | 38 | 73 | (D) | 9 |
| 2007 | 5,921 | 132 | 8 | 378 | 122 | 25 | 37 | 58 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 24 ..... farms | 1,191 | 3 | 7 | 35 | 20 | 22 | 66 | 9 |
| number | 6,491 | 9 | 51 | (D) | (D) | 102 | (D) | 44 |
| 25 to 49 ..... farms | 65 | - | - | 2 | - | 3 | 1 | - |
| number | 2,148 | - | - | (D) | - | (D) | (D) | - |
| 50 to 99 ..... farms | 18 | - | - | 1 | 1 | 1 | - | - |
| number | 1,149 | - | - | (D) | (D) | (D) | - | - |
| 100 to 199 ..... farms | 10 | - | - | - | - | 1 | - | - |
| number | 1,405 | - | - | - | - | (D) | - | - |
| 200 to 499 ..... farms | 11 | 1 | - | - | - | - | 1 | - |
| number | 2,634 | (D) | - | - | - | - | (D) | - |
| 500 to 999 ..... farms | 4 | - | - | - | - | - | - | - |
| number | 2,950 | - | - | - | - | - | - | - |
| 1,000 or more ..... farms | 4 | 1 | - | 1 | - | - | - | - |
| number | 10,364 | (D) | - | (D) | - | - | - | - |

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Table 12. **Hogs and Pigs – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Total hogs and pigs ....farms, 2012 | 10 | 5 | 6 | 17 | 1 | 27 | 19 | 8 |
| 2007 | 12 | 19 | 9 | 30 | 5 | 87 | 30 | 13 |
| number, 2012 | 51 | 10 | 26 | 151 | (D) | 120 | 250 | 92 |
| 2007 | 77 | 98 | 49 | 407 | 33 | 4,712 | 174 | 33 |
| Farms by inventory: | | | | | | | | |
| 1 to 24 ....farms, 2012 | 10 | 5 | 6 | 15 | 1 | 27 | 15 | 6 |
| 2007 | 12 | 19 | 9 | 26 | 5 | 74 | 28 | 13 |
| number, 2012 | 51 | 10 | 26 | (D) | (D) | 120 | 103 | (D) |
| 2007 | 77 | 98 | 49 | (D) | 33 | 475 | (D) | 33 |
| 25 to 49 ....farms, 2012 | - | - | - | 2 | - | - | 3 | 2 |
| 2007 | - | - | - | 1 | - | 9 | 2 | - |
| number, 2012 | - | - | - | (D) | - | - | (D) | (D) |
| 2007 | - | - | - | (D) | - | 322 | (D) | - |
| 50 to 99 ....farms, 2012 | - | - | - | - | - | - | 1 | - |
| 2007 | - | - | - | 3 | - | 1 | - | - |
| number, 2012 | - | - | - | - | - | - | (D) | - |
| 2007 | - | - | - | 210 | - | (D) | - | - |
| 100 to 199 ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| 200 to 499 ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| 500 to 999 ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | 1 | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | (D) | - | - |
| 1,000 or more ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | 2 | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | (D) | - | - |
| Hogs and pigs used or to be used for breeding ....farms, 2012 | 7 | - | 3 | 8 | 1 | 7 | 12 | 2 |
| 2007 | 8 | 8 | 2 | 14 | - | 39 | 13 | 8 |
| number, 2012 | 20 | - | 7 | 54 | (D) | 24 | 49 | (D) |
| 2007 | 10 | 28 | (D) | 121 | - | 403 | 40 | 26 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 24 .... | 7 | - | 3 | 7 | 1 | 7 | 12 | 2 |
| 25 to 49 .... | - | - | - | 1 | - | - | - | - |
| 50 to 99 .... | - | - | - | - | - | - | - | - |
| 100 or more .... | - | - | - | - | - | - | - | - |
| Other hogs and pigs ....farms, 2012 | 7 | 5 | 4 | 13 | - | 23 | 15 | 8 |
| 2007 | 10 | 16 | 9 | 22 | 5 | 76 | 21 | 5 |
| number, 2012 | 31 | 10 | 19 | 97 | - | 96 | 201 | (D) |
| 2007 | 67 | 70 | (D) | 286 | 33 | 4,309 | 134 | 7 |
| **SALES** | | | | | | | | |
| Hogs and pigs sold ....farms, 2012 | 14 | 14 | 9 | 21 | - | 32 | 29 | 21 |
| 2007 | 25 | 20 | 11 | 30 | 3 | 81 | 47 | 13 |
| number, 2012 | 94 | 72 | 312 | 506 | - | 224 | 396 | 121 |
| 2007 | 157 | 87 | 47 | 1,860 | 15 | 9,355 | 253 | 130 |
| $1,000, 2012 | 19 | 14 | 30 | 48 | - | 42 | 29 | 51 |
| 2007 | 23 | 15 | 8 | 74 | 2 | 1,143 | 33 | 12 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 24 ....farms | 13 | 14 | 4 | 17 | - | 30 | 25 | 20 |
| number | (D) | 72 | 17 | 116 | - | (D) | 127 | (D) |
| 25 to 49 ....farms | 1 | - | - | 2 | - | 2 | 3 | 1 |
| number | (D) | - | - | (D) | - | (D) | (D) | (D) |
| 50 to 99 ....farms | - | - | 5 | 1 | - | - | - | - |
| number | - | - | 295 | (D) | - | - | - | - |
| 100 to 199 ....farms | - | - | - | - | - | - | 1 | - |
| number | - | - | - | - | - | - | (D) | - |
| 200 to 499 ....farms | - | - | - | 1 | - | - | - | - |
| number | - | - | - | (D) | - | - | - | - |
| 500 to 999 ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| 1,000 or more ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |

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Table 12. **Hogs and Pigs – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Total hogs and pigs ..... farms, 2012 | 5 | 41 | 34 | 34 | 21 | 47 | 10 | 17 |
| 2007 | 4 | 74 | 62 | 70 | 47 | 96 | 15 | 23 |
| number, 2012 | 55 | 658 | 281 | 355 | 111 | (D) | 442 | 62 |
| 2007 | 24 | 798 | 592 | 542 | 533 | 623 | 236 | 98 |
| Farms by inventory: | | | | | | | | |
| 1 to 24 ..... farms, 2012 | 4 | 37 | 29 | 32 | 20 | 41 | 6 | 17 |
| 2007 | 4 | 63 | 55 | 68 | 40 | 87 | 13 | 23 |
| number, 2012 | (D) | 151 | 116 | (D) | (D) | 313 | 12 | 62 |
| 2007 | 24 | 416 | 308 | (D) | 281 | 288 | (D) | 98 |
| 25 to 49 ..... farms, 2012 | 1 | 2 | 5 | 1 | 1 | 5 | 1 | - |
| 2007 | - | 8 | 6 | 1 | 6 | 8 | - | - |
| number, 2012 | (D) | (D) | 165 | (D) | (D) | (D) | (D) | - |
| 2007 | - | 217 | (D) | (D) | (D) | (D) | - | - |
| 50 to 99 ..... farms, 2012 | - | 1 | - | - | - | 1 | 1 | - |
| 2007 | - | 3 | 1 | - | 1 | 1 | 1 | - |
| number, 2012 | - | (D) | - | - | - | (D) | (D) | - |
| 2007 | - | 165 | (D) | - | (D) | (D) | (D) | - |
| 100 to 199 ..... farms, 2012 | - | - | - | 1 | - | - | 1 | - |
| 2007 | - | - | - | 1 | - | - | 1 | - |
| number, 2012 | - | - | - | (D) | - | - | (D) | - |
| 2007 | - | - | - | (D) | - | - | (D) | - |
| 200 to 499 ..... farms, 2012 | - | 1 | - | - | - | - | 1 | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | (D) | - | - | - | - | (D) | - |
| 2007 | - | - | - | - | - | - | - | - |
| 500 to 999 ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| 1,000 or more ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Hogs and pigs used or to be used for breeding ..... farms, 2012 | 1 | 15 | 14 | 14 | 8 | 24 | 6 | 4 |
| 2007 | - | 26 | 34 | 11 | 27 | 53 | 8 | 10 |
| number, 2012 | (D) | 119 | 35 | 61 | 24 | (D) | 56 | 10 |
| 2007 | - | 152 | 150 | 53 | 150 | 214 | 74 | 31 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 24 ..... | 1 | 14 | 14 | 13 | 8 | 23 | 6 | 4 |
| 25 to 49 ..... | - | - | - | 1 | - | 1 | - | - |
| 50 to 99 ..... | - | 1 | - | - | - | - | - | - |
| 100 or more ..... | - | - | - | - | - | - | - | - |
| Other hogs and pigs ..... farms, 2012 | 5 | 33 | 29 | 26 | 18 | 40 | 8 | 14 |
| 2007 | 4 | 62 | 50 | 64 | 42 | 73 | 10 | 22 |
| number, 2012 | (D) | 539 | 246 | 294 | 87 | 409 | 386 | 52 |
| 2007 | 24 | 646 | 442 | 489 | 383 | 409 | 162 | 67 |
| **SALES** | | | | | | | | |
| Hogs and pigs sold ..... farms, 2012 | 9 | 70 | 45 | 43 | 40 | 72 | 8 | 17 |
| 2007 | - | 65 | 70 | 68 | 62 | 94 | 15 | 26 |
| number, 2012 | 76 | 837 | 381 | 934 | 390 | (D) | 557 | 108 |
| 2007 | - | 2,109 | 1,198 | 1,330 | 1,236 | 1,849 | 474 | 369 |
| $1,000, 2012 | 46 | 136 | 149 | (D) | 37 | 92 | 76 | 16 |
| 2007 | - | 99 | 131 | 167 | 137 | 117 | 34 | 22 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 24 ..... farms | 9 | 63 | 43 | 39 | 37 | 66 | 5 | 16 |
| number | 76 | 287 | (D) | (D) | 171 | 407 | 53 | (D) |
| 25 to 49 ..... farms | - | 5 | 2 | 3 | 2 | 4 | - | 1 |
| number | - | (D) | (D) | (D) | (D) | 137 | - | (D) |
| 50 to 99 ..... farms | - | - | - | - | - | 2 | 1 | - |
| number | - | - | - | - | - | (D) | (D) | - |
| 100 to 199 ..... farms | - | - | - | - | 1 | - | - | - |
| number | - | - | - | - | (D) | - | - | - |
| 200 to 499 ..... farms | - | 2 | - | - | - | - | 2 | - |
| number | - | (D) | - | - | - | - | (D) | - |
| 500 to 999 ..... farms | - | - | - | 1 | - | - | - | - |
| number | - | - | - | (D) | - | - | - | - |
| 1,000 or more ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |

--continued

Table 12. **Hogs and Pigs – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Total hogs and pigs ....farms, 2012 | 33 | 1 | 10 | 70 | 18 | 33 | 10 | 50 |
| 2007 | 42 | 8 | 9 | 88 | 15 | 29 | 4 | 73 |
| number, 2012 | 248 | (D) | (D) | 435 | 134 | 198 | 40 | 463 |
| 2007 | 256 | 87 | 224 | 474 | 153 | 456 | 8 | 678 |
| Farms by inventory: | | | | | | | | |
| 1 to 24 ....farms, 2012 | 31 | 1 | 9 | 66 | 16 | 31 | 10 | 46 |
| 2007 | 41 | 6 | 7 | 87 | 12 | 23 | 4 | 70 |
| number, 2012 | (D) | (D) | (D) | 250 | (D) | (D) | 40 | 262 |
| 2007 | (D) | (D) | (D) | (D) | 50 | 139 | 8 | 393 |
| 25 to 49 ....farms, 2012 | - | - | - | 3 | 2 | 2 | - | 3 |
| 2007 | 1 | 2 | 1 | - | 3 | 4 | - | 2 |
| number, 2012 | - | - | - | (D) | (D) | (D) | - | (D) |
| 2007 | (D) | (D) | (D) | - | 103 | (D) | - | (D) |
| 50 to 99 ....farms, 2012 | 2 | - | - | 1 | - | - | - | 1 |
| 2007 | - | - | - | 1 | - | 1 | - | - |
| number, 2012 | (D) | - | - | (D) | - | - | - | (D) |
| 2007 | - | - | - | (D) | - | (D) | - | - |
| 100 to 199 ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | 1 | - | - | 1 | - | 1 |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | (D) | - | - | (D) | - | (D) |
| 200 to 499 ....farms, 2012 | - | - | 1 | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | (D) | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| 500 to 999 ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| 1,000 or more ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Hogs and pigs used or to be used for breeding ....farms, 2012 | 18 | - | 3 | 23 | 8 | 15 | 5 | 16 |
| 2007 | 15 | 1 | 4 | 19 | 6 | 10 | - | 33 |
| number, 2012 | 45 | - | (D) | 94 | 48 | 77 | 8 | 104 |
| 2007 | 66 | (D) | 17 | 118 | 19 | 41 | - | 200 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 24 .... | 18 | - | 3 | 23 | 8 | 14 | 5 | 16 |
| 25 to 49 .... | - | - | - | - | - | 1 | - | - |
| 50 to 99 .... | - | - | - | - | - | - | - | - |
| 100 or more .... | - | - | - | - | - | - | - | - |
| Other hogs and pigs ....farms, 2012 | 18 | 1 | 9 | 65 | 16 | 25 | 5 | 42 |
| 2007 | 34 | 8 | 9 | 83 | 12 | 27 | 4 | 66 |
| number, 2012 | 203 | (D) | (D) | 341 | 86 | 121 | 32 | 359 |
| 2007 | 190 | (D) | 207 | 356 | 134 | 415 | 8 | 478 |
| **SALES** | | | | | | | | |
| Hogs and pigs sold ....farms, 2012 | 30 | - | 24 | 71 | 36 | 67 | 4 | 51 |
| 2007 | 41 | 14 | 14 | 93 | 23 | 42 | 7 | 67 |
| number, 2012 | 291 | - | 474 | 867 | 217 | 403 | 47 | (D) |
| 2007 | 291 | 183 | 246 | 1,742 | 267 | 671 | 38 | 960 |
| $1,000, 2012 | 94 | - | 75 | 99 | 75 | (D) | 7 | 91 |
| 2007 | 34 | 30 | 20 | 113 | 41 | 69 | 5 | 91 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 24 ....farms | 28 | - | 21 | 64 | 34 | 67 | 3 | 45 |
| number | (D) | - | (D) | 299 | (D) | 403 | (D) | (D) |
| 25 to 49 ....farms | 1 | - | 2 | 2 | 2 | - | 1 | 5 |
| number | (D) | - | (D) | (D) | (D) | - | (D) | 166 |
| 50 to 99 ....farms | 1 | - | - | 3 | - | - | - | - |
| number | (D) | - | - | 177 | - | - | - | - |
| 100 to 199 ....farms | - | - | - | 1 | - | - | - | 1 |
| number | - | - | - | (D) | - | - | - | (D) |
| 200 to 499 ....farms | - | - | 1 | 1 | - | - | - | - |
| number | - | - | (D) | (D) | - | - | - | - |
| 500 to 999 ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| 1,000 or more ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |

--continued

Table 12. **Hogs and Pigs – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Total hogs and pigs ..... farms, 2012 | 47 | 42 | 48 | - | 7 | 56 | 19 | 65 |
| 2007 | 98 | 45 | 84 | - | 28 | 66 | 23 | 94 |
| number, 2012 | 371 | (D) | 644 | - | 68 | 327 | 4,681 | 449 |
| 2007 | 736 | 940 | 777 | - | 645 | 304 | 8,488 | 528 |
| Farms by inventory: | | | | | | | | |
| 1 to 24 ..... farms, 2012 | 45 | 35 | 45 | - | 6 | 55 | 14 | 61 |
| 2007 | 97 | 41 | 78 | - | 23 | 65 | 13 | 92 |
| number, 2012 | (D) | 130 | 212 | - | (D) | (D) | 93 | 216 |
| 2007 | (D) | 192 | 464 | - | (D) | (D) | 61 | (D) |
| 25 to 49 ..... farms, 2012 | 1 | 3 | - | - | 1 | 1 | - | 1 |
| 2007 | - | 2 | 3 | - | 4 | - | 3 | 2 |
| number, 2012 | (D) | 103 | - | - | (D) | (D) | - | (D) |
| 2007 | - | (D) | 117 | - | 120 | - | 121 | (D) |
| 50 to 99 ..... farms, 2012 | 1 | 1 | 2 | - | - | - | 1 | 3 |
| 2007 | - | - | 3 | - | - | 1 | - | - |
| number, 2012 | (D) | (D) | (D) | - | - | - | (D) | (D) |
| 2007 | - | - | 196 | - | - | (D) | - | - |
| 100 to 199 ..... farms, 2012 | - | 1 | - | - | - | - | 1 | - |
| 2007 | 1 | 1 | - | - | - | - | 2 | - |
| number, 2012 | - | (D) | - | - | - | - | (D) | - |
| 2007 | (D) | (D) | - | - | - | - | (D) | - |
| 200 to 499 ..... farms, 2012 | - | 1 | 1 | - | - | - | - | - |
| 2007 | - | - | - | - | 1 | - | 1 | - |
| number, 2012 | - | (D) | (D) | - | - | - | - | - |
| 2007 | - | - | - | - | (D) | - | (D) | - |
| 500 to 999 ..... farms, 2012 | - | 1 | - | - | - | - | - | - |
| 2007 | - | 1 | - | - | - | - | 1 | - |
| number, 2012 | - | (D) | - | - | - | - | - | - |
| 2007 | - | (D) | - | - | - | - | (D) | - |
| 1,000 or more ..... farms, 2012 | - | - | - | - | - | - | 3 | - |
| 2007 | - | - | - | - | - | - | 3 | - |
| number, 2012 | - | - | - | - | - | - | (D) | - |
| 2007 | - | - | - | - | - | - | (D) | - |
| Hogs and pigs used or to be used for breeding ..... farms, 2012 | 17 | 15 | 19 | - | 4 | 23 | 9 | 24 |
| 2007 | 33 | 11 | 32 | - | 9 | 41 | 11 | 43 |
| number, 2012 | 63 | 156 | 141 | - | 18 | 68 | 542 | 114 |
| 2007 | 183 | 133 | 231 | - | 69 | 141 | 968 | 171 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 24 ..... | 17 | 12 | 17 | - | 4 | 23 | 6 | 24 |
| 25 to 49 ..... | - | 2 | 1 | - | - | - | - | - |
| 50 to 99 ..... | - | 1 | 1 | - | - | - | - | - |
| 100 or more ..... | - | - | - | - | - | - | 3 | - |
| Other hogs and pigs ..... farms, 2012 | 38 | 36 | 38 | - | 5 | 45 | 19 | 49 |
| 2007 | 82 | 42 | 74 | - | 25 | 33 | 23 | 68 |
| number, 2012 | 308 | (D) | 503 | - | 50 | 259 | 4,139 | 335 |
| 2007 | 553 | 807 | 546 | - | 576 | 163 | 7,520 | 357 |
| **SALES** | | | | | | | | |
| Hogs and pigs sold ..... farms, 2012 | 71 | 43 | 62 | 8 | 18 | 95 | 25 | 78 |
| 2007 | 101 | 41 | 88 | - | 27 | 76 | 34 | 84 |
| number, 2012 | 575 | 1,848 | 831 | 46 | 103 | 697 | 6,122 | 715 |
| 2007 | 1,991 | 2,355 | 1,515 | - | 449 | 530 | 13,912 | 4,326 |
| $1,000, 2012 | (D) | (D) | 136 | (D) | 24 | 117 | 977 | 93 |
| 2007 | 201 | 193 | 132 | - | 48 | 57 | 1,566 | 545 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 24 ..... farms | 69 | 36 | 52 | 8 | 17 | 92 | 19 | 73 |
| number | (D) | 175 | (D) | 46 | (D) | 592 | 103 | 335 |
| 25 to 49 ..... farms | 1 | 4 | 8 | - | 1 | 3 | 1 | 2 |
| number | (D) | 133 | 273 | - | (D) | 105 | (D) | (D) |
| 50 to 99 ..... farms | - | - | - | - | - | - | 1 | 1 |
| number | - | - | - | - | - | - | (D) | (D) |
| 100 to 199 ..... farms | - | 1 | 2 | - | - | - | - | 2 |
| number | - | (D) | (D) | - | - | - | - | (D) |
| 200 to 499 ..... farms | 1 | - | - | - | - | - | 1 | - |
| number | (D) | - | - | - | - | - | (D) | - |
| 500 to 999 ..... farms | - | 2 | - | - | - | - | 1 | - |
| number | - | (D) | - | - | - | - | (D) | - |
| 1,000 or more ..... farms | - | - | - | - | - | - | 2 | - |
| number | - | - | - | - | - | - | (D) | - |

## Table 13. **Sheep and Lambs – Inventory, Wool Production, and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Sheep and lambs inventory ....farms, 2012 | 1,967 | 15 | 7 | 72 | 23 | 53 | 106 | 4 |
| 2007 | 2,366 | 20 | 5 | 75 | 19 | 57 | 120 | 3 |
| number, 2012 | 44,863 | 1,078 | (D) | 1,371 | 322 | 882 | 1,158 | 212 |
| 2007 | 53,220 | 1,133 | 86 | 1,949 | 216 | 862 | 2,217 | 115 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 24 ....farms | 1,592 | 12 | 6 | 63 | 20 | 43 | 97 | 1 |
| number | 12,830 | 94 | 34 | 450 | 102 | 396 | 648 | (D) |
| 25 to 99 ....farms | 328 | 1 | 1 | 7 | 2 | 9 | 9 | 3 |
| number | 14,323 | (D) | (D) | (D) | (D) | (D) | 510 | (D) |
| 100 to 299 ....farms | 37 | 1 | - | 2 | 1 | 1 | - | - |
| number | 6,083 | (D) | - | (D) | (D) | (D) | - | - |
| 300 to 999 ....farms | 7 | 1 | - | - | - | - | - | - |
| number | 3,404 | (D) | - | - | - | - | - | - |
| 1,000 or more ....farms | 3 | - | - | - | - | - | - | - |
| number | 8,223 | - | - | - | - | - | - | - |
| Ewes 1 year old or older ....farms, 2012 | 1,500 | 4 | 5 | 47 | 12 | 48 | 79 | 3 |
| 2007 | 1,977 | 18 | 2 | 55 | 18 | 45 | 100 | 2 |
| number, 2012 | 26,318 | (D) | 40 | 735 | 162 | 518 | 612 | 159 |
| 2007 | 35,138 | 883 | (D) | 1,205 | 158 | 503 | 1,318 | (D) |
| Wool production ....farms, 2012 | 1,476 | 9 | 6 | 62 | 15 | 31 | 75 | 4 |
| 2007 | 1,172 | 9 | 1 | 39 | 9 | 38 | 45 | 1 |
| pounds, 2012 | 293,004 | 4,461 | (D) | 9,687 | 925 | 3,642 | 6,501 | 1,755 |
| 2007 | 287,844 | 6,700 | (D) | 7,167 | 684 | 3,059 | 9,406 | (D) |
| $1,000, 2012 | 254 | (D) | - | 3 | (D) | 2 | 1 | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Sheep and lambs sold ....farms, 2012 | 1,065 | 7 | 3 | 38 | 10 | 22 | 42 | 3 |
| 2007 | 1,416 | 17 | 1 | 52 | 3 | 28 | 43 | 3 |
| number, 2012 | 30,262 | 620 | (D) | 790 | 249 | 272 | 525 | 164 |
| 2007 | 36,613 | 1,207 | (D) | 1,152 | 101 | 340 | 1,013 | (D) |
| $1,000, 2012 | 6,047 | 93 | (D) | 140 | 60 | 36 | 93 | 36 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| Sheep and lambs inventory ....farms, 2012 | 23 | 9 | 27 | 11 | 6 | 49 | 18 | 38 |
| 2007 | 48 | 13 | 33 | 26 | 7 | 57 | 22 | 45 |
| number, 2012 | 518 | 82 | 320 | 306 | 1,014 | 880 | 136 | 655 |
| 2007 | 695 | 180 | 362 | 641 | 191 | 1,255 | 117 | 858 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 24 ....farms | 19 | 8 | 21 | 7 | - | 38 | 17 | 24 |
| number | 161 | (D) | 157 | (D) | - | 332 | (D) | 161 |
| 25 to 99 ....farms | 3 | 1 | 6 | 3 | 5 | 11 | 1 | 14 |
| number | (D) | (D) | 163 | 124 | (D) | 548 | (D) | 494 |
| 100 to 299 ....farms | 1 | - | - | 1 | - | - | - | - |
| number | (D) | - | - | (D) | - | - | - | - |
| 300 to 999 ....farms | - | - | - | - | 1 | - | - | - |
| number | - | - | - | - | (D) | - | - | - |
| 1,000 or more ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Ewes 1 year old or older ....farms, 2012 | 17 | 8 | 16 | 7 | 5 | 32 | 11 | 31 |
| 2007 | 39 | 12 | 30 | 22 | 4 | 50 | 13 | 40 |
| number, 2012 | 325 | 43 | 85 | 203 | 542 | 569 | 52 | 467 |
| 2007 | 431 | 116 | 251 | 492 | 129 | 915 | 80 | 545 |
| Wool production ....farms, 2012 | 13 | 8 | 26 | 8 | 1 | 35 | 11 | 29 |
| 2007 | 17 | 12 | 13 | 12 | 1 | 19 | 9 | 27 |
| pounds, 2012 | 912 | 570 | 1,945 | 1,880 | (D) | 4,663 | 769 | 3,015 |
| 2007 | 2,523 | 1,106 | 1,244 | 3,159 | (D) | 4,832 | 155 | 3,240 |
| $1,000, 2012 | - | (D) | (Z) | 1 | (D) | 1 | - | 2 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Sheep and lambs sold ....farms, 2012 | 12 | 8 | 14 | 10 | 6 | 36 | 11 | 22 |
| 2007 | 22 | 11 | 17 | 28 | 6 | 39 | 12 | 23 |
| number, 2012 | 319 | 83 | 107 | 256 | 276 | 716 | 156 | 230 |
| 2007 | 326 | 144 | 210 | 667 | 92 | 1,098 | 147 | 287 |
| $1,000, 2012 | 38 | 11 | 18 | 49 | 39 | 144 | 38 | 41 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |

--continued

Table 13. **Sheep and Lambs – Inventory, Wool Production, and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Sheep and lambs inventory ..... farms, 2012 | 24 | 107 | 72 | 53 | 49 | 114 | 46 | 37 |
| 2007 | 19 | 156 | 77 | 38 | 62 | 117 | 40 | 46 |
| number, 2012 | 363 | 1,571 | 591 | 1,765 | 1,462 | 1,784 | 1,131 | 315 |
| 2007 | 386 | 1,751 | 1,099 | 881 | 2,575 | 1,705 | 1,054 | 538 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 24 ..... farms | 17 | 87 | 69 | 41 | 37 | 93 | 26 | 35 |
| number | 89 | 616 | 468 | 383 | 379 | (D) | (D) | (D) |
| 25 to 99 ..... farms | 7 | 20 | 3 | 8 | 8 | 19 | 19 | 2 |
| number | 274 | 955 | 123 | 282 | 456 | 764 | 838 | (D) |
| 100 to 299 ..... farms | - | - | - | 2 | 4 | 2 | 1 | - |
| number | - | - | - | (D) | 627 | (D) | (D) | - |
| 300 to 999 ..... farms | - | - | - | 2 | - | - | - | - |
| number | - | - | - | (D) | - | - | - | - |
| 1,000 or more ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Ewes 1 year old or older ..... farms, 2012 | 14 | 77 | 54 | 40 | 45 | 91 | 37 | 26 |
| 2007 | 18 | 107 | 66 | 34 | 59 | 100 | 35 | 33 |
| number, 2012 | 205 | 849 | 290 | 1,122 | 871 | 1,148 | 682 | 169 |
| 2007 | 247 | 827 | 791 | 639 | 1,445 | 1,042 | 611 | 333 |
| Wool production ..... farms, 2012 | 15 | 81 | 64 | 45 | 37 | 70 | 34 | 27 |
| 2007 | 11 | 75 | 43 | 28 | 40 | 50 | 13 | 10 |
| pounds, 2012 | 1,017 | 6,399 | 2,985 | 14,920 | 9,259 | 5,623 | 5,570 | (D) |
| 2007 | 493 | 6,154 | 4,406 | 5,069 | 18,750 | 6,860 | 2,660 | 730 |
| $1,000, 2012 | (D) | 2 | 3 | (D) | 4 | 3 | 2 | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Sheep and lambs sold ..... farms, 2012 | 12 | 62 | 35 | 38 | 28 | 55 | 32 | 15 |
| 2007 | 9 | 80 | 34 | 30 | 57 | 68 | 25 | 31 |
| number, 2012 | 174 | 702 | 172 | 1,700 | 622 | 874 | 404 | 117 |
| 2007 | 146 | 807 | 356 | 613 | 1,044 | 895 | 601 | 257 |
| $1,000, 2012 | 49 | 144 | 39 | 343 | 88 | 171 | 56 | 24 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Sheep and lambs inventory ..... farms, 2012 | 75 | 7 | 8 | 116 | 52 | 63 | 10 | 83 |
| 2007 | 92 | 19 | 24 | 130 | 97 | 61 | 19 | 122 |
| number, 2012 | 1,527 | 151 | 147 | 1,863 | 1,026 | 1,251 | 172 | 1,431 |
| 2007 | 1,725 | 225 | 227 | 2,129 | 3,013 | 1,369 | 288 | 2,202 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 24 ..... farms | 53 | 5 | 5 | 101 | 42 | 50 | 6 | 72 |
| number | (D) | (D) | 52 | (D) | 480 | (D) | 55 | (D) |
| 25 to 99 ..... farms | 21 | 2 | 3 | 13 | 9 | 11 | 4 | 8 |
| number | 933 | (D) | 95 | 736 | (D) | 628 | 117 | 348 |
| 100 to 299 ..... farms | 1 | - | - | 2 | 1 | 2 | - | 2 |
| number | (D) | - | - | (D) | (D) | (D) | - | (D) |
| 300 to 999 ..... farms | - | - | - | - | - | - | - | 1 |
| number | - | - | - | - | - | - | - | (D) |
| 1,000 or more ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Ewes 1 year old or older ..... farms, 2012 | 60 | 7 | 4 | 79 | 45 | 57 | 8 | 70 |
| 2007 | 68 | 16 | 24 | 108 | 90 | 50 | 17 | 111 |
| number, 2012 | 783 | 97 | 48 | 664 | 638 | 810 | 80 | 770 |
| 2007 | 1,084 | 135 | 114 | 1,371 | 1,674 | 910 | 157 | 1,399 |
| Wool production ..... farms, 2012 | 54 | 5 | 8 | 89 | 41 | 45 | 8 | 61 |
| 2007 | 58 | 7 | 5 | 47 | 63 | 35 | 12 | 64 |
| pounds, 2012 | 12,629 | 1,105 | 587 | 6,750 | 6,137 | 4,411 | 672 | 3,917 |
| 2007 | 10,104 | 965 | 197 | 8,026 | 11,709 | 5,051 | 1,980 | 5,932 |
| $1,000, 2012 | 2 | - | - | 2 | 2 | 2 | - | 2 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Sheep and lambs sold ..... farms, 2012 | 56 | 5 | 6 | 49 | 29 | 43 | 5 | 35 |
| 2007 | 49 | 11 | 2 | 67 | 66 | 50 | 17 | 63 |
| number, 2012 | 842 | 126 | 67 | 562 | 407 | 696 | 54 | 681 |
| 2007 | 1,245 | 93 | (D) | 734 | 1,353 | 709 | 210 | 1,535 |
| $1,000, 2012 | 144 | 13 | 9 | (D) | 77 | 140 | 8 | 128 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |

--continued

Table 13. **Sheep and Lambs – Inventory, Wool Production, and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Sheep and lambs inventory ....farms, 2012 | 121 | 74 | 87 | 10 | 26 | 87 | 46 | 139 |
| 2007 | 150 | 100 | 86 | 13 | 42 | 79 | 73 | 154 |
| number, 2012 | 2,522 | 3,839 | 1,797 | (D) | 569 | 1,194 | 2,464 | 6,525 |
| 2007 | 2,016 | 3,221 | 1,838 | 446 | 767 | 547 | 2,370 | 9,971 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 24 ....farms | 91 | 49 | 71 | 9 | 20 | 81 | 31 | 125 |
| number | 729 | 482 | 448 | (D) | 166 | 679 | 361 | (D) |
| 25 to 99 ....farms | 27 | 23 | 12 | - | 4 | 4 | 12 | 13 |
| number | 1,041 | (D) | 476 | - | (D) | (D) | 460 | 495 |
| 100 to 299 ....farms | 2 | 1 | 4 | - | 2 | 2 | 2 | - |
| number | (D) | (D) | 873 | - | (D) | (D) | (D) | - |
| 300 to 999 ....farms | 1 | - | - | 1 | - | - | - | - |
| number | (D) | - | - | (D) | - | - | - | - |
| 1,000 or more ....farms | - | 1 | - | - | - | - | 1 | 1 |
| number | - | (D) | - | - | - | - | (D) | (D) |
| Ewes 1 year old or older ....farms, 2012 | 101 | 58 | 61 | 4 | 21 | 69 | 42 | 105 |
| 2007 | 128 | 90 | 63 | 13 | 32 | 70 | 65 | 130 |
| number, 2012 | 1,453 | 2,301 | 1,181 | (D) | 380 | 678 | 1,428 | 4,329 |
| 2007 | 1,153 | 1,749 | 1,162 | 350 | 535 | 302 | 1,896 | 8,030 |
| Wool production ....farms, 2012 | 80 | 56 | 70 | 9 | 26 | 70 | 39 | 109 |
| 2007 | 78 | 58 | 36 | 4 | 25 | 40 | 46 | 72 |
| pounds, 2012 | 7,967 | 26,511 | 12,302 | 1,590 | 8,285 | 4,216 | 11,998 | 89,772 |
| 2007 | 8,835 | 21,394 | 10,077 | 1,662 | 5,151 | 1,535 | 18,915 | 86,915 |
| $1,000, 2012 | 4 | 29 | 1 | - | 4 | 1 | 10 | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Sheep and lambs sold ....farms, 2012 | 63 | 42 | 37 | 5 | 16 | 62 | 27 | 64 |
| 2007 | 94 | 69 | 46 | 10 | 41 | 44 | 57 | 91 |
| number, 2012 | 2,266 | 1,622 | 1,070 | 146 | 568 | 675 | 1,779 | (D) |
| 2007 | 1,049 | 1,724 | 1,497 | 586 | 664 | 276 | 2,893 | 10,209 |
| $1,000, 2012 | 368 | 262 | 197 | 33 | 105 | 137 | 296 | (D) |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |

## Table 14. **All Goats – Inventory and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | | |
|---|---|---|---|---|---|
| | Farms | Number | Farms | Number | Value ($1,000) |
| **State Total** | | | | | |
| Washington ..... 2012 | 2,506 | 27,062 | 944 | 12,515 | 1,688 |
| 2007 | 3,143 | 32,840 | 1,077 | 14,862 | (NA) |
| **Counties, 2012** | | | | | |
| Adams | 4 | 44 | 1 | (D) | (D) |
| Asotin | 11 | 100 | 4 | (D) | 3 |
| Benton | 110 | 1,130 | 53 | 602 | 65 |
| Chelan | 33 | 321 | 18 | 185 | 24 |
| Clallam | 34 | 256 | 17 | 91 | 23 |
| Clark | 180 | 1,602 | 67 | 749 | 104 |
| Columbia | 5 | (D) | 1 | (D) | (D) |
| Cowlitz | 49 | 353 | 21 | 132 | 24 |
| Douglas | 23 | 152 | 9 | 58 | 6 |
| Ferry | 16 | 276 | 1 | (D) | (D) |
| Franklin | 38 | 482 | 13 | 139 | 27 |
| Garfield | 5 | 27 | 2 | (D) | (D) |
| Grant | 43 | 706 | 15 | 586 | 89 |
| Grays Harbor | 44 | 369 | 16 | 166 | 34 |
| Island | 36 | 280 | 11 | 72 | 14 |
| Jefferson | 26 | 286 | 11 | 132 | 14 |
| King | 154 | 1,193 | 37 | 232 | 32 |
| Kitsap | 91 | 503 | 33 | 122 | 16 |
| Kittitas | 67 | 661 | 32 | 304 | 35 |
| Klickitat | 39 | 608 | 19 | 309 | 33 |
| Lewis | 127 | 973 | 36 | 308 | 46 |
| Lincoln | 29 | 460 | 14 | 261 | 24 |
| Mason | 42 | 275 | 5 | 78 | 7 |
| Okanogan | 74 | 821 | 35 | 281 | 41 |
| Pacific | 10 | 57 | 2 | (D) | (D) |
| Pend Oreille | 26 | 491 | 12 | 299 | 30 |
| Pierce | 165 | 1,308 | 44 | 314 | 72 |
| San Juan | 28 | 249 | 10 | 188 | 27 |
| Skagit | 75 | 460 | 20 | 184 | 25 |
| Skamania | 15 | 190 | 9 | 116 | 22 |
| Snohomish | 134 | 1,438 | 35 | 441 | 96 |
| Spokane | 150 | 1,842 | 59 | 2,300 | 238 |
| Stevens | 80 | 1,063 | 42 | 414 | 59 |
| Thurston | 118 | 1,817 | 46 | 397 | 59 |
| Wahkiakum | 1 | (D) | - | - | - |
| Walla Walla | 38 | 943 | 24 | 546 | 153 |
| Whatcom | 104 | 1,221 | 50 | 611 | 62 |
| Whitman | 42 | 579 | 19 | 303 | 35 |
| Yakima | 240 | 3,374 | 101 | 1,427 | 139 |

## Table 15. **Milk Goats – Inventory and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | | |
|---|---|---|---|---|---|
| | Farms | Number | Farms | Number | Value ($1,000) |
| **State Total** | | | | | |
| Washington.....2012 | 934 | 9,095 | 347 | 3,160 | 574 |
| 2007 | 1,076 | 8,168 | 342 | 3,444 | (NA) |
| **Counties, 2012** | | | | | |
| Adams | 1 | (D) | 1 | (D) | (D) |
| Asotin | 5 | 53 | 2 | (D) | (D) |
| Benton | 15 | 283 | 7 | 151 | 19 |
| Chelan | 9 | (D) | 4 | 25 | 4 |
| Clallam | 18 | 126 | 9 | 76 | 21 |
| Clark | 70 | 584 | 25 | (D) | 52 |
| Columbia | 3 | (D) | - | - | - |
| Cowlitz | 10 | 70 | 6 | (D) | (D) |
| Douglas | 8 | (D) | 4 | 18 | 2 |
| Ferry | 10 | 198 | - | - | - |
| Franklin | 10 | (D) | 8 | 99 | 21 |
| Garfield | 3 | (D) | - | - | - |
| Grant | 8 | (D) | 2 | (D) | (D) |
| Grays Harbor | 25 | 211 | 10 | 103 | 23 |
| Island | 14 | 84 | 5 | 21 | 3 |
| Jefferson | 17 | 215 | 10 | (D) | (D) |
| King | 55 | 283 | 20 | 103 | 17 |
| Kitsap | 42 | 318 | 20 | 86 | 11 |
| Kittitas | 19 | 167 | 7 | 78 | 10 |
| Klickitat | 14 | 111 | 7 | (D) | 17 |
| Lewis | 56 | 249 | 14 | (D) | (D) |
| Lincoln | 11 | 17 | 3 | 15 | 2 |
| Mason | 16 | 89 | 2 | (D) | (D) |
| Okanogan | 38 | 372 | 19 | 150 | 27 |
| Pacific | 3 | (D) | - | - | - |
| Pend Oreille | 6 | (D) | 3 | 14 | 3 |
| Pierce | 52 | 550 | 16 | 159 | 40 |
| San Juan | 11 | 94 | 3 | 18 | 4 |
| Skagit | 18 | 93 | 1 | (D) | (D) |
| Skamania | 2 | (D) | - | - | - |
| Snohomish | 64 | 755 | 17 | 288 | 75 |
| Spokane | 62 | 585 | 24 | 218 | 37 |
| Stevens | 41 | (D) | 19 | 200 | 41 |
| Thurston | 44 | 1,163 | 23 | 205 | 31 |
| Walla Walla | 15 | (D) | 6 | 25 | 6 |
| Whatcom | 44 | 429 | 21 | 225 | 27 |
| Whitman | 20 | 270 | 5 | 84 | 18 |
| Yakima | 75 | (D) | 24 | 96 | 14 |

## Table 16. **Angora Goats – Inventory and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Angora goats | | | | | Mohair | | |
|---|---|---|---|---|---|---|---|---|
| | Inventory | | Sales | | | Production [1] | | Value ($1,000) |
| | Farms | Number | Farms | Number | Value ($1,000) | Farms | Pounds | |
| **State Total** | | | | | | | | |
| Washington..... 2012 | 151 | 939 | 23 | 117 | 10 | 39 | 4,884 | 5 |
| 2007 | 200 | 1,197 | 45 | 294 | (NA) | 105 | 8,313 | (NA) |
| **Counties, 2012** | | | | | | | | |
| Benton | 9 | 69 | 4 | 18 | 1 | 2 | (D) | (D) |
| Chelan | 1 | (D) | - | - | - | - | - | - |
| Clallam | - | - | - | - | - | - | - | (D) |
| Clark | 12 | 43 | 1 | (D) | (D) | 3 | 29 | - |
| Cowlitz | 11 | 37 | 2 | (D) | (D) | 2 | (D) | - |
| Douglas | 1 | (D) | - | - | - | - | - | - |
| Franklin | 1 | (D) | - | - | - | - | - | - |
| Grant | 4 | (D) | - | - | - | - | - | - |
| Island | 9 | 81 | - | - | - | 1 | (D) | (D) |
| King | 13 | 130 | 2 | (D) | (D) | 7 | 931 | (D) |
| Kitsap | 9 | 38 | 4 | 7 | 1 | 2 | (D) | (D) |
| Klickitat | 5 | 61 | 2 | (D) | (D) | 3 | 640 | - |
| Lewis | 8 | 35 | 1 | (D) | (D) | - | - | - |
| Pend Oreille | 2 | (D) | - | - | - | - | - | - |
| Pierce | 16 | 39 | 3 | 7 | (Z) | - | - | (D) |
| Skagit | 6 | 25 | 1 | (D) | (D) | - | - | (D) |
| Snohomish | 9 | 153 | 3 | 20 | 2 | 5 | 1,385 | (D) |
| Spokane | 13 | 80 | - | - | - | 9 | 212 | (D) |
| Stevens | 1 | (D) | - | - | - | - | - | - |
| Thurston | 9 | 32 | - | - | - | 5 | 100 | - |
| Walla Walla | 2 | (D) | - | - | - | - | - | - |
| Whatcom | 5 | 34 | - | - | - | - | - | - |
| Whitman | 3 | 7 | - | - | - | - | - | - |
| Yakima | 2 | (D) | - | - | - | - | - | - |

[1] Data are for farms with production, not necessarily sold.

## Table 17. **Meat Goats – Inventory and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | | |
|---|---|---|---|---|---|
| | Farms | Number | Farms | Number | Value ($1,000) |
| **State Total** | | | | | |
| Washington ..... 2012 | 1,792 | 17,028 | 665 | 9,238 | 1,104 |
| 2007 | 2,478 | 23,475 | 874 | 11,124 | (NA) |
| **Counties, 2012** | | | | | |
| Adams | 4 | (D) | 1 | (D) | (D) |
| Asotin | 9 | 47 | 2 | (D) | (D) |
| Benton | 91 | 778 | 44 | 433 | 45 |
| Chelan | 24 | 277 | 15 | 160 | 20 |
| Clallam | 18 | 130 | 8 | 15 | 2 |
| Clark | 127 | 975 | 47 | 433 | (D) |
| Columbia | 2 | (D) | 1 | (D) | (D) |
| Cowlitz | 35 | 246 | 17 | 113 | 22 |
| Douglas | 16 | 102 | 9 | 40 | 4 |
| Ferry | 11 | 78 | 1 | (D) | (D) |
| Franklin | 28 | 256 | 5 | 40 | 5 |
| Garfield | 2 | (D) | 2 | (D) | (D) |
| Grant | 39 | 553 | 15 | (D) | (D) |
| Grays Harbor | 31 | 158 | 9 | 63 | 11 |
| Island | 22 | 115 | 8 | 51 | 11 |
| Jefferson | 12 | 71 | 2 | (D) | (D) |
| King | 107 | 780 | 19 | (D) | (D) |
| Kitsap | 48 | 147 | 11 | 29 | 4 |
| Kittitas | 57 | 494 | 27 | 226 | 25 |
| Klickitat | 30 | 436 | 14 | 212 | (D) |
| Lewis | 84 | 689 | 26 | 201 | 23 |
| Lincoln | 18 | 443 | 14 | 246 | 21 |
| Mason | 31 | 186 | 3 | (D) | (D) |
| Okanogan | 54 | 449 | 19 | 131 | 14 |
| Pacific | 7 | (D) | 2 | (D) | (D) |
| Pend Oreille | 19 | 420 | 10 | 285 | 27 |
| Pierce | 121 | 719 | 28 | 148 | 32 |
| San Juan | 20 | 155 | 7 | 170 | 23 |
| Skagit | 63 | 342 | 18 | (D) | (D) |
| Skamania | 13 | (D) | 9 | 116 | 22 |
| Snohomish | 83 | 530 | 21 | 133 | 19 |
| Spokane | 97 | 1,177 | 36 | 2,082 | 201 |
| Stevens | 51 | 585 | 25 | 214 | 18 |
| Thurston | 86 | 622 | 31 | 192 | 28 |
| Wahkiakum | 1 | (D) | - | - | - |
| Walla Walla | 30 | 832 | 20 | 521 | 147 |
| Whatcom | 71 | 758 | 34 | 386 | 35 |
| Whitman | 26 | 302 | 17 | 219 | 17 |
| Yakima | 204 | 2,803 | 88 | 1,331 | 125 |

## Table 18. **Equine – Inventory and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | | | Sales | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | | Owned | | Total | | | Owned | | |
| | Farms | Number | Farms | Number | Farms | Number | Value ($1,000) | Farms | Number | Value ($1,000) |
| **HORSES AND PONIES** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington 2012 | 9,923 | 64,616 | 9,516 | 54,342 | (NA) | (NA) | (NA) | 1,937 | 5,180 | 17,770 |
| 2007 | 10,957 | 89,739 | 9,728 | 71,431 | (NA) | (NA) | (NA) | 2,826 | 10,112 | (NA) |
| **Counties, 2012** | | | | | | | | | | |
| Adams | 54 | 373 | 52 | 359 | (NA) | (NA) | (NA) | 10 | 16 | 19 |
| Asotin | 87 | 890 | 81 | 553 | (NA) | (NA) | (NA) | 18 | 37 | 53 |
| Benton | 452 | 2,678 | 444 | 2,472 | (NA) | (NA) | (NA) | 119 | 325 | 1,051 |
| Chelan | 129 | 901 | 120 | 794 | (NA) | (NA) | (NA) | 21 | 50 | 106 |
| Clallam | 126 | 698 | 122 | 633 | (NA) | (NA) | (NA) | 21 | 36 | 112 |
| Clark | 540 | 3,104 | 515 | 2,460 | (NA) | (NA) | (NA) | 112 | 226 | 748 |
| Columbia | 56 | 325 | 56 | 309 | (NA) | (NA) | (NA) | 9 | 31 | 143 |
| Cowlitz | 129 | 589 | 118 | 447 | (NA) | (NA) | (NA) | 25 | 38 | 73 |
| Douglas | 103 | 606 | 97 | 492 | (NA) | (NA) | (NA) | 11 | 22 | 109 |
| Ferry | 108 | 766 | 102 | 655 | (NA) | (NA) | (NA) | 26 | 60 | 58 |
| Franklin | 139 | 840 | 136 | 792 | (NA) | (NA) | (NA) | 16 | 27 | 162 |
| Garfield | 26 | 147 | 24 | 128 | (NA) | (NA) | (NA) | 3 | 6 | 6 |
| Grant | 286 | 2,806 | 275 | 2,673 | (NA) | (NA) | (NA) | 55 | 338 | 388 |
| Grays Harbor | 149 | 957 | 141 | 802 | (NA) | (NA) | (NA) | 36 | 66 | 98 |
| Island | 104 | 798 | 99 | 646 | (NA) | (NA) | (NA) | 23 | 80 | 251 |
| Jefferson | 37 | 197 | 33 | 169 | (NA) | (NA) | (NA) | 2 | (D) | (D) |
| King | 634 | 5,507 | 608 | 3,964 | (NA) | (NA) | (NA) | 148 | 584 | 2,349 |
| Kitsap | 231 | 1,398 | 225 | 1,153 | (NA) | (NA) | (NA) | 46 | 73 | 253 |
| Kittitas | 438 | 3,073 | 415 | 2,628 | (NA) | (NA) | (NA) | 89 | 208 | 1,025 |
| Klickitat | 223 | 1,231 | 206 | 1,038 | (NA) | (NA) | (NA) | 28 | 82 | 194 |
| Lewis | 464 | 2,713 | 448 | 2,385 | (NA) | (NA) | (NA) | 85 | 300 | 724 |
| Lincoln | 196 | 1,516 | 182 | 1,202 | (NA) | (NA) | (NA) | 30 | 87 | 238 |
| Mason | 97 | 466 | 93 | 386 | (NA) | (NA) | (NA) | 15 | 28 | 119 |
| Okanogan | 466 | 2,916 | 444 | 2,592 | (NA) | (NA) | (NA) | 82 | 266 | 562 |
| Pacific | 48 | 146 | 45 | 136 | (NA) | (NA) | (NA) | 10 | 28 | 42 |
| Pend Oreille | 112 | 470 | 110 | 441 | (NA) | (NA) | (NA) | 21 | 51 | 60 |
| Pierce | 519 | 3,841 | 507 | 3,053 | (NA) | (NA) | (NA) | 114 | 245 | 1,298 |
| San Juan | 47 | 321 | 42 | 280 | (NA) | (NA) | (NA) | 11 | 26 | 180 |
| Skagit | 246 | 1,347 | 225 | 1,145 | (NA) | (NA) | (NA) | 64 | 102 | 503 |
| Skamania | 25 | 157 | 25 | 149 | (NA) | (NA) | (NA) | 3 | (D) | 8 |
| Snohomish | 520 | 3,826 | 491 | 2,826 | (NA) | (NA) | (NA) | 92 | 224 | 956 |
| Spokane | 809 | 5,453 | 788 | 4,676 | (NA) | (NA) | (NA) | 182 | 442 | 1,230 |
| Stevens | 390 | 2,387 | 380 | 2,284 | (NA) | (NA) | (NA) | 81 | 237 | 669 |
| Thurston | 434 | 2,895 | 418 | 2,399 | (NA) | (NA) | (NA) | 95 | 219 | 1,128 |
| Wahkiakum | 15 | 48 | 15 | 44 | (NA) | (NA) | (NA) | 1 | (D) | (D) |
| Walla Walla | 229 | 1,133 | 220 | 1,002 | (NA) | (NA) | (NA) | 38 | 136 | 459 |
| Whatcom | 376 | 1,952 | 363 | 1,572 | (NA) | (NA) | (NA) | 45 | 110 | 386 |
| Whitman | 178 | 1,214 | 172 | 904 | (NA) | (NA) | (NA) | 26 | 68 | 183 |
| Yakima | 701 | 3,931 | 679 | 3,699 | (NA) | (NA) | (NA) | 124 | 299 | 1,820 |
| **MULES, BURROS, AND DONKEYS** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington 2012 | 1,286 | 3,615 | (NA) | (NA) | 99 | 272 | 129 | (NA) | (NA) | (NA) |
| 2007 | 1,345 | 3,793 | (NA) | (NA) | 169 | 359 | (NA) | (NA) | (NA) | (NA) |
| **Counties, 2012** | | | | | | | | | | |
| Adams | 9 | 23 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Asotin | 28 | 91 | (NA) | (NA) | 3 | 7 | 3 | (NA) | (NA) | (NA) |
| Benton | 59 | 166 | (NA) | (NA) | 3 | (D) | 1 | (NA) | (NA) | (NA) |
| Chelan | 20 | 107 | (NA) | (NA) | 6 | 14 | 9 | (NA) | (NA) | (NA) |
| Clallam | 26 | 117 | (NA) | (NA) | 3 | 9 | 4 | (NA) | (NA) | (NA) |
| Clark | 56 | 156 | (NA) | (NA) | 1 | (D) | (D) | (NA) | (NA) | (NA) |
| Columbia | 8 | 10 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Cowlitz | 17 | 74 | (NA) | (NA) | 6 | 17 | 6 | (NA) | (NA) | (NA) |
| Douglas | 4 | (D) | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Ferry | 13 | 47 | (NA) | (NA) | 1 | (D) | (D) | (NA) | (NA) | (NA) |
| Franklin | 13 | 30 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Garfield | 3 | 16 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Grant | 31 | 87 | (NA) | (NA) | 5 | 43 | 10 | (NA) | (NA) | (NA) |
| Grays Harbor | 16 | 37 | (NA) | (NA) | 1 | (D) | (D) | (NA) | (NA) | (NA) |
| Island | 17 | 35 | (NA) | (NA) | 1 | (D) | (D) | (NA) | (NA) | (NA) |
| Jefferson | 8 | 13 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| King | 80 | 215 | (NA) | (NA) | 1 | (D) | (D) | (NA) | (NA) | (NA) |
| Kitsap | 16 | 32 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Kittitas | 59 | 172 | (NA) | (NA) | 2 | (D) | (D) | (NA) | (NA) | (NA) |
| Klickitat | 27 | 70 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Lewis | 70 | 177 | (NA) | (NA) | 3 | 7 | 4 | (NA) | (NA) | (NA) |
| Lincoln | 34 | 132 | (NA) | (NA) | 1 | (D) | (D) | (NA) | (NA) | (NA) |
| Mason | 12 | 33 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Okanogan | 52 | 147 | (NA) | (NA) | 5 | 6 | 2 | (NA) | (NA) | (NA) |
| Pacific | 7 | 15 | (NA) | (NA) | 2 | (D) | (D) | (NA) | (NA) | (NA) |
| Pend Oreille | 21 | 59 | (NA) | (NA) | 5 | 13 | 5 | (NA) | (NA) | (NA) |
| Pierce | 66 | 164 | (NA) | (NA) | 2 | (D) | (D) | (NA) | (NA) | (NA) |
| San Juan | 8 | 19 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Skagit | 42 | 172 | (NA) | (NA) | 5 | 29 | 25 | (NA) | (NA) | (NA) |
| Skamania | 10 | 24 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Snohomish | 76 | 196 | (NA) | (NA) | 10 | 26 | 13 | (NA) | (NA) | (NA) |
| Spokane | 119 | 299 | (NA) | (NA) | 12 | 32 | 16 | (NA) | (NA) | (NA) |
| Stevens | 48 | 116 | (NA) | (NA) | 5 | 10 | 5 | (NA) | (NA) | (NA) |
| Thurston | 42 | 77 | (NA) | (NA) | 1 | (D) | (D) | (NA) | (NA) | (NA) |
| Wahkiakum | 2 | (D) | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Walla Walla | 30 | 75 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |

--continued

Table 18. **Equine – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | | | Sales | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | | Owned | | Total | | | Owned | | |
| | Farms | Number | Farms | Number | Farms | Number | Value ($1,000) | Farms | Number | Value ($1,000) |
| **MULES, BURROS, AND DONKEYS** - Con. | | | | | | | | | | |
| **Counties, 2012** - Con. | | | | | | | | | | |
| Whatcom | 39 | 140 | (NA) | (NA) | - | - | - | (NA) | (NA) | (NA) |
| Whitman | 19 | 53 | (NA) | (NA) | 2 | (D) | (D) | (NA) | (NA) | (NA) |
| Yakima | 79 | 212 | (NA) | (NA) | 13 | 17 | 6 | (NA) | (NA) | (NA) |

## Table 19. **Poultry – Inventory and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Any poultry ....farms, 2012 | 6,689 | 42 | 30 | 190 | 73 | 138 | 476 | 20 |
| 2007 | 5,404 | 43 | 22 | 139 | 67 | 103 | 409 | 9 |
| Layers (see text) ....farms, 2012 | 6,276 | 37 | 25 | 168 | 73 | 123 | 457 | 18 |
| 2007 | 4,878 | 36 | 15 | 125 | 61 | 94 | 378 | 9 |
| number, 2012 | 7,236,128 | (D) | 293 | 4,530 | 1,458 | 3,311 | 13,548 | 230 |
| 2007 | 5,785,648 | (D) | 511 | 2,077 | 1,283 | 2,235 | 6,778 | 216 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 49 | 5,860 | 35 | 25 | 159 | 65 | 112 | 421 | 18 |
| 50 to 99 | 255 | - | - | 6 | 7 | 5 | 17 | - |
| 100 to 399 | 128 | - | - | 1 | 1 | 6 | 15 | - |
| 400 to 3,199 | 17 | 1 | - | 2 | - | - | 4 | - |
| 3,200 to 9,999 | 1 | - | - | - | - | - | - | - |
| 10,000 to 19,999 | - | - | - | - | - | - | - | - |
| 20,000 to 49,999 | 2 | - | - | - | - | - | - | - |
| 50,000 to 99,999 | 3 | - | - | - | - | - | - | - |
| 100,000 or more | 10 | 1 | - | - | - | - | - | - |
| Pullets for laying flock replacement ....farms, 2012 | 821 | 6 | 3 | 13 | 12 | 22 | 95 | 1 |
| 2007 | 639 | 11 | - | 19 | 8 | 18 | 60 | 2 |
| number, 2012 | 1,980,818 | (D) | 15 | 127 | 142 | 1,033 | 3,565 | (D) |
| 2007 | 1,212,493 | (D) | - | 144 | 200 | 279 | 860 | (D) |
| Broilers and other meat-type chickens ....farms, 2012 | 831 | 6 | 3 | 25 | 10 | 10 | 55 | - |
| 2007 | 467 | 4 | 3 | 14 | 4 | 10 | 20 | - |
| number, 2012 | 7,511,065 | 620 | 6 | 291 | 230 | 129 | 420,614 | - |
| 2007 | 4,647,226 | 136 | 150 | 63 | 100 | 213 | 466,518 | - |
| Turkeys (see text) ....farms, 2012 | 561 | 6 | 3 | 12 | 9 | 22 | 45 | 4 |
| 2007 | 408 | 6 | - | 15 | 3 | 12 | 28 | - |
| number, 2012 | 5,326 | 66 | 15 | 77 | 52 | 172 | 441 | 74 |
| 2007 | 3,792 | 123 | - | 191 | 9 | 76 | 133 | - |
| Ducks, geese, and other miscellaneous poultry (see text) ....farms, 2012 | 1,445 | 2 | 15 | 32 | 15 | 30 | 97 | - |
| 2007 | 1,932 | 16 | 13 | 63 | 18 | 51 | 157 | - |
| **SALES** | | | | | | | | |
| Any poultry sold (see text) ....farms, 2012 | 3,282 | 14 | 5 | 64 | 40 | 70 | 260 | 7 |
| 2007 | 3,810 | 25 | 17 | 85 | 41 | 78 | 309 | 8 |
| Layers sold (see text) ....farms, 2012 | 871 | 6 | - | 15 | 7 | 8 | 77 | - |
| 2007 | 772 | 4 | 3 | 13 | 7 | 24 | 52 | - |
| number, 2012 | 2,061,921 | (D) | - | 319 | 58 | 414 | 2,980 | - |
| 2007 | (D) | (D) | 90 | 157 | 195 | (D) | 1,229 | - |
| Pullets for laying flock replacement sold ....farms, 2012 | 91 | 1 | - | 2 | 3 | - | 9 | - |
| 2007 | 72 | 1 | - | 8 | - | 1 | 9 | 1 |
| number, 2012 | (D) | (D) | - | (D) | 9 | - | 903 | - |
| 2007 | (D) | (D) | - | 68 | - | (D) | 67 | (D) |
| Broilers and other meat-type chickens sold ....farms, 2012 | 527 | - | - | 3 | 5 | 4 | 42 | - |
| 2007 | 307 | - | 3 | 6 | 2 | 2 | 20 | - |
| number, 2012 | 28,252,490 | - | - | (D) | 27 | (D) | 2,546,036 | - |
| 2007 | 31,669,170 | - | 90 | 132 | (D) | (D) | 4,043,064 | - |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 1,999 | 485 | - | - | 2 | 5 | 4 | 34 | - |
| 2,000 to 59,999 | 4 | - | - | 1 | - | - | 1 | - |
| 60,000 to 99,999 | - | - | - | - | - | - | - | - |
| 100,000 to 199,999 | 3 | - | - | - | - | - | - | - |
| 200,000 to 499,999 | 12 | - | - | - | - | - | 7 | - |
| 500,000 or more | 23 | - | - | - | - | - | - | - |
| Turkeys sold (see text) ....farms, 2012 | 298 | 6 | - | 7 | 4 | 5 | 28 | 2 |
| 2007 | 189 | 1 | - | 8 | 4 | 4 | 11 | - |
| number, 2012 | 14,606 | (D) | - | 186 | 8 | 67 | 366 | (D) |
| 2007 | 3,324 | (D) | - | 130 | 22 | 21 | 72 | - |
| Ducks, geese, and other miscellaneous poultry sold (see text) ....farms, 2012 | 416 | 1 | 1 | 9 | 3 | 9 | 28 | - |
| 2007 | 420 | 4 | 9 | 6 | 1 | 17 | 30 | - |

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Table 19. **Poultry – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Any poultry ..... farms, 2012 | 104 | 32 | 64 | 66 | 12 | 108 | 131 | 100 |
| 2007 | 95 | 39 | 27 | 60 | 6 | 142 | 111 | 113 |
| Layers (see text) ..... farms, 2012 | 95 | 31 | 58 | 58 | 11 | 101 | 123 | 95 |
| 2007 | 86 | 38 | 23 | 43 | 5 | 126 | 103 | 98 |
| number, 2012 | 1,924 | 421 | 1,050 | (D) | 721 | (D) | 2,013 | 2,822 |
| 2007 | 1,524 | 354 | 546 | (D) | 20 | (D) | 1,777 | 1,242 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 49 ..... | 86 | 31 | 56 | 55 | 9 | 94 | 119 | 84 |
| 50 to 99 ..... | 7 | - | 1 | 2 | - | 3 | 4 | 3 |
| 100 to 399 ..... | 2 | - | 1 | - | 2 | 3 | - | 8 |
| 400 to 3,199 ..... | - | - | - | - | - | - | - | - |
| 3,200 to 9,999 ..... | - | - | - | - | - | - | - | - |
| 10,000 to 19,999 ..... | - | - | - | - | - | - | - | - |
| 20,000 to 49,999 ..... | - | - | - | - | - | - | - | - |
| 50,000 to 99,999 ..... | - | - | - | - | - | - | - | - |
| 100,000 or more ..... | - | - | - | 1 | - | 1 | - | - |
| Pullets for laying flock replacement ..... farms, 2012 | 24 | 1 | 9 | 4 | - | 10 | 16 | 9 |
| 2007 | 14 | 2 | 7 | 8 | - | 18 | 21 | 2 |
| number, 2012 | 296 | (D) | 65 | (D) | - | (D) | 186 | 146 |
| 2007 | 277 | (D) | 87 | (D) | - | (D) | 198 | (D) |
| Broilers and other meat-type chickens ..... farms, 2012 | 12 | - | 9 | 17 | - | 31 | 16 | 13 |
| 2007 | 20 | 4 | 6 | 11 | - | 13 | 2 | 2 |
| number, 2012 | 292,778 | - | 244 | 230 | - | 405 | 1,094 | 676 |
| 2007 | 520,493 | 25 | 42 | 3,066 | - | 419 | (D) | (D) |
| Turkeys (see text) ..... farms, 2012 | 9 | 5 | 7 | - | - | 10 | 12 | 9 |
| 2007 | 2 | 6 | 5 | 7 | 2 | 24 | 3 | 7 |
| number, 2012 | 36 | 15 | 54 | - | - | 32 | 120 | 114 |
| 2007 | (D) | 12 | 16 | 144 | (D) | 668 | 17 | 35 |
| Ducks, geese, and other miscellaneous poultry (see text) ..... farms, 2012 | 26 | 5 | 11 | 15 | 3 | 25 | 30 | 18 |
| 2007 | 29 | 14 | 15 | 28 | 4 | 63 | 37 | 50 |
| **SALES** | | | | | | | | |
| Any poultry sold (see text) ..... farms, 2012 | 53 | 18 | 28 | 31 | 5 | 36 | 51 | 62 |
| 2007 | 62 | 30 | 20 | 37 | 1 | 93 | 88 | 78 |
| Layers sold (see text) ..... farms, 2012 | 23 | 5 | 1 | 4 | - | 9 | 21 | 8 |
| 2007 | 16 | 8 | - | 2 | - | 18 | 15 | 14 |
| number, 2012 | 718 | 36 | (D) | (D) | - | (D) | 134 | 161 |
| 2007 | 632 | 51 | - | (D) | - | (D) | 270 | (D) |
| Pullets for laying flock replacement sold ..... farms, 2012 | 1 | - | - | - | - | 1 | 1 | - |
| 2007 | 8 | - | - | - | - | 1 | 5 | 2 |
| number, 2012 | (D) | - | - | - | - | (D) | (D) | - |
| 2007 | 280 | - | - | - | - | (D) | 60 | (D) |
| Broilers and other meat-type chickens sold ..... farms, 2012 | 6 | - | 8 | 3 | - | 7 | 10 | 10 |
| 2007 | 17 | - | 2 | 2 | - | 10 | 1 | 1 |
| number, 2012 | 1,782,920 | - | 373 | 86 | - | 128 | 959 | 431 |
| 2007 | 3,593,290 | - | (D) | (D) | - | 354 | (D) | (D) |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 1,999 ..... | 1 | - | 8 | 3 | - | 7 | 10 | 10 |
| 2,000 to 59,999 ..... | - | - | - | - | - | - | - | - |
| 60,000 to 99,999 ..... | - | - | - | - | - | - | - | - |
| 100,000 to 199,999 ..... | 1 | - | - | - | - | - | - | - |
| 200,000 to 499,999 ..... | 2 | - | - | - | - | - | - | - |
| 500,000 or more ..... | 2 | - | - | - | - | - | - | - |
| Turkeys sold (see text) ..... farms, 2012 | 1 | - | 8 | - | - | 3 | 8 | 6 |
| 2007 | 4 | - | 2 | 6 | - | 12 | 1 | 3 |
| number, 2012 | (D) | - | 52 | - | - | 5 | 76 | 82 |
| 2007 | 27 | - | (D) | 126 | - | 30 | (D) | 55 |
| Ducks, geese, and other miscellaneous poultry sold (see text) ..... farms, 2012 | 19 | 1 | 1 | 5 | - | 6 | 10 | 6 |
| 2007 | 12 | - | 2 | 11 | 1 | 10 | 2 | 10 |

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Table 19. **Poultry – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Any poultry ....farms, 2012 | 41 | 456 | 276 | 145 | 111 | 378 | 58 | 102 |
| 2007 | 36 | 342 | 210 | 93 | 142 | 284 | 51 | 110 |
| Layers (see text) ....farms, 2012 | 39 | 439 | 269 | 142 | 108 | 334 | 54 | 96 |
| 2007 | 33 | 331 | 188 | 81 | 132 | 243 | 47 | 95 |
| number, 2012 | 2,229 | 9,778 | 5,175 | 2,533 | 2,747 | 11,740 | 1,007 | 2,326 |
| 2007 | 855 | 9,057 | 3,524 | 1,239 | 2,414 | 4,926 | 535 | 4,290 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 49 | 27 | 395 | 252 | 134 | 99 | 313 | 49 | 82 |
| 50 to 99 | 3 | 30 | 11 | 3 | 5 | 16 | 4 | 8 |
| 100 to 399 | 8 | 14 | 5 | 5 | 4 | 3 | 1 | 6 |
| 400 to 3,199 | 1 | - | 1 | - | - | 1 | - | - |
| 3,200 to 9,999 | - | - | - | - | - | 1 | - | - |
| 10,000 to 19,999 | - | - | - | - | - | - | - | - |
| 20,000 to 49,999 | - | - | - | - | - | - | - | - |
| 50,000 to 99,999 | - | - | - | - | - | - | - | - |
| 100,000 or more | - | - | - | - | - | - | - | - |
| Pullets for laying flock replacement ....farms, 2012 | 8 | 46 | 51 | 13 | 14 | 46 | 8 | 12 |
| 2007 | 2 | 38 | 12 | 4 | 12 | 34 | 4 | 15 |
| number, 2012 | 456 | 2,239 | 1,226 | 227 | 251 | 522 | (D) | 226 |
| 2007 | (D) | 1,662 | 134 | 68 | 100 | 538 | 4 | 170 |
| Broilers and other meat-type chickens ....farms, 2012 | 3 | 33 | 33 | 13 | 9 | 71 | 4 | 10 |
| 2007 | 2 | 40 | 18 | 6 | 9 | 32 | 12 | 2 |
| number, 2012 | 425 | 1,376 | 858 | 1,256 | 81 | 6,654,140 | 28 | 87 |
| 2007 | (D) | 1,911 | 639 | 106 | 171 | 3,234,013 | 353 | (D) |
| Turkeys (see text) ....farms, 2012 | 7 | 34 | 23 | 13 | 6 | 32 | 4 | 13 |
| 2007 | - | 30 | 13 | 9 | 5 | 9 | 5 | 1 |
| number, 2012 | 79 | 262 | 128 | 183 | 29 | 236 | 89 | 191 |
| 2007 | - | 219 | 45 | 25 | 26 | 31 | 41 | (D) |
| Ducks, geese, and other miscellaneous poultry (see text) ....farms, 2012 | 9 | 99 | 58 | 23 | 17 | 93 | 19 | 26 |
| 2007 | 18 | 107 | 64 | 21 | 39 | 100 | 9 | 35 |
| **SALES** | | | | | | | | |
| Any poultry sold (see text) ....farms, 2012 | 27 | 245 | 140 | 70 | 55 | 164 | 16 | 57 |
| 2007 | 24 | 280 | 157 | 71 | 89 | 189 | 27 | 83 |
| Layers sold (see text) ....farms, 2012 | 8 | 81 | 31 | 18 | 11 | 45 | 1 | 23 |
| 2007 | - | 70 | 38 | 14 | 16 | 43 | 2 | 25 |
| number, 2012 | 481 | 1,940 | 627 | 368 | 111 | 7,260 | (D) | 1,152 |
| 2007 | - | 4,513 | (D) | 74 | 435 | 3,743 | (D) | 3,877 |
| Pullets for laying flock replacement sold ....farms, 2012 | 2 | 6 | 2 | 4 | 3 | 1 | - | 8 |
| 2007 | - | 6 | 2 | - | - | 4 | - | - |
| number, 2012 | (D) | 316 | (D) | 40 | 50 | (D) | - | 151 |
| 2007 | - | 406 | (D) | - | - | 480 | - | - |
| Broilers and other meat-type chickens sold ....farms, 2012 | 7 | 35 | 19 | 8 | 11 | 60 | 4 | 5 |
| 2007 | - | 15 | 10 | - | 6 | 31 | 3 | 4 |
| number, 2012 | 2,826 | 3,051 | 2,838 | (D) | 1,755 | 23,080,000 | (D) | (D) |
| 2007 | - | 1,060 | 700 | - | 52 | 21,453,700 | 294 | 385 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 1,999 | 7 | 35 | 19 | 8 | 11 | 36 | 4 | 4 |
| 2,000 to 59,999 | - | - | - | - | - | - | - | 1 |
| 60,000 to 99,999 | - | - | - | - | - | - | - | - |
| 100,000 to 199,999 | - | - | - | - | - | 2 | - | - |
| 200,000 to 499,999 | - | - | - | - | - | 1 | - | - |
| 500,000 or more | - | - | - | - | - | 21 | - | - |
| Turkeys sold (see text) ....farms, 2012 | 6 | 20 | 16 | 8 | 5 | 9 | 2 | 5 |
| 2007 | - | 17 | - | - | 2 | 13 | 4 | 8 |
| number, 2012 | 47 | 203 | 125 | 119 | (D) | 78 | (D) | (D) |
| 2007 | - | 170 | - | - | (D) | 193 | 16 | 213 |
| Ducks, geese, and other miscellaneous poultry sold (see text) ....farms, 2012 | 4 | 38 | 18 | 6 | 4 | 19 | 5 | 8 |
| 2007 | - | 34 | 9 | 8 | 5 | 32 | 4 | 18 |

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Table 19. **Poultry – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Any poultry ..... farms, 2012 | 231 | 41 | 75 | 418 | 75 | 237 | 49 | 357 |
| 2007 | 204 | 48 | 68 | 339 | 76 | 181 | 32 | 345 |
| Layers (see text) ..... farms, 2012 | 218 | 38 | 63 | 406 | 67 | 230 | 48 | 327 |
| 2007 | 192 | 47 | 57 | 308 | 68 | 173 | 30 | 316 |
| number, 2012 | 3,929 | 721 | 1,284 | (D) | 1,625 | (D) | 840 | 759,220 |
| 2007 | 3,258 | 869 | 652 | (D) | 2,265 | 324,755 | 707 | 468,043 |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 49 ..... | 203 | 36 | 59 | 380 | 59 | 221 | 47 | 308 |
| 50 to 99 ..... | 13 | 1 | 2 | 16 | 6 | 4 | 1 | 9 |
| 100 to 399 ..... | 2 | 1 | 2 | 9 | 2 | 2 | - | 4 |
| 400 to 3,199 ..... | - | - | - | - | - | 1 | - | 1 |
| 3,200 to 9,999 ..... | - | - | - | - | - | - | - | - |
| 10,000 to 19,999 ..... | - | - | - | - | - | - | - | - |
| 20,000 to 49,999 ..... | - | - | - | - | - | 1 | - | 1 |
| 50,000 to 99,999 ..... | - | - | - | - | - | - | - | 3 |
| 100,000 or more ..... | - | - | - | 1 | - | 1 | - | 1 |
| Pullets for laying flock replacement ..... farms, 2012 | 34 | 6 | 10 | 45 | 11 | 31 | 6 | 51 |
| 2007 | 24 | 7 | 6 | 41 | 12 | 30 | 10 | 28 |
| number, 2012 | 489 | 116 | 109 | (D) | 103 | (D) | 54 | (D) |
| 2007 | 347 | 128 | 54 | (D) | 274 | 45,836 | 350 | 591 |
| Broilers and other meat-type chickens ..... farms, 2012 | 38 | 4 | 10 | 48 | 2 | 29 | 3 | 21 |
| 2007 | 5 | 4 | - | 34 | 3 | 24 | 7 | 27 |
| number, 2012 | 1,251 | (D) | 292 | 1,607 | (D) | 2,950 | 75 | 916 |
| 2007 | 123 | 40 | - | (D) | 363 | 2,300 | 65 | 578 |
| Turkeys (see text) ..... farms, 2012 | 8 | 1 | 2 | 45 | 4 | 23 | 1 | 35 |
| 2007 | 12 | 2 | - | 45 | 6 | 19 | 1 | 21 |
| number, 2012 | 143 | (D) | (D) | 401 | 25 | 622 | (D) | 188 |
| 2007 | 18 | (D) | - | 559 | (D) | 111 | (D) | 149 |
| Ducks, geese, and other miscellaneous poultry (see text) ..... farms, 2012 | 31 | 18 | 14 | 96 | 21 | 61 | 9 | 87 |
| 2007 | 63 | 16 | 32 | 140 | 21 | 63 | 8 | 152 |
| **SALES** | | | | | | | | |
| Any poultry sold (see text) ..... farms, 2012 | 100 | 19 | 44 | 199 | 54 | 121 | 30 | 178 |
| 2007 | 140 | 34 | 37 | 238 | 65 | 125 | 24 | 246 |
| Layers sold (see text) ..... farms, 2012 | 14 | 7 | 10 | 65 | 11 | 31 | 8 | 41 |
| 2007 | 17 | 8 | 9 | 56 | 16 | 13 | 4 | 53 |
| number, 2012 | 352 | 178 | 344 | 1,429 | 1,101 | (D) | 156 | 3,025 |
| 2007 | 167 | 153 | 77 | (D) | 209 | (D) | 141 | 302,663 |
| Pullets for laying flock replacement sold ..... farms, 2012 | 3 | - | - | 9 | - | 6 | - | 7 |
| 2007 | 3 | - | - | 4 | - | - | 6 | - |
| number, 2012 | 32 | - | - | 541 | - | 192 | - | (D) |
| 2007 | 20 | - | - | (D) | - | - | 42 | - |
| Broilers and other meat-type chickens sold ..... farms, 2012 | 12 | 5 | 9 | 28 | 10 | 24 | 1 | 14 |
| 2007 | 16 | - | 2 | 20 | 11 | 15 | - | 15 |
| number, 2012 | (D) | 56 | 200 | 2,716 | 596 | 2,819 | (D) | 690 |
| 2007 | 1,081 | - | (D) | (D) | 2,040 | 3,234 | - | 745 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 1,999 ..... | 11 | 5 | 9 | 28 | 10 | 24 | 1 | 14 |
| 2,000 to 59,999 ..... | 1 | - | - | - | - | - | - | - |
| 60,000 to 99,999 ..... | - | - | - | - | - | - | - | - |
| 100,000 to 199,999 ..... | - | - | - | - | - | - | - | - |
| 200,000 to 499,999 ..... | - | - | - | - | - | - | - | - |
| 500,000 or more ..... | - | - | - | - | - | - | - | - |
| Turkeys sold (see text) ..... farms, 2012 | 1 | - | 4 | 16 | 3 | 15 | 1 | 16 |
| 2007 | 6 | - | - | 21 | 2 | 1 | - | 5 |
| number, 2012 | (D) | - | 26 | 233 | 5 | 460 | (D) | 130 |
| 2007 | 80 | - | - | 312 | (D) | (D) | - | 14 |
| Ducks, geese, and other miscellaneous poultry sold (see text) ..... farms, 2012 | 8 | 3 | 8 | 21 | 5 | 10 | 3 | 26 |
| 2007 | 15 | 1 | 4 | 28 | 3 | 10 | - | 35 |

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Table 19. **Poultry – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **INVENTORY** | | | | | | | | |
| Any poultry ....farms, 2012 | 458 | 256 | 330 | 27 | 118 | 358 | 109 | 397 |
| 2007 | 334 | 199 | 247 | 29 | 93 | 213 | 90 | 253 |
| Layers (see text) ....farms, 2012 | 443 | 244 | 307 | 27 | 112 | 340 | 99 | 353 |
| 2007 | 305 | 184 | 216 | 26 | 71 | 196 | 74 | 225 |
| number, 2012 | 7,964 | 3,972 | 1,402,243 | 658 | 2,259 | 8,148 | 1,368 | (D) |
| 2007 | 6,593 | 2,855 | 1,509,090 | 750 | 1,955 | 3,855 | 1,202 | (D) |
| 2012 farms by inventory: | | | | | | | | |
| 1 to 49 | 419 | 236 | 287 | 25 | 108 | 320 | 97 | 335 |
| 50 to 99 | 18 | 8 | 11 | - | 3 | 15 | 2 | 11 |
| 100 to 399 | 6 | - | 6 | 2 | - | 3 | - | 4 |
| 400 to 3,199 | - | - | - | - | 1 | 2 | - | 2 |
| 3,200 to 9,999 | - | - | - | - | - | - | - | - |
| 10,000 to 19,999 | - | - | - | - | - | - | - | - |
| 20,000 to 49,999 | - | - | - | - | - | - | - | - |
| 50,000 to 99,999 | - | - | - | - | - | - | - | - |
| 100,000 or more | - | - | 3 | - | - | - | - | 1 |
| Pullets for laying flock replacement ....farms, 2012 | 47 | 30 | 31 | 3 | 15 | 33 | 13 | 32 |
| 2007 | 27 | 32 | 29 | 1 | 11 | 39 | 11 | 20 |
| number, 2012 | 822 | 385 | (D) | 14 | 681 | 492 | 203 | 391 |
| 2007 | 249 | 301 | (D) | (D) | (D) | 1,269 | 119 | 448 |
| Broilers and other meat-type chickens ....farms, 2012 | 36 | 28 | 40 | 7 | 14 | 33 | 10 | 125 |
| 2007 | 23 | 12 | 24 | 6 | 11 | 26 | 11 | 16 |
| number, 2012 | 1,325 | 707 | 1,915 | 185 | 659 | 121,012 | 101 | 2,329 |
| 2007 | 892 | 732 | (D) | 178 | 551 | (D) | 333 | 178 |
| Turkeys (see text) ....farms, 2012 | 34 | 17 | 35 | 4 | 6 | 33 | 1 | 27 |
| 2007 | 31 | 19 | 16 | 3 | 12 | 10 | 1 | 18 |
| number, 2012 | 257 | 101 | 633 | (D) | 24 | 221 | (D) | 119 |
| 2007 | 107 | 167 | 116 | 3 | 221 | 56 | (D) | 129 |
| Ducks, geese, and other miscellaneous poultry (see text) ....farms, 2012 | 99 | 42 | 92 | 3 | 20 | 92 | 24 | 68 |
| 2007 | 117 | 57 | 81 | 8 | 26 | 80 | 28 | 89 |
| **SALES** | | | | | | | | |
| Any poultry sold (see text) ....farms, 2012 | 262 | 118 | 163 | 14 | 52 | 201 | 49 | 160 |
| 2007 | 235 | 131 | 191 | 20 | 63 | 132 | 62 | 175 |
| Layers sold (see text) ....farms, 2012 | 84 | 29 | 46 | 1 | 13 | 57 | 16 | 36 |
| 2007 | 39 | 21 | 67 | 4 | 17 | 21 | 13 | 30 |
| number, 2012 | 1,715 | 505 | (D) | (D) | 1,067 | 1,533 | 181 | (D) |
| 2007 | (D) | 816 | (D) | 70 | (D) | 534 | 258 | (D) |
| Pullets for laying flock replacement sold ....farms, 2012 | 12 | 2 | 4 | - | - | 2 | 1 | 1 |
| 2007 | 2 | - | 2 | - | 1 | 3 | - | 3 |
| number, 2012 | 400 | (D) | 166 | - | - | (D) | (D) | (D) |
| 2007 | (D) | - | (D) | - | (D) | 30 | - | 51 |
| Broilers and other meat-type chickens sold ....farms, 2012 | 29 | 20 | 33 | 2 | 8 | 45 | 5 | 35 |
| 2007 | 21 | 17 | 12 | 5 | 7 | 11 | 6 | 14 |
| number, 2012 | 1,860 | 1,066 | 2,433 | (D) | 600 | 804,022 | 1,630 | 2,276 |
| 2007 | 3,472 | 860 | (D) | 175 | 557 | (D) | 400 | 1,835 |
| 2012 farms by number sold: | | | | | | | | |
| 1 to 1,999 | 29 | 20 | 33 | 2 | 8 | 43 | 5 | 35 |
| 2,000 to 59,999 | - | - | - | - | - | - | - | - |
| 60,000 to 99,999 | - | - | - | - | - | - | - | - |
| 100,000 to 199,999 | - | - | - | - | - | - | - | - |
| 200,000 to 499,999 | - | - | - | - | - | 2 | - | - |
| 500,000 or more | - | - | - | - | - | - | - | - |
| Turkeys sold (see text) ....farms, 2012 | 24 | 6 | 12 | 2 | 3 | 24 | 2 | 20 |
| 2007 | 16 | 5 | 18 | - | 8 | 4 | 2 | 1 |
| number, 2012 | 267 | 30 | 551 | (D) | (D) | 326 | (D) | 69 |
| 2007 | 104 | 50 | 206 | - | 1,248 | 107 | (D) | (D) |
| Ducks, geese, and other miscellaneous poultry sold (see text) ....farms, 2012 | 32 | 9 | 30 | 2 | 8 | 21 | 7 | 22 |
| 2007 | 24 | 5 | 28 | - | 2 | 12 | 9 | 19 |

## Table 20. **Miscellaneous Poultry – Inventory and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | |
|---|---|---|---|---|
| | Farms | Number | Farms | Number |
| **CHUKARS** | | | | |
| **State Total** | | | | |
| Washington ..... 2012 | 19 | 6,489 | 11 | 11,877 |
| 2007 | (NA) | (NA) | (NA) | (NA) |
| **Counties, 2012** | | | | |
| Asotin | 2 | (D) | - | - |
| Clark | 3 | 4 | - | - |
| Cowlitz | 1 | (D) | - | - |
| Franklin | 1 | (D) | 1 | (D) |
| Kittitas | 1 | (D) | 1 | (D) |
| Lewis | 1 | (D) | 1 | (D) |
| Lincoln | 1 | (D) | 1 | (D) |
| Mason | - | - | 1 | (D) |
| Pierce | 1 | (D) | 1 | (D) |
| Skamania | 1 | (D) | 1 | (D) |
| Walla Walla | 2 | (D) | 2 | (D) |
| Whitman | 3 | 54 | - | - |
| Yakima | 2 | (D) | 2 | (D) |
| **DUCKS** | | | | |
| **State Total** | | | | |
| Washington ..... 2012 | 708 | 9,546 | 205 | 5,167 |
| 2007 | 1,068 | 14,096 | 206 | 10,779 |
| **Counties, 2012** | | | | |
| Adams | 2 | (D) | 1 | (D) |
| Asotin | 6 | 34 | - | - |
| Benton | 19 | 491 | 5 | 94 |
| Chelan | 5 | 38 | 2 | (D) |
| Clallam | 18 | 758 | 5 | 166 |
| Clark | 46 | 1,537 | 18 | 590 |
| Cowlitz | 18 | 320 | 12 | 296 |
| Ferry | 7 | 31 | 1 | (D) |
| Franklin | 5 | 57 | - | - |
| Garfield | 3 | 154 | - | - |
| Grant | 17 | 282 | 2 | (D) |
| Grays Harbor | 23 | 172 | 8 | 68 |
| Island | 15 | 104 | 5 | 161 |
| Jefferson | 5 | 177 | 4 | 125 |
| King | 59 | 689 | 25 | 546 |
| Kitsap | 29 | 245 | 13 | 131 |
| Kittitas | 7 | 70 | 3 | 25 |
| Klickitat | 10 | 52 | - | - |
| Lewis | 38 | 554 | 11 | 740 |
| Lincoln | - | - | 1 | (D) |
| Mason | 11 | 164 | 2 | (D) |
| Okanogan | 16 | 160 | 4 | 35 |
| Pacific | 11 | 116 | 3 | 34 |
| Pend Oreille | 4 | 39 | 2 | (D) |
| Pierce | 46 | 390 | 12 | 142 |
| San Juan | 7 | 69 | 1 | (D) |
| Skagit | 40 | 298 | 6 | 121 |
| Skamania | 2 | (D) | - | - |
| Snohomish | 42 | 464 | 14 | 379 |
| Spokane | 29 | 333 | 4 | 110 |
| Stevens | 22 | 210 | 7 | 47 |
| Thurston | 56 | 667 | 17 | 683 |
| Wahkiakum | 1 | (D) | - | - |
| Walla Walla | 6 | (D) | 1 | (D) |
| Whatcom | 52 | 497 | 11 | 372 |
| Whitman | 8 | 33 | - | - |
| Yakima | 23 | 105 | 5 | 29 |
| **EMUS** | | | | |
| **State Total** | | | | |
| Washington ..... 2012 | 45 | 284 | 9 | 63 |
| 2007 | 98 | 966 | 10 | 113 |
| **Counties, 2012** | | | | |
| Asotin | 2 | (D) | - | - |
| Benton | 1 | (D) | - | - |
| Clark | 3 | 6 | 2 | (D) |
| Grays Harbor | 2 | (D) | - | - |
| Jefferson | 1 | (D) | - | - |
| Kitsap | 2 | (D) | - | - |
| Kittitas | 1 | (D) | - | - |
| Lewis | 10 | 86 | - | - |
| Mason | 5 | 19 | 1 | (D) |
| Pierce | 1 | (D) | 1 | (D) |
| Skagit | 2 | (D) | - | - |
| Snohomish | 2 | (D) | 2 | (D) |
| Spokane | 7 | 60 | 1 | (D) |
| Stevens | 2 | (D) | - | - |
| Thurston | 2 | (D) | 2 | (D) |
| Whatcom | 1 | (D) | - | - |
| Yakima | 1 | (D) | - | - |

--continued

Table 20. **Miscellaneous Poultry – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | |
|---|---|---|---|---|
| | Farms | Number | Farms | Number |
| **GEESE** | | | | |
| **State Total** | | | | |
| Washington....2012 | 272 | 1,819 | 53 | 894 |
| 2007 | 535 | 3,371 | 72 | 767 |
| **Counties, 2012** | | | | |
| Adams | 1 | (D) | 1 | (D) |
| Asotin | 4 | 16 | - | - |
| Benton | 7 | 47 | 3 | (D) |
| Chelan | 5 | 12 | 1 | (D) |
| Clallam | 2 | (D) | - | - |
| Clark | 27 | 150 | 5 | 67 |
| Cowlitz | 5 | 22 | - | - |
| Douglas | 2 | (D) | - | - |
| Ferry | 5 | 18 | - | - |
| Franklin | 2 | (D) | - | - |
| Garfield | 2 | (D) | - | - |
| Grant | 10 | 125 | 4 | 48 |
| Grays Harbor | 6 | 16 | - | - |
| Island | 7 | 51 | - | - |
| Jefferson | 1 | (D) | - | - |
| King | 18 | 217 | 3 | 15 |
| Kitsap | 7 | 143 | 2 | (D) |
| Kittitas | 3 | 27 | - | - |
| Klickitat | 4 | 18 | - | - |
| Lewis | 17 | 98 | 2 | (D) |
| Lincoln | 2 | (D) | 1 | (D) |
| Mason | 2 | (D) | 2 | (D) |
| Okanogan | 3 | 23 | - | - |
| Pacific | 4 | 62 | - | - |
| Pend Oreille | 3 | 4 | - | - |
| Pierce | 27 | 101 | 3 | 6 |
| San Juan | 10 | 64 | - | - |
| Skagit | 9 | 50 | 2 | (D) |
| Skamania | 5 | 23 | - | - |
| Snohomish | 10 | 54 | 8 | 42 |
| Spokane | 13 | 64 | 6 | (D) |
| Stevens | 11 | 30 | 1 | (D) |
| Thurston | 11 | 68 | 3 | 3 |
| Wahkiakum | 1 | (D) | 1 | (D) |
| Walla Walla | 2 | (D) | - | - |
| Whatcom | 15 | 84 | 3 | 11 |
| Yakima | 9 | 31 | 2 | (D) |
| **GUINEAS** | | | | |
| **State Total** | | | | |
| Washington....2012 | 150 | 1,148 | 27 | 240 |
| 2007 | (NA) | (NA) | (NA) | (NA) |
| **Counties, 2012** | | | | |
| Benton | 6 | 47 | 3 | 4 |
| Chelan | 4 | 19 | 2 | (D) |
| Clark | 7 | 26 | 1 | (D) |
| Cowlitz | 2 | (D) | 2 | (D) |
| Douglas | 1 | (D) | 1 | (D) |
| Ferry | 1 | (D) | 1 | (D) |
| Grant | 3 | 8 | - | - |
| Grays Harbor | 5 | 86 | - | - |
| Island | 3 | 14 | - | - |
| Jefferson | 3 | 8 | - | - |
| King | 8 | 117 | 2 | (D) |
| Kitsap | 6 | 34 | - | - |
| Kittitas | 9 | 72 | - | - |
| Klickitat | 4 | 102 | 2 | (D) |
| Lewis | 6 | 20 | - | - |
| Lincoln | 9 | 50 | 2 | (D) |
| Okanogan | 3 | 6 | - | - |
| Pacific | 2 | (D) | - | - |
| Pend Oreille | 2 | (D) | - | - |
| Pierce | 12 | 94 | 1 | (D) |
| Skamania | 5 | 45 | 2 | (D) |
| Snohomish | 3 | 12 | 1 | (D) |
| Spokane | 16 | 150 | 4 | 28 |
| Stevens | 4 | 31 | 1 | (D) |
| Thurston | 10 | 32 | - | - |
| Wahkiakum | - | - | 1 | (D) |
| Whatcom | 10 | 49 | - | - |
| Whitman | 3 | 9 | - | - |
| Yakima | 3 | 49 | 1 | (D) |
| **OSTRICHES** | | | | |
| **State Total** | | | | |
| Washington....2012 | 2 | (D) | - | - |
| 2007 | 9 | 53 | 3 | 6 |
| **Counties, 2012** | | | | |
| Snohomish | 1 | (D) | - | - |
| Yakima | 1 | (D) | - | - |

--continued

Table 20. **Miscellaneous Poultry – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | |
|---|---|---|---|---|
| | Farms | Number | Farms | Number |
| **PEACOCKS OR PEAHENS** | | | | |
| **State Total** | | | | |
| Washington ..... 2012 | 127 | 956 | 30 | 206 |
| 2007 | (NA) | (NA) | (NA) | (NA) |
| **Counties, 2012** | | | | |
| Benton | 2 | (D) | - | - |
| Clallam | 3 | 49 | 3 | 26 |
| Clark | 8 | 48 | 2 | (D) |
| Cowlitz | 4 | 62 | 2 | (D) |
| Franklin | 2 | (D) | - | - |
| Garfield | 2 | (D) | - | - |
| Grays Harbor | 2 | (D) | - | - |
| Island | 1 | (D) | - | - |
| King | 9 | 53 | 5 | 16 |
| Kitsap | 3 | 34 | 2 | (D) |
| Kittitas | 3 | 26 | - | - |
| Klickitat | 2 | (D) | - | - |
| Lewis | 3 | 17 | - | - |
| Lincoln | 2 | (D) | - | - |
| Mason | 8 | 77 | 3 | 24 |
| Okanogan | 4 | 37 | 1 | (D) |
| Pend Oreille | 1 | (D) | - | - |
| Pierce | 8 | 63 | 1 | (D) |
| Skagit | 5 | 10 | - | - |
| Snohomish | 19 | 92 | 5 | 46 |
| Spokane | 9 | 64 | 4 | 33 |
| Stevens | 4 | 36 | - | - |
| Thurston | 10 | 41 | - | - |
| Wahkiakum | 2 | (D) | - | - |
| Walla Walla | 1 | (D) | - | - |
| Whatcom | 2 | (D) | - | - |
| Whitman | 3 | 30 | 2 | (D) |
| Yakima | 5 | 20 | - | - |
| **PHEASANTS** | | | | |
| **State Total** | | | | |
| Washington ..... 2012 | 77 | 21,966 | 34 | 72,181 |
| 2007 | 175 | 28,031 | 52 | 45,913 |
| **Counties, 2012** | | | | |
| Asotin | 2 | (D) | - | - |
| Benton | 1 | (D) | 1 | (D) |
| Clark | 3 | 34 | - | - |
| Cowlitz | 4 | 38 | 3 | 83 |
| Franklin | 2 | (D) | 2 | (D) |
| Garfield | 2 | (D) | - | - |
| Grant | 1 | (D) | 1 | (D) |
| King | 3 | (D) | 3 | 80 |
| Kitsap | 5 | 107 | 3 | 30 |
| Kittitas | 3 | (D) | 3 | (D) |
| Klickitat | 1 | (D) | 1 | (D) |
| Lewis | 4 | (D) | 1 | (D) |
| Lincoln | 2 | (D) | 2 | (D) |
| Okanogan | 2 | (D) | - | - |
| Pierce | 8 | 51 | - | - |
| San Juan | 2 | (D) | - | - |
| Skagit | 1 | (D) | 1 | (D) |
| Snohomish | 5 | (D) | - | - |
| Spokane | 5 | 63 | 1 | (D) |
| Stevens | - | - | 1 | (D) |
| Thurston | 8 | 150 | 4 | (D) |
| Wahkiakum | 2 | (D) | - | - |
| Walla Walla | 2 | (D) | 2 | (D) |
| Whatcom | 9 | 102 | 5 | (D) |
| **PIGEONS OR SQUAB** | | | | |
| **State Total** | | | | |
| Washington ..... 2012 | 53 | 16,863 | 22 | (D) |
| 2007 | 160 | 26,180 | 54 | 142,282 |
| **Counties, 2012** | | | | |
| Asotin | 1 | (D) | 1 | (D) |
| Benton | 3 | (D) | - | - |
| Clark | 8 | 713 | 3 | 168 |
| Cowlitz | 1 | (D) | 1 | (D) |
| Franklin | 3 | (D) | 3 | (D) |
| Grant | 1 | (D) | - | - |
| Island | 2 | (D) | - | - |
| King | 2 | (D) | 1 | (D) |
| Kitsap | 2 | (D) | - | - |
| Pierce | 1 | (D) | - | - |
| San Juan | 2 | (D) | 1 | (D) |
| Skagit | 4 | 119 | 1 | (D) |
| Snohomish | 3 | 210 | 2 | (D) |
| Spokane | 5 | 84 | - | - |
| Stevens | 2 | (D) | 1 | (D) |
| Thurston | 6 | 97 | 3 | 63 |
| Yakima | 7 | 252 | 5 | 88 |

--continued

Table 20. **Miscellaneous Poultry – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | |
|---|---|---|---|---|
| | Farms | Number | Farms | Number |
| **QUAIL** | | | | |
| **State Total** | | | | |
| Washington....2012 | 43 | (D) | 26 | (D) |
| 2007 | 58 | 44,822 | 37 | (D) |
| **Counties, 2012** | | | | |
| Benton | 1 | (D) | 2 | (D) |
| Clark | 2 | (D) | - | - |
| Cowlitz | 4 | 64 | 3 | 72 |
| Island | 1 | (D) | 1 | (D) |
| King | 3 | 39 | 4 | 640 |
| Mason | 1 | (D) | 1 | (D) |
| Pend Oreille | 6 | 12 | 6 | 108 |
| Pierce | 1 | (D) | - | - |
| Skagit | 3 | 22 | - | - |
| Snohomish | 3 | (D) | - | - |
| Stevens | 1 | (D) | 1 | (D) |
| Thurston | 7 | 56 | 4 | 100 |
| Whatcom | 5 | 95 | 3 | 315 |
| Whitman | 1 | (D) | 1 | (D) |
| Yakima | 4 | 26 | - | - |
| **RHEAS** | | | | |
| **State Total** | | | | |
| Washington....2012 | 12 | 60 | - | - |
| 2007 | (NA) | (NA) | (NA) | (NA) |
| **Counties, 2012** | | | | |
| Chelan | 2 | (D) | - | - |
| King | 1 | (D) | - | - |
| Kitsap | 2 | (D) | - | - |
| Kittitas | 1 | (D) | - | - |
| Pierce | 1 | (D) | - | - |
| Yakima | 5 | 30 | - | - |
| **ROOSTERS** | | | | |
| **State Total** | | | | |
| Washington....2012 | 316 | 1,266 | 60 | 1,283 |
| 2007 | (NA) | (NA) | (NA) | (NA) |
| **Counties, 2012** | | | | |
| Asotin | 3 | 7 | - | - |
| Benton | 1 | (D) | - | - |
| Chelan | 5 | 12 | 2 | (D) |
| Clallam | 4 | 14 | 1 | (D) |
| Clark | 24 | 84 | 2 | (D) |
| Douglas | 2 | (D) | - | - |
| Ferry | 4 | 17 | - | - |
| Franklin | 2 | (D) | - | - |
| Grant | 4 | 10 | 2 | (D) |
| Grays Harbor | 7 | 17 | 2 | (D) |
| Island | 3 | 5 | - | - |
| King | 22 | 153 | 3 | 89 |
| Kitsap | 12 | 23 | - | - |
| Kittitas | 2 | (D) | - | - |
| Klickitat | 4 | 9 | 1 | (D) |
| Lewis | 26 | 76 | 7 | 36 |
| Lincoln | 2 | (D) | - | - |
| Mason | 6 | 74 | 2 | (D) |
| Okanogan | 16 | 47 | 5 | 103 |
| Pacific | 6 | 30 | - | - |
| Pend Oreille | 2 | (D) | - | - |
| Pierce | 14 | 30 | 2 | (D) |
| San Juan | 1 | (D) | 1 | (D) |
| Skagit | 4 | 33 | 2 | (D) |
| Skamania | 2 | (D) | - | - |
| Snohomish | 29 | 86 | 3 | 6 |
| Spokane | 29 | 85 | 10 | 126 |
| Stevens | 8 | 41 | - | - |
| Thurston | 24 | 101 | 4 | (D) |
| Walla Walla | 7 | 7 | 3 | 6 |
| Whatcom | 16 | 69 | 1 | (D) |
| Whitman | 6 | 38 | 4 | 15 |
| Yakima | 19 | 128 | 3 | 8 |
| **OTHER POULTRY (SEE TEXT)** | | | | |
| **State Total** | | | | |
| Washington....2012 | 59 | 1,341 | 15 | 425 |
| 2007 | 841 | 23,467 | 156 | 28,893 |
| **Counties, 2012** | | | | |
| Benton | 5 | 122 | - | - |
| Clallam | 1 | (D) | - | - |
| Clark | 3 | (D) | - | - |
| Cowlitz | 2 | (D) | 2 | (D) |
| Franklin | 1 | (D) | - | - |
| Grant | 1 | (D) | 1 | (D) |

--continued

Table 20. **Miscellaneous Poultry – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | |
|---|---|---|---|---|
| | Farms | Number | Farms | Number |
| **OTHER POULTRY (SEE TEXT)** - Con. | | | | |
| **Counties, 2012** - Con. | | | | |
| King | 5 | (D) | 1 | (D) |
| Kitsap | 2 | (D) | - | - |
| Lewis | 7 | 50 | - | - |
| Mason | 4 | 31 | 1 | (D) |
| Okanogan | 1 | (D) | - | - |
| Pierce | 1 | (D) | 2 | (D) |
| San Juan | 2 | (D) | 1 | (D) |
| Skagit | 2 | (D) | - | - |
| Snohomish | 6 | 73 | 2 | (D) |
| Spokane | 4 | 193 | 1 | (D) |
| Thurston | 2 | (D) | - | - |
| Whatcom | 6 | 408 | - | - |
| Yakima | 4 | 16 | 4 | 16 |
| **POULTRY HATCHED (SEE TEXT)** | | | | |
| **State Total** | | | | |
| Washington 2012 | (X) | (X) | 891 | (D) |
| 2007 | (X) | (X) | 733 | (D) |
| **Counties, 2012** | | | | |
| Adams | (X) | (X) | 3 | 12 |
| Asotin | (X) | (X) | 3 | 124 |
| Benton | (X) | (X) | 20 | (D) |
| Chelan | (X) | (X) | 10 | 251 |
| Clallam | (X) | (X) | 26 | 832 |
| Clark | (X) | (X) | 46 | 2,422 |
| Columbia | (X) | (X) | 2 | (D) |
| Cowlitz | (X) | (X) | 21 | 867 |
| Douglas | (X) | (X) | 6 | 70 |
| Ferry | (X) | (X) | 9 | 91 |
| Franklin | (X) | (X) | 14 | 192 |
| Garfield | (X) | (X) | 2 | (D) |
| Grant | (X) | (X) | 16 | 459 |
| Grays Harbor | (X) | (X) | 11 | 269 |
| Island | (X) | (X) | 11 | 213 |
| Jefferson | (X) | (X) | 3 | (D) |
| King | (X) | (X) | 60 | 2,926 |
| Kitsap | (X) | (X) | 42 | 827 |
| Kittitas | (X) | (X) | 13 | 130 |
| Klickitat | (X) | (X) | 9 | 100 |
| Lewis | (X) | (X) | 43 | (D) |
| Lincoln | (X) | (X) | 6 | 128 |
| Mason | (X) | (X) | 16 | 669 |
| Okanogan | (X) | (X) | 31 | 1,253 |
| Pacific | (X) | (X) | 12 | 800 |
| Pend Oreille | (X) | (X) | 17 | 300 |
| Pierce | (X) | (X) | 47 | 1,242 |
| San Juan | (X) | (X) | 11 | 159 |
| Skagit | (X) | (X) | 17 | 699 |
| Skamania | (X) | (X) | 14 | 727 |
| Snohomish | (X) | (X) | 64 | 820 |
| Spokane | (X) | (X) | 59 | 2,364 |
| Stevens | (X) | (X) | 31 | 1,591 |
| Thurston | (X) | (X) | 61 | 6,313 |
| Wahkiakum | (X) | (X) | 7 | 177 |
| Walla Walla | (X) | (X) | 11 | 590 |
| Whatcom | (X) | (X) | 58 | (D) |
| Whitman | (X) | (X) | 15 | (D) |
| Yakima | (X) | (X) | 44 | 742 |

## Table 21. **Colonies of Bees – Inventory and Honey Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Colonies inventory | | Honey collected [1] | | Honey sales | |
|---|---|---|---|---|---|---|
| | Farms | Number | Farms | Pounds | Farms | Value ($1,000) |
| **State Total** | | | | | | |
| Washington 2012 | 1,051 | 96,685 | 564 | 2,267,253 | 393 | 3,949 |
| 2007 | 872 | 83,170 | 486 | 2,621,311 | (NA) | (NA) |
| **Counties, 2012** | | | | | | |
| Adams | 4 | 44 | 5 | (D) | 5 | (D) |
| Asotin | 1 | (D) | 1 | (D) | 1 | (D) |
| Benton | 14 | 3,021 | 6 | (D) | 4 | 106 |
| Chelan | 17 | (D) | 5 | 2,881 | 4 | 5 |
| Clallam | 29 | 162 | 16 | 6,342 | 9 | 18 |
| Clark | 70 | 2,906 | 40 | 31,318 | 28 | 60 |
| Columbia | 3 | (D) | 3 | (D) | 3 | 154 |
| Cowlitz | 21 | 70 | 9 | 2,482 | 7 | 4 |
| Douglas | 4 | 33 | 3 | (D) | 2 | (D) |
| Ferry | 2 | (D) | 2 | (D) | 2 | (D) |
| Franklin | 5 | 8,204 | 3 | 15,276 | 3 | 28 |
| Garfield | 1 | (D) | 1 | (D) | 1 | (D) |
| Grant | 14 | 31,460 | 8 | (D) | 7 | 358 |
| Grays Harbor | 40 | 273 | 11 | 5,248 | 7 | 19 |
| Island | 36 | 191 | 13 | 6,443 | 12 | 12 |
| Jefferson | 14 | 66 | 5 | 1,339 | 4 | 6 |
| King | 110 | 1,339 | 75 | 35,152 | 61 | 72 |
| Kitsap | 48 | 146 | 17 | 1,616 | 13 | 6 |
| Kittitas | 19 | 40 | 12 | 872 | 6 | 1 |
| Klickitat | 12 | 31 | 6 | 885 | 3 | 3 |
| Lewis | 84 | 262 | 32 | 3,375 | 15 | 5 |
| Lincoln | 4 | (D) | 4 | (D) | 3 | (D) |
| Mason | 14 | 23 | 7 | 532 | - | - |
| Okanogan | 28 | 1,561 | 21 | 41,268 | 16 | 76 |
| Pacific | 13 | 63 | 6 | 368 | 2 | (D) |
| Pend Oreille | 2 | (D) | 1 | (D) | - | - |
| Pierce | 53 | 981 | 37 | 25,492 | 23 | 61 |
| San Juan | 23 | 54 | 5 | 330 | 4 | 1 |
| Skagit | 17 | (D) | 13 | (D) | 9 | (D) |
| Skamania | 11 | (D) | 5 | (D) | 2 | (D) |
| Snohomish | 56 | 588 | 30 | 13,448 | 21 | 30 |
| Spokane | 96 | 3,437 | 63 | 100,630 | 49 | 199 |
| Stevens | 18 | 1,755 | 12 | 72,980 | 8 | 137 |
| Thurston | 76 | 445 | 36 | 11,852 | 22 | 27 |
| Wahkiakum | 1 | (D) | 1 | (D) | 1 | (D) |
| Walla Walla | 5 | (D) | 2 | (D) | 2 | (D) |
| Whatcom | 36 | 727 | 15 | 61,799 | 10 | (D) |
| Whitman | 13 | 126 | 11 | 2,760 | 9 | 6 |
| Yakima | 37 | 20,357 | 22 | 951,736 | 15 | 1,347 |

[1] Data are for farms with production, not necessarily sold.

## Table 22. **Aquaculture Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | | Farms with aquaculture sold | Value ($1,000) |
|---|---|---|---|
| **CATFISH** | | | |
| **State Total** | | | |
| Washington | 2012 | 1 | (D) |
| | 2007 | 1 | (D) |
| **Counties, 2012** | | | |
| Franklin | | 1 | (D) |
| **TROUT** | | | |
| **State Total** | | | |
| Washington | 2012 | 120 | 33,753 |
| | 2007 | 113 | 21,848 |
| **Counties, 2012** | | | |
| Asotin | | 1 | (D) |
| Chelan | | 6 | 415 |
| Clallam | | 9 | 621 |
| Clark | | 2 | (D) |
| Columbia | | 3 | 654 |
| Cowlitz | | 9 | 525 |
| Ferry | | 2 | (D) |
| Franklin | | 2 | (D) |
| Grant | | 4 | 502 |
| Grays Harbor | | 4 | 890 |
| Jefferson | | 2 | (D) |
| King | | 7 | 348 |
| Klickitat | | 1 | (D) |
| Lewis | | 7 | 915 |
| Mason | | 7 | (D) |
| Okanogan | | 10 | (D) |
| Pacific | | 4 | 140 |
| Pend Oreille | | 2 | (D) |
| Pierce | | 8 | (D) |
| Skagit | | 2 | (D) |
| Skamania | | 1 | (D) |
| Snohomish | | 6 | 624 |
| Spokane | | 2 | (D) |
| Stevens | | 7 | 912 |
| Thurston | | 4 | (D) |
| Wahkiakum | | 2 | (D) |
| Whatcom | | 4 | 272 |
| Yakima | | 2 | (D) |
| **OTHER FOOD FISH (SEE TEXT)** | | | |
| **State Total** | | | |
| Washington | 2012 | 143 | 59,844 |
| | 2007 | 70 | 43,047 |
| **Counties, 2012** | | | |
| Benton | | 1 | (D) |
| Chelan | | 10 | 2,584 |
| Clallam | | 13 | 1,709 |
| Columbia | | 2 | (D) |
| Cowlitz | | 8 | 1,680 |
| Franklin | | 1 | (D) |
| Grant | | 1 | (D) |
| Grays Harbor | | 10 | (D) |
| Jefferson | | 2 | (D) |
| King | | 6 | (D) |
| Kitsap | | 1 | (D) |
| Kittitas | | 1 | (D) |
| Klickitat | | 1 | (D) |
| Lewis | | 10 | 3,356 |
| Mason | | 14 | 1,725 |
| Okanogan | | 8 | 1,037 |
| Pacific | | 7 | 885 |
| Pierce | | 11 | 681 |
| San Juan | | 1 | (D) |
| Skagit | | 4 | (D) |
| Skamania | | 5 | 3,445 |
| Snohomish | | 8 | (D) |
| Spokane | | 1 | (D) |
| **OTHER FOOD FISH (SEE TEXT)** - Con. | | | |
| **Counties, 2012** - Con. | | | |
| Stevens | | 4 | (D) |
| Thurston | | 6 | (D) |
| Wahkiakum | | 1 | (D) |
| Whatcom | | 5 | (D) |
| Yakima | | 1 | (D) |
| **CRUSTACEANS** | | | |
| **State Total** | | | |
| Washington | 2012 | - | - |
| | 2007 | 1 | (D) |
| **MOLLUSKS** | | | |
| **State Total** | | | |
| Washington | 2012 | 171 | 92,385 |
| | 2007 | 160 | 85,201 |
| **Counties, 2012** | | | |
| Clallam | | 1 | (D) |
| Grays Harbor | | 8 | 5,559 |
| Island | | 1 | (D) |
| Jefferson | | 26 | 3,133 |
| Kitsap | | 5 | 109 |
| Mason | | 71 | 32,473 |
| Pacific | | 25 | 21,304 |
| Pierce | | 4 | (D) |
| San Juan | | 6 | 234 |
| Skagit | | 5 | (D) |
| Snohomish | | 2 | (D) |
| Thurston | | 14 | 16,238 |
| Walla Walla | | 1 | (D) |
| Whatcom | | 2 | (D) |
| **ORNAMENTAL FISH** | | | |
| **State Total** | | | |
| Washington | 2012 | 9 | (D) |
| | 2007 | 18 | 116 |
| **Counties, 2012** | | | |
| King | | 1 | (D) |
| Lewis | | 2 | (D) |
| Pierce | | 1 | (D) |
| Snohomish | | 1 | (D) |
| Stevens | | 2 | (D) |
| Whatcom | | 2 | (D) |
| **SPORT OR GAME FISH** | | | |
| **State Total** | | | |
| Washington | 2012 | 2 | (D) |
| | 2007 | 74 | 8,910 |
| **Counties, 2012** | | | |
| Franklin | | 1 | (D) |
| Grays Harbor | | 1 | (D) |
| **OTHER AQUACULTURE PRODUCTS (SEE TEXT)** | | | |
| **State Total** | | | |
| Washington | 2012 | 7 | 903 |
| | 2007 | 5 | 2,643 |
| **Counties, 2012** | | | |
| Grant | | 1 | (D) |
| Jefferson | | 2 | (D) |
| Lewis | | 1 | (D) |
| Pacific | | 1 | (D) |
| Skagit | | 1 | (D) |
| Thurston | | 1 | (D) |

## Table 23. **Miscellaneous Livestock and Animal Specialties – Inventory and Sales: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | | |
|---|---|---|---|---|---|
| | Farms | Number | Farms | Number | Value ($1,000) |
| **ALPACAS** | | | | | |
| **State Total** | | | | | |
| Washington ..... 2012 | 604 | 10,377 | 95 | 945 | 2,417 |
| 2007 | 788 | 13,140 | 203 | 1,298 | (NA) |
| **Counties, 2012** | | | | | |
| Adams | 1 | (D) | - | - | - |
| Benton | 18 | 306 | 7 | 35 | 51 |
| Chelan | 3 | 35 | 1 | (D) | (D) |
| Clallam | 9 | 83 | 2 | (D) | (D) |
| Clark | 54 | 1,000 | 8 | 32 | 82 |
| Cowlitz | 5 | 101 | 1 | (D) | (D) |
| Douglas | 1 | (D) | - | - | - |
| Ferry | 7 | 55 | 1 | (D) | (D) |
| Franklin | 4 | 6 | - | - | - |
| Garfield | 1 | (D) | - | - | - |
| Grant | 5 | 65 | - | - | - |
| Grays Harbor | 2 | (D) | - | - | - |
| Island | 20 | 622 | 4 | (D) | (D) |
| Jefferson | 1 | (D) | - | - | - |
| King | 106 | 1,590 | 17 | 100 | 222 |
| Kitsap | 14 | 118 | 2 | (D) | (D) |
| Kittitas | 6 | 39 | 2 | (D) | (D) |
| Klickitat | 14 | 120 | 4 | 9 | 33 |
| Lewis | 33 | 296 | 3 | 14 | (D) |
| Lincoln | 2 | (D) | - | - | - |
| Mason | 17 | 204 | 2 | (D) | (D) |
| Okanogan | 10 | 44 | 1 | (D) | (D) |
| Pend Oreille | 6 | 27 | 1 | (D) | (D) |
| Pierce | 30 | 318 | 4 | 11 | 28 |
| San Juan | 6 | 108 | 2 | (D) | (D) |
| Skagit | 32 | 364 | - | - | - |
| Skamania | 1 | (D) | - | - | - |
| Snohomish | 53 | 849 | 7 | 57 | 154 |
| Spokane | 38 | 717 | 9 | 41 | 93 |
| Stevens | 21 | 225 | 3 | 17 | 22 |
| Thurston | 42 | 2,348 | 5 | (D) | (D) |
| Wahkiakum | 1 | (D) | - | - | - |
| Walla Walla | 5 | 15 | 1 | (D) | (D) |
| Whatcom | 22 | 145 | 4 | 17 | 43 |
| Whitman | 1 | (D) | - | - | - |
| Yakima | 13 | 420 | 4 | 50 | 125 |
| **BISON** | | | | | |
| **State Total** | | | | | |
| Washington ..... 2012 | 52 | 961 | 26 | 235 | 401 |
| 2007 | 100 | 1,534 | 54 | 501 | (NA) |
| **Counties, 2012** | | | | | |
| Adams | 1 | (D) | - | - | - |
| Clallam | 3 | 39 | - | - | - |
| Clark | 1 | (D) | 1 | (D) | (D) |
| Douglas | 3 | 54 | 1 | (D) | (D) |
| Grant | 2 | (D) | 2 | (D) | (D) |
| Grays Harbor | 4 | 110 | 2 | (D) | (D) |
| Island | 4 | 36 | - | - | - |
| King | 1 | (D) | 2 | (D) | (D) |
| Kittitas | 5 | 36 | 1 | (D) | (D) |
| Klickitat | 1 | (D) | 1 | (D) | (D) |
| Lewis | 1 | (D) | 1 | (D) | (D) |
| Okanogan | 1 | (D) | 1 | (D) | (D) |
| Pacific | 1 | (D) | 1 | (D) | (D) |
| Pend Oreille | 1 | (D) | 1 | (D) | (D) |
| Pierce | 1 | (D) | 1 | (D) | (D) |
| Skagit | 3 | 21 | - | - | - |
| Snohomish | 5 | 51 | 1 | (D) | (D) |
| Spokane | 6 | 151 | 6 | 38 | 48 |
| Stevens | 4 | 82 | 2 | (D) | (D) |
| Thurston | 1 | (D) | 1 | (D) | (D) |
| Whatcom | 1 | (D) | 1 | (D) | (D) |
| Yakima | 2 | (D) | - | - | - |
| **DEER IN CAPTIVITY** | | | | | |
| **State Total** | | | | | |
| Washington ..... 2012 | 15 | 451 | 5 | 24 | 34 |
| 2007 | 18 | 714 | 6 | 32 | (NA) |
| **Counties, 2012** | | | | | |
| Clallam | 2 | (D) | - | - | - |
| Grant | 2 | (D) | 2 | (D) | (D) |
| Jefferson | 2 | (D) | - | - | - |
| Lincoln | 2 | (D) | - | - | - |
| Pierce | 1 | (D) | - | - | - |
| Spokane | 2 | (D) | 1 | (D) | (D) |
| Stevens | 3 | 152 | 2 | (D) | (D) |
| Thurston | 1 | (D) | - | - | - |

See footnote(s) at end of table.

--continued

Table 23. **Miscellaneous Livestock and Animal Specialties – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | | |
|---|---|---|---|---|---|
| | Farms | Number | Farms | Number | Value ($1,000) |
| **ELK IN CAPTIVITY** | | | | | |
| **State Total** | | | | | |
| Washington ..... 2012 | 3 | 134 | 1 | (D) | (D) |
| 2007 | 8 | 471 | 2 | (D) | (NA) |
| **Counties, 2012** | | | | | |
| Clallam | 2 | (D) | - | - | - |
| Klickitat | 1 | (D) | 1 | (D) | (D) |
| **LLAMAS** | | | | | |
| **State Total** | | | | | |
| Washington ..... 2012 | 772 | 3,576 | 65 | 179 | 172 |
| 2007 | 1,616 | 8,140 | 184 | 451 | (NA) |
| **Counties, 2012** | | | | | |
| Adams | 6 | 15 | 4 | (D) | 4 |
| Benton | 25 | 73 | 2 | (D) | (D) |
| Chelan | 5 | 25 | 1 | (D) | (D) |
| Clallam | 27 | 117 | - | - | - |
| Clark | 70 | 374 | 4 | 32 | 31 |
| Columbia | 1 | (D) | - | - | - |
| Cowlitz | 15 | 35 | 1 | (D) | (D) |
| Douglas | 6 | 32 | - | - | - |
| Ferry | 10 | 98 | - | - | - |
| Franklin | 11 | 143 | 3 | 10 | 10 |
| Garfield | 1 | (D) | - | - | - |
| Grant | 13 | 52 | - | - | - |
| Grays Harbor | 11 | 44 | 1 | (D) | (D) |
| Island | 15 | 72 | - | - | - |
| Jefferson | 12 | 85 | 1 | (D) | (D) |
| King | 52 | 190 | 5 | 6 | 8 |
| Kitsap | 24 | 75 | 3 | 6 | 3 |
| Kittitas | 7 | 24 | - | - | - |
| Klickitat | 16 | 65 | - | - | - |
| Lewis | 41 | 155 | 5 | 15 | 15 |
| Lincoln | 7 | 13 | 1 | (D) | (D) |
| Mason | 16 | 40 | - | - | - |
| Okanogan | 19 | 101 | - | - | - |
| Pacific | 2 | (D) | - | - | - |
| Pend Oreille | 4 | 11 | - | - | - |
| Pierce | 34 | 147 | 3 | 6 | 6 |
| San Juan | 8 | 23 | - | - | - |
| Skagit | 26 | 153 | 2 | (D) | (D) |
| Skamania | 8 | 24 | - | - | - |
| Snohomish | 35 | 124 | 3 | (D) | 3 |
| Spokane | 86 | 518 | 7 | 28 | 24 |
| Stevens | 23 | 58 | 3 | (D) | 3 |
| Thurston | 35 | 151 | 3 | (D) | 2 |
| Wahkiakum | 3 | 10 | - | - | - |
| Walla Walla | 11 | 55 | 2 | (D) | (D) |
| Whatcom | 27 | 244 | 6 | 11 | 11 |
| Whitman | 17 | 60 | 2 | (D) | (D) |
| Yakima | 43 | 144 | 3 | 6 | 6 |
| **RABBITS, LIVE (SEE TEXT)** | | | | | |
| **State Total** | | | | | |
| Washington ..... 2012 | 394 | 5,533 | 93 | 4,773 | 57 |
| 2007 | (NA) | (NA) | (NA) | (NA) | (NA) |
| **Counties, 2012** | | | | | |
| Adams | 5 | 7 | - | - | - |
| Asotin | 1 | (D) | - | - | - |
| Benton | 7 | 31 | 3 | 25 | (Z) |
| Chelan | 4 | 38 | 3 | 30 | (Z) |
| Clallam | 12 | 490 | 2 | (D) | (D) |
| Clark | 16 | 116 | 6 | 118 | 2 |
| Cowlitz | 2 | (D) | - | - | - |
| Douglas | 6 | 10 | - | - | - |
| Ferry | 5 | 13 | 1 | (D) | (D) |
| Franklin | 8 | 42 | 4 | 80 | 1 |
| Grant | 2 | (D) | 1 | (D) | (D) |
| Grays Harbor | 7 | 101 | 1 | (D) | (D) |
| Island | 4 | 26 | - | - | - |
| Jefferson | 4 | 30 | - | - | - |
| King | 22 | 253 | 8 | 305 | 4 |
| Kitsap | 11 | 139 | 3 | (D) | (D) |
| Kittitas | 16 | 115 | - | - | - |
| Klickitat | 2 | (D) | - | - | - |
| Lewis | 29 | 266 | 10 | 184 | 2 |
| Lincoln | 3 | 3 | - | - | - |
| Mason | 12 | 45 | 1 | (D) | (D) |
| Okanogan | 12 | 208 | 3 | 57 | 1 |
| Pacific | 2 | (D) | - | - | - |
| Pend Oreille | 5 | (D) | 2 | (D) | (D) |
| Pierce | 14 | 64 | 3 | 23 | (Z) |
| San Juan | 4 | 22 | 2 | (D) | (D) |
| Skagit | 19 | 89 | 5 | 176 | 2 |

See footnote(s) at end of table.

--continued

Table 23. **Miscellaneous Livestock and Animal Specialties – Inventory and Sales: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Inventory | | Sales | | |
|---|---|---|---|---|---|
| | Farms | Number | Farms | Number | Value ($1,000) |
| **RABBITS, LIVE (SEE TEXT)** - Con. | | | | | |
| **Counties, 2012** - Con. | | | | | |
| Snohomish | 30 | 1,650 | 12 | 1,440 | (D) |
| Spokane | 22 | 612 | 3 | (D) | (D) |
| Stevens | 21 | 132 | 4 | 52 | (Z) |
| Thurston | 27 | 208 | 2 | (D) | (D) |
| Walla Walla | 1 | (D) | - | - | - |
| Whatcom | 25 | 78 | 4 | 27 | (D) |
| Whitman | 14 | 230 | 4 | 82 | 1 |
| Yakima | 20 | 224 | 6 | 150 | (D) |
| **OTHER LIVESTOCK (SEE TEXT)** | | | | | |
| **State Total** | | | | | |
| Washington 2012 | 54 | (X) | 25 | (X) | 456 |
| 2007 | 28 | (X) | 95 | (X) | (NA) |
| **Counties, 2012** | | | | | |
| Benton | 1 | (X) | - | (X) | - |
| Clallam | 2 | (X) | - | (X) | - |
| Clark | 3 | (X) | 1 | (X) | (D) |
| Franklin | - | (X) | 1 | (X) | (D) |
| Grant | 1 | (X) | - | (X) | - |
| Jefferson | 1 | (X) | - | (X) | - |
| King | 4 | (X) | 4 | (X) | (D) |
| Kitsap | - | (X) | 1 | (X) | (D) |
| Klickitat | 3 | (X) | 1 | (X) | (D) |
| Lewis | 4 | (X) | 2 | (X) | (D) |
| Lincoln | 1 | (X) | 1 | (X) | (D) |
| Mason | 3 | (X) | - | (X) | - |
| Pend Oreille | 1 | (X) | - | (X) | - |
| Pierce | 4 | (X) | 3 | (X) | (Z) |
| San Juan | 2 | (X) | 1 | (X) | (D) |
| Skagit | 4 | (X) | - | (X) | - |
| Snohomish | 2 | (X) | 1 | (X) | (D) |
| Spokane | 6 | (X) | 2 | (X) | (D) |
| Stevens | 4 | (X) | - | (X) | - |
| Thurston | 5 | (X) | 4 | (X) | 1 |
| Whatcom | 3 | (X) | 2 | (X) | (D) |
| Yakima | - | (X) | 1 | (X) | (D) |
| **OTHER LIVESTOCK PRODUCTS (SEE TEXT)** [1] | | | | | |
| **State Total** | | | | | |
| Washington 2012 | (NA) | (NA) | 372 | (X) | 8,242 |
| 2007 | (NA) | (NA) | 295 | (X) | (NA) |
| **Counties, 2012** | | | | | |
| Adams | (NA) | (NA) | 2 | (X) | (D) |
| Asotin | (NA) | (NA) | 3 | (X) | 4 |
| Benton | (NA) | (NA) | 27 | (X) | 64 |
| Chelan | (NA) | (NA) | 4 | (X) | 13 |
| Clallam | (NA) | (NA) | 4 | (X) | 49 |
| Clark | (NA) | (NA) | 29 | (X) | 180 |
| Columbia | (NA) | (NA) | 5 | (X) | 6 |
| Cowlitz | (NA) | (NA) | 3 | (X) | (D) |
| Douglas | (NA) | (NA) | 1 | (X) | (D) |
| Ferry | (NA) | (NA) | 1 | (X) | (D) |
| Grant | (NA) | (NA) | 10 | (X) | 25 |
| Grays Harbor | (NA) | (NA) | 3 | (X) | 4 |
| Island | (NA) | (NA) | 2 | (X) | (D) |
| King | (NA) | (NA) | 43 | (X) | 1,085 |
| Kitsap | (NA) | (NA) | 9 | (X) | 25 |
| Kittitas | (NA) | (NA) | 13 | (X) | 445 |
| Klickitat | (NA) | (NA) | 3 | (X) | 7 |
| Lewis | (NA) | (NA) | 29 | (X) | 784 |
| Lincoln | (NA) | (NA) | 4 | (X) | 10 |
| Mason | (NA) | (NA) | 1 | (X) | (D) |
| Okanogan | (NA) | (NA) | 8 | (X) | 12 |
| Pend Oreille | (NA) | (NA) | 5 | (X) | 7 |
| Pierce | (NA) | (NA) | 19 | (X) | (D) |
| San Juan | (NA) | (NA) | 4 | (X) | 17 |
| Skagit | (NA) | (NA) | 9 | (X) | 56 |
| Skamania | (NA) | (NA) | 1 | (X) | (D) |
| Snohomish | (NA) | (NA) | 19 | (X) | 3,324 |
| Spokane | (NA) | (NA) | 29 | (X) | 132 |
| Stevens | (NA) | (NA) | 18 | (X) | (D) |
| Thurston | (NA) | (NA) | 28 | (X) | 53 |
| Whatcom | (NA) | (NA) | 17 | (X) | 322 |
| Whitman | (NA) | (NA) | 8 | (X) | 8 |
| Yakima | (NA) | (NA) | 11 | (X) | (D) |

[1] Data are for farms with production, not necessarily sold.

## Table 24. **Selected Crops Harvested: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Harvested cropland ..... farms | 20,846 | 370 | 74 | 675 | 734 | 278 | 1,022 | 147 |
| acres | 4,342,904 | 364,428 | 35,811 | 296,362 | 23,458 | 6,513 | 24,099 | 98,182 |
| Irrigated ..... farms | 12,021 | 227 | 20 | 644 | 714 | 164 | 413 | 52 |
| acres | 1,550,138 | 122,892 | 319 | 189,833 | 21,790 | 3,072 | 3,387 | 3,635 |
| Barley for grain ..... farms | 817 | 11 | 12 | 2 | - | 4 | - | 30 |
| acres | 175,074 | 3,238 | 1,568 | (D) | - | 428 | - | 4,866 |
| bushels | 12,073,493 | 173,084 | 97,673 | (D) | - | 33,298 | - | 357,635 |
| Irrigated ..... farms | 66 | 6 | - | 2 | - | 2 | - | 1 |
| acres | 5,551 | 964 | - | (D) | - | (D) | - | (D) |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 110 | 3 | 4 | 2 | - | - | - | - |
| 25 to 99 acres ..... | 209 | 2 | 1 | - | - | 1 | - | 15 |
| 100 to 249 acres ..... | 253 | 3 | 5 | - | - | 3 | - | 9 |
| 250 to 499 acres ..... | 155 | 2 | 2 | - | - | - | - | 4 |
| 500 to 999 acres ..... | 74 | - | - | - | - | - | - | 2 |
| 1,000 acres or more ..... | 16 | 1 | - | - | - | - | - | - |
| Corn for grain ..... farms | 575 | 65 | - | 9 | 3 | - | 5 | 2 |
| acres | 114,516 | 13,646 | - | 14,038 | 8 | - | (D) | (D) |
| bushels | 23,824,561 | 2,282,753 | - | 3,571,120 | 1,232 | - | (D) | (D) |
| Irrigated ..... farms | 567 | 65 | - | 9 | 3 | - | 3 | 2 |
| acres | 113,685 | 13,646 | - | 14,038 | 8 | - | (D) | (D) |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 126 | 8 | - | - | 3 | - | 4 | - |
| 25 to 99 acres ..... | 164 | 16 | - | - | - | - | - | 1 |
| 100 to 249 acres ..... | 165 | 28 | - | 2 | - | - | 1 | 1 |
| 250 to 499 acres ..... | 68 | 4 | - | 2 | - | - | - | - |
| 500 to 999 acres ..... | 34 | 8 | - | 2 | - | - | - | - |
| 1,000 acres or more ..... | 18 | 1 | - | 3 | - | - | - | - |
| Corn for silage or greenchop ..... farms | 529 | 13 | - | 13 | - | 1 | 10 | - |
| acres | 93,239 | 2,216 | - | 1,361 | - | (D) | 2,181 | - |
| tons | 2,320,924 | 34,793 | - | 37,649 | - | (D) | 35,590 | - |
| Irrigated ..... farms | 360 | 13 | - | 13 | - | 1 | 7 | - |
| acres | 67,068 | 2,216 | - | 1,361 | - | (D) | 187 | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 118 | 7 | - | 7 | - | - | 2 | - |
| 25 to 99 acres ..... | 171 | - | - | 4 | - | - | 5 | - |
| 100 to 249 acres ..... | 131 | 2 | - | 1 | - | 1 | 1 | - |
| 250 to 499 acres ..... | 67 | 3 | - | - | - | - | 1 | - |
| 500 to 999 acres ..... | 28 | 1 | - | - | - | - | - | - |
| 1,000 acres or more ..... | 14 | - | - | 1 | - | - | 1 | - |
| Dry edible beans, excluding limas ..... farms | 420 | 33 | 3 | 2 | 1 | 1 | - | 13 |
| acres | 114,506 | 7,882 | 1,165 | (D) | (D) | (D) | - | 2,922 |
| cwt | 2,275,125 | 195,817 | 16,978 | (D) | (D) | (D) | - | 49,608 |
| Irrigated ..... farms | 192 | 33 | - | 2 | 1 | - | - | - |
| acres | 35,041 | 7,882 | - | (D) | (D) | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 48 | 2 | - | - | 1 | 1 | - | - |
| 25 to 99 acres ..... | 97 | 14 | - | - | - | - | - | - |
| 100 to 249 acres ..... | 141 | 11 | 2 | 2 | - | - | - | 11 |
| 250 to 499 acres ..... | 80 | 3 | - | - | - | - | - | - |
| 500 to 999 acres ..... | 28 | 1 | 1 | - | - | - | - | 2 |
| 1,000 acres or more ..... | 26 | 2 | - | - | - | - | - | - |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) ..... farms | 10,396 | 101 | 40 | 249 | 69 | 161 | 592 | 57 |
| acres | 748,909 | 19,947 | 5,447 | 15,844 | 1,514 | 5,147 | 17,541 | 3,420 |
| tons, dry equivalent | 2,873,198 | 114,000 | 5,938 | 84,966 | 2,932 | 14,064 | 33,320 | 8,235 |
| Irrigated ..... farms | 3,780 | 96 | 4 | 243 | 53 | 51 | 37 | 40 |
| acres | 385,037 | 19,241 | 26 | 14,952 | 825 | 2,206 | 833 | 1,469 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 5,973 | 31 | 13 | 182 | 55 | 107 | 432 | 36 |
| 25 to 99 acres ..... | 2,677 | 22 | 9 | 50 | 13 | 43 | 134 | 11 |
| 100 to 249 acres ..... | 1,052 | 24 | 9 | 3 | - | 10 | 19 | 6 |
| 250 to 499 acres ..... | 432 | 13 | 8 | 5 | - | 1 | 4 | 2 |
| 500 to 999 acres ..... | 177 | 6 | 1 | 5 | 1 | - | 2 | 2 |
| 1,000 acres or more ..... | 85 | 5 | - | 4 | - | - | 1 | - |
| Oats for grain ..... farms | 139 | 7 | 5 | - | - | 2 | 10 | 2 |
| acres | 6,129 | (D) | 434 | - | - | (D) | 302 | (D) |
| bushels | 466,810 | (D) | 14,804 | - | - | (D) | 33,552 | (D) |
| Irrigated ..... farms | 24 | 2 | - | - | - | 2 | 1 | - |
| acres | 671 | (D) | - | - | - | (D) | (D) | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 80 | 5 | 1 | - | - | 2 | 5 | - |
| 25 to 99 acres ..... | 39 | - | 2 | - | - | - | 5 | 1 |
| 100 to 249 acres ..... | 17 | - | 2 | - | - | - | - | - |
| 250 to 499 acres ..... | 2 | 1 | - | - | - | - | - | 1 |
| 500 to 999 acres ..... | 1 | 1 | - | - | - | - | - | - |
| 1,000 acres or more ..... | - | - | - | - | - | - | - | - |
| Sorghum for grain ..... farms | 2 | - | - | - | - | - | - | - |
| acres | (D) | - | - | - | - | - | - | - |
| bushels | (D) | - | - | - | - | - | - | - |
| Irrigated ..... farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | - | - | - | - | - | - | - | - |
| 25 to 99 acres ..... | 2 | - | - | - | - | - | - | - |
| 100 to 249 acres ..... | - | - | - | - | - | - | - | - |
| 250 to 499 acres ..... | - | - | - | - | - | - | - | - |
| 500 to 999 acres ..... | - | - | - | - | - | - | - | - |
| 1,000 acres or more ..... | - | - | - | - | - | - | - | - |
| Soybeans for beans ..... farms | 2 | - | - | - | - | - | - | - |
| acres | (D) | - | - | - | - | - | - | - |
| bushels | (D) | - | - | - | - | - | - | - |
| Irrigated ..... farms | 1 | - | - | - | - | - | - | - |
| acres | (D) | - | - | - | - | - | - | - |

--continued

Table 24. **Selected Crops Harvested: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| Harvested cropland ....farms | 221 | 545 | 145 | 563 | 113 | 1,047 | 293 | 219 |
| acres | 17,462 | 191,252 | 8,895 | 261,364 | 90,550 | 525,432 | 20,461 | 6,454 |
| Irrigated ....farms | 87 | 381 | 62 | 507 | 19 | 988 | 117 | 94 |
| acres | 7,199 | 17,845 | 2,739 | 203,297 | 771 | 415,595 | 8,268 | 1,229 |
| Barley for grain ....farms | 5 | 10 | 2 | 8 | 33 | 10 | 1 | 5 |
| acres | 802 | 3,894 | (D) | 925 | 5,070 | 1,672 | (D) | 640 |
| bushels | 76,890 | 128,643 | (D) | 99,398 | 342,190 | 46,949 | (D) | 60,464 |
| Irrigated ....farms | - | - | 1 | 8 | 1 | 1 | - | 1 |
| acres | - | - | (D) | 925 | (D) | (D) | - | (D) |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 1 | - | 1 | 1 | - | 4 | - | - |
| 25 to 99 acres | - | 2 | 1 | 2 | 12 | - | 1 | 1 |
| 100 to 249 acres | 4 | - | - | 4 | 15 | 2 | - | 4 |
| 250 to 499 acres | - | 7 | - | 1 | 6 | 4 | - | - |
| 500 to 999 acres | - | 1 | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Corn for grain ....farms | - | 3 | 1 | 131 | - | 212 | - | 2 |
| acres | - | 275 | (D) | 20,400 | - | 46,337 | - | (D) |
| bushels | - | 42,078 | (D) | 4,592,711 | - | 9,516,688 | - | (D) |
| Irrigated ....farms | - | 3 | 1 | 131 | - | 212 | - | - |
| acres | - | 275 | (D) | 20,400 | - | 46,337 | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | 1 | 40 | - | 17 | - | - |
| 25 to 99 acres | - | 2 | - | 31 | - | 71 | - | 2 |
| 100 to 249 acres | - | 1 | - | 40 | - | 66 | - | - |
| 250 to 499 acres | - | - | - | 13 | - | 37 | - | - |
| 500 to 999 acres | - | - | - | 4 | - | 14 | - | - |
| 1,000 acres or more | - | - | - | 3 | - | 7 | - | - |
| Corn for silage or greenchop ....farms | 8 | 1 | - | 32 | - | 49 | 8 | 3 |
| acres | 601 | (D) | - | 9,020 | - | 13,130 | 730 | 408 |
| tons | 13,840 | (D) | - | 228,568 | - | 357,943 | 18,230 | (D) |
| Irrigated ....farms | 2 | 1 | - | 32 | - | 49 | 8 | 2 |
| acres | (D) | (D) | - | 9,020 | - | 13,130 | 730 | (D) |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 1 | - | - | - | - | 5 | - | - |
| 25 to 99 acres | 4 | - | - | 13 | - | 5 | 6 | 2 |
| 100 to 249 acres | 3 | 1 | - | 8 | - | 22 | 2 | - |
| 250 to 499 acres | - | - | - | 5 | - | 10 | - | 1 |
| 500 to 999 acres | - | - | - | 4 | - | 4 | - | - |
| 1,000 acres or more | - | - | - | 2 | - | 3 | - | - |
| Dry edible beans, excluding limas ....farms | - | - | - | 28 | 2 | 102 | - | 1 |
| acres | - | - | - | 3,233 | (D) | 20,467 | - | (D) |
| cwt | - | - | - | 81,988 | (D) | 555,524 | - | (D) |
| Irrigated ....farms | - | - | - | 28 | - | 102 | - | - |
| acres | - | - | - | 3,233 | - | 20,467 | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | 6 | - | 4 | - | 1 |
| 25 to 99 acres | - | - | - | 10 | 2 | 30 | - | - |
| 100 to 249 acres | - | - | - | 10 | - | 47 | - | - |
| 250 to 499 acres | - | - | - | 1 | - | 12 | - | - |
| 500 to 999 acres | - | - | - | 1 | - | 7 | - | - |
| 1,000 acres or more | - | - | - | - | - | 2 | - | - |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) ....farms | 121 | 54 | 120 | 206 | 36 | 485 | 195 | 128 |
| acres | 3,851 | 6,735 | 8,137 | 69,541 | 1,816 | 117,492 | 10,130 | 4,967 |
| tons, dry equivalent | 7,638 | 17,167 | 17,935 | 479,494 | 4,992 | 694,181 | 21,098 | 13,094 |
| Irrigated ....farms | 2 | 41 | 38 | 203 | 12 | 471 | 32 | 11 |
| acres | (D) | 2,247 | 2,395 | 68,979 | 561 | 111,657 | 2,209 | 695 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 83 | 23 | 37 | 31 | 15 | 125 | 89 | 88 |
| 25 to 99 acres | 27 | 15 | 56 | 46 | 16 | 109 | 76 | 29 |
| 100 to 249 acres | 10 | 13 | 22 | 50 | 5 | 129 | 22 | 7 |
| 250 to 499 acres | 1 | 1 | 4 | 37 | - | 60 | 7 | 3 |
| 500 to 999 acres | - | 1 | 1 | 25 | - | 41 | 1 | 1 |
| 1,000 acres or more | - | 1 | - | 17 | - | 21 | - | - |
| Oats for grain ....farms | 1 | 2 | 1 | 1 | - | - | - | - |
| acres | (D) | (D) | (D) | (D) | - | - | - | - |
| bushels | (D) | (D) | (D) | (D) | - | - | - | - |
| Irrigated ....farms | - | - | - | 1 | - | - | - | - |
| acres | - | - | - | (D) | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 1 | - | - | - | - | - | - | - |
| 25 to 99 acres | - | 1 | 1 | - | - | - | - | - |
| 100 to 249 acres | - | 1 | - | 1 | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sorghum for grain ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| bushels | - | - | - | - | - | - | - | - |
| Irrigated ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Soybeans for beans ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| bushels | - | - | - | - | - | - | - | - |
| Irrigated ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |

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Table 24. **Selected Crops Harvested: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Harvested cropland ..... farms | 122 | 851 | 327 | 525 | 365 | 965 | 461 | 156 |
| acres | 2,903 | 13,340 | 1,913 | 51,234 | 80,898 | 45,858 | 383,304 | 3,847 |
| Irrigated ..... farms | 57 | 443 | 225 | 475 | 200 | 222 | 117 | 67 |
| acres | 937 | 3,306 | 389 | 49,654 | 18,413 | 7,387 | 33,836 | 290 |
| Barley for grain ..... farms | - | 3 | - | 2 | 11 | 18 | 104 | - |
| acres | - | 3 | - | (D) | 797 | 693 | 32,799 | - |
| bushels | - | 15 | - | (D) | 53,083 | 48,478 | 2,163,476 | - |
| Irrigated ..... farms | - | 1 | - | 2 | 4 | 1 | 8 | - |
| acres | - | (D) | - | (D) | (D) | (D) | 975 | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | - | 3 | - | 1 | 4 | 4 | 8 | - |
| 25 to 99 acres ..... | - | - | - | 1 | 4 | 11 | 10 | - |
| 100 to 249 acres ..... | - | - | - | - | 3 | 3 | 38 | - |
| 250 to 499 acres ..... | - | - | - | - | - | - | 24 | - |
| 500 to 999 acres ..... | - | - | - | - | - | - | 18 | - |
| 1,000 acres or more ..... | - | - | - | - | - | - | 6 | - |
| Corn for grain ..... farms | - | - | - | 2 | - | - | 2 | - |
| acres | - | - | - | (D) | - | - | (D) | - |
| bushels | - | - | - | (D) | - | - | (D) | - |
| Irrigated ..... farms | - | - | - | 2 | - | - | 2 | - |
| acres | - | - | - | (D) | - | - | (D) | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | - | - | - | 2 | - | - | - | - |
| 25 to 99 acres ..... | - | - | - | - | - | - | - | - |
| 100 to 249 acres ..... | - | - | - | - | - | - | 2 | - |
| 250 to 499 acres ..... | - | - | - | - | - | - | - | - |
| 500 to 999 acres ..... | - | - | - | - | - | - | - | - |
| 1,000 acres or more ..... | - | - | - | - | - | - | - | - |
| Corn for silage or greenchop ..... farms | - | 21 | - | 3 | 1 | 8 | 1 | - |
| acres | - | 1,945 | - | (D) | (D) | 915 | (D) | - |
| tons | - | 40,719 | - | (D) | (D) | 16,855 | (D) | - |
| Irrigated ..... farms | - | - | - | 3 | 1 | 6 | 1 | - |
| acres | - | - | - | (D) | (D) | (D) | (D) | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | - | 6 | - | 2 | 1 | 1 | - | - |
| 25 to 99 acres ..... | - | 11 | - | 1 | - | 4 | - | - |
| 100 to 249 acres ..... | - | 3 | - | - | - | 2 | 1 | - |
| 250 to 499 acres ..... | - | - | - | - | - | 1 | - | - |
| 500 to 999 acres ..... | - | 1 | - | - | - | - | - | - |
| 1,000 acres or more ..... | - | - | - | - | - | - | - | - |
| Dry edible beans, excluding limas ..... farms | - | 2 | - | 2 | 1 | 2 | 7 | - |
| acres | - | (D) | - | (D) | (D) | (D) | 1,558 | - |
| cwt | - | (D) | - | (D) | (D) | (D) | 28,807 | - |
| Irrigated ..... farms | - | - | - | 2 | 1 | - | 7 | - |
| acres | - | - | - | (D) | (D) | - | 1,558 | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | - | 2 | - | 1 | - | 2 | - | - |
| 25 to 99 acres ..... | - | - | - | - | - | - | 1 | - |
| 100 to 249 acres ..... | - | - | - | 1 | - | - | 4 | - |
| 250 to 499 acres ..... | - | - | - | - | 1 | - | 1 | - |
| 500 to 999 acres ..... | - | - | - | - | - | - | 1 | - |
| 1,000 acres or more ..... | - | - | - | - | - | - | - | - |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) ..... farms | 85 | 305 | 54 | 439 | 223 | 755 | 190 | 65 |
| acres | 2,701 | 7,627 | 867 | 44,062 | 32,540 | 33,358 | 23,392 | 2,474 |
| tons, dry equivalent | 4,110 | 17,030 | 1,190 | 201,863 | 44,022 | 69,557 | 63,127 | 3,941 |
| Irrigated ..... farms | 12 | 11 | 4 | 391 | 76 | 75 | 59 | 6 |
| acres | 771 | 811 | 9 | 42,925 | 7,170 | 3,717 | 7,467 | 31 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 57 | 233 | 40 | 242 | 85 | 427 | 52 | 50 |
| 25 to 99 acres ..... | 23 | 55 | 14 | 94 | 62 | 238 | 68 | 13 |
| 100 to 249 acres ..... | 3 | 13 | - | 55 | 33 | 72 | 36 | - |
| 250 to 499 acres ..... | 2 | 4 | - | 26 | 27 | 16 | 26 | 1 |
| 500 to 999 acres ..... | - | - | - | 15 | 11 | 2 | 8 | - |
| 1,000 acres or more ..... | - | - | - | 7 | 5 | - | - | 1 |
| Oats for grain ..... farms | - | 3 | - | 10 | 6 | 6 | - | - |
| acres | - | 18 | - | 544 | 90 | 515 | - | - |
| bushels | - | 2,133 | - | 56,218 | 3,920 | 41,811 | - | - |
| Irrigated ..... farms | - | - | - | 8 | 2 | - | - | - |
| acres | - | - | - | (D) | (D) | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | - | 3 | - | 5 | 6 | 1 | - | - |
| 25 to 99 acres ..... | - | - | - | 3 | - | 2 | - | - |
| 100 to 249 acres ..... | - | - | - | 2 | - | 3 | - | - |
| 250 to 499 acres ..... | - | - | - | - | - | - | - | - |
| 500 to 999 acres ..... | - | - | - | - | - | - | - | - |
| 1,000 acres or more ..... | - | - | - | - | - | - | - | - |
| Sorghum for grain ..... farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| bushels | - | - | - | - | - | - | - | - |
| Irrigated ..... farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | - | - | - | - | - | - | - | - |
| 25 to 99 acres ..... | - | - | - | - | - | - | - | - |
| 100 to 249 acres ..... | - | - | - | - | - | - | - | - |
| 250 to 499 acres ..... | - | - | - | - | - | - | - | - |
| 500 to 999 acres ..... | - | - | - | - | - | - | - | - |
| 1,000 acres or more ..... | - | - | - | - | - | - | - | - |
| Soybeans for beans ..... farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| bushels | - | - | - | - | - | - | - | - |
| Irrigated ..... farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |

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Table 24. **Selected Crops Harvested: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Harvested cropland ....farms | 941 | 226 | 173 | 603 | 180 | 612 | 81 | 609 |
| acres | 78,819 | 6,529 | 12,433 | 9,643 | 4,332 | 57,055 | 972 | 23,425 |
| Irrigated ....farms | 808 | 103 | 34 | 293 | 93 | 287 | 48 | 267 |
| acres | 47,740 | (D) | 782 | 2,438 | (D) | 18,683 | 332 | 5,134 |
| Barley for grain ....farms | 9 | - | 1 | - | 2 | 29 | - | 9 |
| acres | 1,873 | - | (D) | - | (D) | 3,307 | - | 386 |
| bushels | 65,740 | - | (D) | - | (D) | 221,689 | - | 22,558 |
| Irrigated ....farms | 4 | - | - | - | - | 3 | - | - |
| acres | 43 | - | - | - | - | 812 | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 4 | - | - | - | 1 | 7 | - | 5 |
| 25 to 99 acres | 1 | - | - | - | 1 | 10 | - | 3 |
| 100 to 249 acres | - | - | 1 | - | - | 9 | - | 1 |
| 250 to 499 acres | 2 | - | - | - | - | 3 | - | - |
| 500 to 999 acres | 2 | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Corn for grain ....farms | 2 | 1 | - | 3 | - | - | - | 1 |
| acres | (D) | (D) | - | 3 | - | - | - | (D) |
| bushels | (D) | (D) | - | 213 | - | - | - | (D) |
| Irrigated ....farms | 2 | 1 | - | 1 | - | - | - | - |
| acres | (D) | (D) | - | (D) | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 2 | 1 | - | 3 | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | 1 |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Corn for silage or greenchop ....farms | 8 | - | - | 6 | - | 29 | - | 33 |
| acres | 1,090 | - | - | 96 | - | 7,117 | - | 4,192 |
| tons | 23,292 | - | - | 1,084 | - | 158,592 | - | 93,478 |
| Irrigated ....farms | 8 | - | - | 2 | - | 4 | - | 10 |
| acres | 1,090 | - | - | (D) | - | 280 | - | 690 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 2 | - | - | 4 | - | 1 | - | 7 |
| 25 to 99 acres | 3 | - | - | 2 | - | 11 | - | 11 |
| 100 to 249 acres | 1 | - | - | - | - | 9 | - | 10 |
| 250 to 499 acres | 2 | - | - | - | - | 5 | - | 4 |
| 500 to 999 acres | - | - | - | - | - | 1 | - | 1 |
| 1,000 acres or more | - | - | - | - | - | 2 | - | - |
| Dry edible beans, excluding limas ....farms | 2 | - | - | 3 | - | - | - | 3 |
| acres | (D) | - | - | 3 | - | - | - | 3 |
| cwt | (D) | - | - | 45 | - | - | - | 45 |
| Irrigated ....farms | 2 | - | - | - | - | - | - | - |
| acres | (D) | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 2 | - | - | 3 | - | - | - | 3 |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) ....farms | 523 | 108 | 155 | 288 | 102 | 333 | 31 | 300 |
| acres | 31,869 | 4,791 | 12,274 | 6,339 | 3,922 | 16,272 | 560 | 11,960 |
| tons, dry equivalent | 75,750 | 13,801 | 19,742 | 10,917 | 8,363 | 60,050 | 970 | 38,896 |
| Irrigated ....farms | 401 | 5 | 18 | 19 | 7 | 20 | 1 | 20 |
| acres | 15,717 | 982 | 766 | 418 | 48 | 1,042 | (D) | 1,810 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 319 | 58 | 66 | 208 | 61 | 200 | 22 | 197 |
| 25 to 99 acres | 119 | 37 | 65 | 69 | 34 | 89 | 9 | 75 |
| 100 to 249 acres | 59 | 9 | 13 | 11 | 3 | 29 | - | 18 |
| 250 to 499 acres | 15 | 4 | 6 | - | 4 | 15 | - | 9 |
| 500 to 999 acres | 9 | - | 2 | - | - | - | - | 1 |
| 1,000 acres or more | 2 | - | 3 | - | - | - | - | - |
| Oats for grain ....farms | 6 | - | - | 2 | - | 4 | - | 3 |
| acres | 323 | - | - | (D) | - | 17 | - | 11 |
| bushels | 25,340 | - | - | (D) | - | 1,314 | - | 550 |
| Irrigated ....farms | 3 | - | - | - | - | - | - | - |
| acres | 7 | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 3 | - | - | 2 | - | 4 | - | 3 |
| 25 to 99 acres | 1 | - | - | - | - | - | - | - |
| 100 to 249 acres | 2 | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sorghum for grain ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| bushels | - | - | - | - | - | - | - | - |
| Irrigated ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Soybeans for beans ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| bushels | - | - | - | - | - | - | - | - |
| Irrigated ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |

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Table 24. **Selected Crops Harvested: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Harvested cropland ..... farms | 1,402 | 687 | 647 | 68 | 532 | 1,110 | 709 | 2,048 |
| acres | 289,301 | 57,638 | 18,357 | 2,201 | 280,934 | 69,731 | 659,460 | 218,054 |
| Irrigated ..... farms | 395 | 202 | 270 | 16 | 344 | 538 | 53 | 1,975 |
| acres | 9,748 | 5,639 | 3,944 | 48 | 88,077 | 34,299 | 4,158 | 210,313 |
| Barley for grain ..... farms | 122 | 58 | 1 | - | 14 | 3 | 293 | 5 |
| acres | 20,499 | 5,400 | (D) | - | 1,670 | (D) | 83,709 | 268 |
| bushels | 1,307,888 | 317,310 | (D) | - | 123,125 | (D) | 6,267,724 | 28,953 |
| Irrigated ..... farms | 3 | 4 | - | - | 4 | - | 6 | 3 |
| acres | 312 | 150 | - | - | 304 | - | 146 | (D) |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 25 | 14 | - | - | 1 | 1 | 14 | 2 |
| 25 to 99 acres ..... | 35 | 28 | 1 | - | 7 | 1 | 55 | 3 |
| 100 to 249 acres ..... | 38 | 10 | - | - | 5 | 1 | 95 | - |
| 250 to 499 acres ..... | 17 | 6 | - | - | - | - | 77 | - |
| 500 to 999 acres ..... | 5 | - | - | - | 1 | - | 45 | - |
| 1,000 acres or more ..... | 2 | - | - | - | - | - | 7 | - |
| Corn for grain ..... farms | 1 | - | - | - | 37 | 1 | 1 | 91 |
| acres | (D) | - | - | - | 2,924 | (D) | (D) | 14,303 |
| bushels | (D) | - | - | - | 547,670 | (D) | (D) | 2,918,853 |
| Irrigated ..... farms | 1 | - | - | - | 37 | - | 1 | 91 |
| acres | (D) | - | - | - | 2,924 | - | (D) | 14,303 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | - | - | - | - | 15 | - | - | 30 |
| 25 to 99 acres ..... | - | - | - | - | 16 | 1 | - | 24 |
| 100 to 249 acres ..... | - | - | - | - | 3 | - | 1 | 20 |
| 250 to 499 acres ..... | - | - | - | - | 1 | - | - | 11 |
| 500 to 999 acres ..... | - | - | - | - | 2 | - | - | 3 |
| 1,000 acres or more ..... | 1 | - | - | - | - | - | - | 3 |
| Corn for silage or greenchop ..... farms | 4 | 1 | 4 | - | - | 134 | - | 138 |
| acres | (D) | (D) | (D) | - | - | 15,304 | - | 31,879 |
| tons | (D) | (D) | (D) | - | - | 339,373 | - | 889,519 |
| Irrigated ..... farms | 4 | - | 2 | - | - | 53 | - | 138 |
| acres | (D) | - | (D) | - | - | 4,671 | - | 31,879 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 3 | 1 | 2 | - | - | 33 | - | 33 |
| 25 to 99 acres ..... | 1 | - | - | - | - | 49 | - | 39 |
| 100 to 249 acres ..... | - | - | 1 | - | - | 33 | - | 30 |
| 250 to 499 acres ..... | - | - | 1 | - | - | 14 | - | 20 |
| 500 to 999 acres ..... | - | - | - | - | - | 5 | - | 11 |
| 1,000 acres or more ..... | - | - | - | - | - | - | - | 5 |
| Dry edible beans, excluding limas ..... farms | 11 | - | 1 | - | 38 | 3 | 153 | 6 |
| acres | 715 | - | (D) | - | 10,270 | 3 | 65,037 | 218 |
| cwt | 10,518 | - | (D) | - | 174,083 | 63 | 1,128,052 | 3,950 |
| Irrigated ..... farms | - | - | - | - | 5 | 3 | - | 6 |
| acres | - | - | - | - | 797 | 3 | - | 218 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 2 | - | 1 | - | 4 | 3 | 7 | 3 |
| 25 to 99 acres ..... | 6 | - | - | - | 12 | - | 19 | 3 |
| 100 to 249 acres ..... | 3 | - | - | - | 6 | - | 44 | - |
| 250 to 499 acres ..... | - | - | - | - | 11 | - | 51 | - |
| 500 to 999 acres ..... | - | - | - | - | 3 | - | 12 | - |
| 1,000 acres or more ..... | - | - | - | - | 2 | - | 20 | - |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) ..... farms | 971 | 544 | 364 | 55 | 166 | 726 | 205 | 795 |
| acres | 58,922 | 41,522 | 15,850 | 2,176 | 13,188 | 35,858 | 18,007 | 36,849 |
| tons, dry equivalent | 114,183 | 85,953 | 42,663 | 3,963 | 71,565 | 165,065 | 44,723 | 192,700 |
| Irrigated ..... farms | 126 | 91 | 49 | 1 | 128 | 147 | 26 | 753 |
| acres | 3,829 | 4,604 | 2,065 | (D) | 10,427 | 12,979 | 3,656 | 35,026 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 552 | 213 | 248 | 28 | 105 | 489 | 113 | 561 |
| 25 to 99 acres ..... | 285 | 200 | 76 | 24 | 44 | 134 | 49 | 145 |
| 100 to 249 acres ..... | 87 | 90 | 30 | 2 | 7 | 71 | 21 | 61 |
| 250 to 499 acres ..... | 33 | 38 | 6 | - | 5 | 28 | 8 | 13 |
| 500 to 999 acres ..... | 11 | 2 | 1 | 1 | 1 | 2 | 13 | 11 |
| 1,000 acres or more ..... | 3 | 1 | 3 | - | 4 | 2 | 1 | 4 |
| Oats for grain ..... farms | 31 | 26 | 2 | - | 1 | 4 | 2 | 2 |
| acres | 1,252 | 1,027 | (D) | - | (D) | 4 | (D) | (D) |
| bushels | 70,828 | 57,649 | (D) | - | (D) | 349 | (D) | (D) |
| Irrigated ..... farms | - | - | - | - | - | 3 | - | 2 |
| acres | - | - | - | - | - | (D) | - | (D) |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | 17 | 12 | 2 | - | - | 4 | 2 | 2 |
| 25 to 99 acres ..... | 9 | 13 | - | - | 1 | - | - | - |
| 100 to 249 acres ..... | 5 | 1 | - | - | - | - | - | - |
| 250 to 499 acres ..... | - | - | - | - | - | - | - | - |
| 500 to 999 acres ..... | - | - | - | - | - | - | - | - |
| 1,000 acres or more ..... | - | - | - | - | - | - | - | - |
| Sorghum for grain ..... farms | 1 | - | - | - | - | 1 | - | - |
| acres | (D) | - | - | - | - | (D) | - | - |
| bushels | (D) | - | - | - | - | (D) | - | - |
| Irrigated ..... farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres ..... | - | - | - | - | - | - | - | - |
| 25 to 99 acres ..... | 1 | - | - | - | - | 1 | - | - |
| 100 to 249 acres ..... | - | - | - | - | - | - | - | - |
| 250 to 499 acres ..... | - | - | - | - | - | - | - | - |
| 500 to 999 acres ..... | - | - | - | - | - | - | - | - |
| 1,000 acres or more ..... | - | - | - | - | - | - | - | - |
| Soybeans for beans ..... farms | - | - | - | - | 2 | - | - | - |
| acres | - | - | - | - | (D) | - | - | - |
| bushels | - | - | - | - | (D) | - | - | - |
| Irrigated ..... farms | - | - | - | - | 1 | - | - | - |
| acres | - | - | - | - | (D) | - | - | - |

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Table 24. **Selected Crops Harvested: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Soybeans for beans - Con. | | | | | | | | |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | 1 | - | - | - | - | - | - | - |
| 100 to 249 acres | 1 | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sugarbeets for sugar ....farms | 4 | - | - | 2 | - | - | - | - |
| acres | (D) | - | - | (D) | - | - | - | - |
| tons | (D) | - | - | (D) | - | - | - | - |
| Irrigated ....farms | 4 | - | - | 2 | - | - | - | - |
| acres | (D) | - | - | (D) | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 2 | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | 2 | - | - | 2 | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sunflower seed, all ....farms | 15 | 2 | - | - | - | - | - | - |
| acres | 1,603 | (D) | - | - | - | - | - | - |
| pounds | 2,144,124 | (D) | - | - | - | - | - | - |
| Irrigated ....farms | 13 | 2 | - | - | - | - | - | - |
| acres | (D) | (D) | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 3 | 1 | - | - | - | - | - | - |
| 25 to 99 acres | 6 | - | - | - | - | - | - | - |
| 100 to 249 acres | 5 | 1 | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | 1 | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Wheat for grain, all ....farms | 2,871 | 224 | 38 | 48 | 6 | 2 | 10 | 94 |
| acres | 2,186,813 | 276,807 | 27,172 | 119,533 | 1,104 | (D) | 570 | 74,251 |
| bushels | 141,020,565 | 15,969,949 | 1,628,205 | 6,867,150 | 21,069 | (D) | 31,817 | 5,861,603 |
| Irrigated ....farms | 687 | 74 | 1 | 16 | 4 | 2 | - | 6 |
| acres | 180,802 | 35,584 | (D) | 15,436 | (D) | (D) | - | 1,231 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 234 | 5 | - | 2 | 1 | - | 3 | 7 |
| 25 to 99 acres | 423 | 13 | 3 | 4 | 1 | 1 | 3 | 18 |
| 100 to 249 acres | 542 | 36 | 2 | 5 | 3 | 1 | 4 | 19 |
| 250 to 499 acres | 441 | 31 | 13 | 4 | 1 | - | - | 9 |
| 500 to 999 acres | 490 | 49 | 10 | 3 | - | - | - | 12 |
| 1,000 acres or more | 741 | 90 | 10 | 30 | - | - | - | 29 |
| Vegetables harvested for sale (see text) ....farms | 2,836 | 49 | 5 | 61 | 40 | 41 | 177 | 5 |
| acres | 351,639 | 28,642 | 59 | 83,081 | 40 | 133 | 418 | 4 |
| Farms by acres harvested: | | | | | | | | |
| 0.1 to 4.9 acres | 2,023 | 8 | 2 | 31 | 40 | 35 | 161 | 5 |
| 5.0 to 24.9 acres | 232 | 2 | 3 | 3 | - | 5 | 14 | - |
| 25.0 to 99.9 acres | 154 | 5 | - | 5 | - | 1 | 2 | - |
| 100.0 to 249.9 acres | 139 | 9 | - | 5 | - | - | - | - |
| 250.0 to 499.9 acres | 140 | 12 | - | 1 | - | - | - | - |
| 500.0 acres or more | 148 | 13 | - | 16 | - | - | - | - |
| 500.0 to 749.9 acres | 55 | 3 | - | 2 | - | - | - | - |
| 750.0 to 999.9 acres | 21 | 3 | - | 3 | - | - | - | - |
| 1,000.0 acres or more | 72 | 7 | - | 11 | - | - | - | - |
| Land in orchards ....farms | 4,846 | 38 | 8 | 353 | 631 | 49 | 149 | 4 |
| acres | 315,456 | 5,850 | 68 | 49,233 | 20,599 | 80 | 434 | 185 |
| Irrigated ....farms | 4,827 | 38 | 8 | 353 | 631 | 49 | 149 | 4 |
| acres | 315,398 | 5,850 | 68 | 49,233 | 20,599 | 80 | 434 | 185 |
| Farms by bearing and nonbearing acres: | | | | | | | | |
| 0.1 to 4.9 acres | 1,898 | 8 | 4 | 98 | 163 | 47 | 134 | 2 |
| 5.0 to 24.9 acres | 1,273 | 3 | 4 | 92 | 253 | 2 | 11 | - |
| 25.0 to 99.9 acres | 1,075 | 8 | - | 87 | 179 | - | 4 | 2 |
| 100.0 to 249.9 acres | 386 | 11 | - | 47 | 29 | - | - | - |
| 250.0 to 499.9 acres | 111 | 5 | - | 8 | 3 | - | - | - |
| 500.0 acres or more | 103 | 3 | - | 21 | 4 | - | - | - |
| 500.0 to 749.9 acres | 40 | 3 | - | 5 | 3 | - | - | - |
| 750.0 to 999.9 acres | 22 | - | - | 9 | - | - | - | - |
| 1,000.0 acres or more | 41 | - | - | 7 | 1 | - | - | - |

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Table 24. **Selected Crops Harvested: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| Soybeans for beans - Con. | | | | | | | | |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sugarbeets for sugar ... farms | - | - | - | 2 | - | - | - | - |
| acres | - | - | - | (D) | - | - | - | - |
| tons | - | - | - | (D) | - | - | - | - |
| Irrigated ... farms | - | - | - | 2 | - | - | - | - |
| acres | - | - | - | (D) | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | 2 | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sunflower seed, all ... farms | - | 1 | - | - | - | 11 | - | - |
| acres | - | (D) | - | - | - | 1,303 | - | - |
| pounds | - | (D) | - | - | - | 1,752,445 | - | - |
| Irrigated ... farms | - | 1 | - | - | - | 10 | - | - |
| acres | - | (D) | - | - | - | (D) | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | 2 | - | - |
| 25 to 99 acres | - | - | - | - | - | 5 | - | - |
| 100 to 249 acres | - | 1 | - | - | - | 3 | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | 1 | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Wheat for grain, all ... farms | 15 | 159 | 8 | 161 | 94 | 281 | 13 | 1 |
| acres | 1,248 | 163,595 | 502 | 73,387 | 82,649 | 150,364 | 2,281 | (D) |
| bushels | 105,716 | 7,043,342 | 24,903 | 4,548,014 | 5,320,258 | 10,736,634 | 217,627 | (D) |
| Irrigated ... farms | 1 | 2 | 1 | 97 | 3 | 197 | 6 | 1 |
| acres | (D) | (D) | (D) | 18,934 | 110 | 47,952 | 2,034 | (D) |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | 6 | 1 | 8 | 6 | 21 | - | - |
| 25 to 99 acres | 10 | 13 | 6 | 44 | 10 | 60 | 7 | - |
| 100 to 249 acres | 5 | 22 | 1 | 49 | 14 | 72 | - | 1 |
| 250 to 499 acres | - | 21 | - | 16 | 13 | 53 | 6 | - |
| 500 to 999 acres | - | 33 | - | 20 | 22 | 35 | - | - |
| 1,000 acres or more | - | 64 | - | 24 | 29 | 40 | - | - |
| Vegetables harvested for sale (see text) ... farms | 42 | 15 | 7 | 141 | 3 | 199 | 43 | 60 |
| acres | 6,273 | 11 | 32 | 63,696 | (D) | 97,142 | 6,678 | (D) |
| Farms by acres harvested: | | | | | | | | |
| 0.1 to 4.9 acres | 19 | 15 | 6 | 17 | 2 | 13 | 26 | 55 |
| 5.0 to 24.9 acres | 8 | - | 1 | 13 | 1 | 2 | 3 | 5 |
| 25.0 to 99.9 acres | 1 | - | - | 17 | - | 31 | 1 | - |
| 100.0 to 249.9 acres | - | - | - | 30 | - | 49 | - | - |
| 250.0 to 499.9 acres | 8 | - | - | 29 | - | 58 | 7 | - |
| 500.0 acres or more | 6 | - | - | 35 | - | 46 | 6 | - |
| 500.0 to 749.9 acres | 6 | - | - | 10 | - | 21 | 6 | - |
| 750.0 to 999.9 acres | - | - | - | 6 | - | 4 | - | - |
| 1,000.0 acres or more | - | - | - | 19 | - | 21 | - | - |
| Land in orchards ... farms | 33 | 327 | 10 | 202 | 4 | 339 | 17 | 26 |
| acres | 64 | 13,930 | 167 | 19,472 | 8 | 64,664 | 45 | 34 |
| Irrigated ... farms | 33 | 327 | 10 | 202 | 4 | 339 | 17 | 21 |
| acres | 64 | 13,930 | 167 | 19,472 | 8 | 64,664 | 45 | 24 |
| Farms by bearing and nonbearing acres: | | | | | | | | |
| 0.1 to 4.9 acres | 31 | 72 | 7 | 27 | 3 | 42 | 13 | 26 |
| 5.0 to 24.9 acres | 2 | 121 | - | 55 | 1 | 54 | 4 | - |
| 25.0 to 99.9 acres | - | 111 | 3 | 64 | - | 126 | - | - |
| 100.0 to 249.9 acres | - | 18 | - | 38 | - | 66 | - | - |
| 250.0 to 499.9 acres | - | 3 | - | 11 | - | 29 | - | - |
| 500.0 acres or more | - | 2 | - | 7 | - | 22 | - | - |
| 500.0 to 749.9 acres | - | - | - | 5 | - | 8 | - | - |
| 750.0 to 999.9 acres | - | - | - | 2 | - | 3 | - | - |
| 1,000.0 acres or more | - | 2 | - | - | - | 11 | - | - |

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Table 24. **Selected Crops Harvested: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Soybeans for beans - Con. | | | | | | | | |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sugarbeets for sugar ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| tons | - | - | - | - | - | - | - | - |
| Irrigated ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sunflower seed, all ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| pounds | - | - | - | - | - | - | - | - |
| Irrigated ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Wheat for grain, all ....farms | - | 3 | - | 28 | 78 | 20 | 327 | - |
| acres | - | 3 | - | 3,299 | 38,349 | 1,864 | 326,071 | - |
| bushels | - | 234 | - | 216,535 | 1,214,327 | 142,336 | 19,744,297 | - |
| Irrigated ....farms | - | - | - | 26 | 14 | 4 | 45 | - |
| acres | - | - | - | (D) | 1,944 | 374 | 16,276 | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | 3 | - | 6 | 7 | 3 | 2 | - |
| 25 to 99 acres | - | - | - | 10 | 16 | 11 | 26 | - |
| 100 to 249 acres | - | - | - | 6 | 22 | 5 | 48 | - |
| 250 to 499 acres | - | - | - | 6 | 12 | 1 | 43 | - |
| 500 to 999 acres | - | - | - | - | 9 | - | 73 | - |
| 1,000 acres or more | - | - | - | - | 12 | - | 135 | - |
| Vegetables harvested for sale (see text) ....farms | 25 | 245 | 144 | 51 | 49 | 77 | 14 | 28 |
| acres | 53 | 1,021 | (D) | 2,635 | (D) | 3,925 | 2,967 | (D) |
| Farms by acres harvested: | | | | | | | | |
| 0.1 to 4.9 acres | 23 | 209 | 144 | 31 | 46 | 50 | 3 | 26 |
| 5.0 to 24.9 acres | 2 | 31 | - | 4 | 2 | 9 | - | - |
| 25.0 to 99.9 acres | - | 4 | - | 10 | - | 6 | - | 2 |
| 100.0 to 249.9 acres | - | - | - | 3 | - | 6 | 8 | - |
| 250.0 to 499.9 acres | - | 1 | - | 3 | - | 6 | 1 | - |
| 500.0 acres or more | - | - | - | - | 1 | - | 2 | - |
| 500.0 to 749.9 acres | - | - | - | - | - | - | - | - |
| 750.0 to 999.9 acres | - | - | - | - | - | - | 2 | - |
| 1,000.0 acres or more | - | - | - | - | 1 | - | - | - |
| Land in orchards ....farms | 23 | 94 | 76 | 47 | 77 | 48 | 11 | 21 |
| acres | 64 | 295 | 72 | 455 | 7,432 | 174 | 29 | 19 |
| Irrigated ....farms | 19 | 94 | 76 | 47 | 77 | 48 | 11 | 21 |
| acres | 49 | 295 | 72 | 455 | 7,432 | 174 | 29 | 19 |
| Farms by bearing and nonbearing acres: | | | | | | | | |
| 0.1 to 4.9 acres | 17 | 88 | 74 | 27 | 27 | 38 | 9 | 21 |
| 5.0 to 24.9 acres | 6 | 3 | 2 | 14 | 29 | 10 | 2 | - |
| 25.0 to 99.9 acres | - | 2 | - | 5 | 7 | - | - | - |
| 100.0 to 249.9 acres | - | 1 | - | 1 | 5 | - | - | - |
| 250.0 to 499.9 acres | - | - | - | - | 5 | - | - | - |
| 500.0 acres or more | - | - | - | - | 4 | - | - | - |
| 500.0 to 749.9 acres | - | - | - | - | - | - | - | - |
| 750.0 to 999.9 acres | - | - | - | - | 2 | - | - | - |
| 1,000.0 acres or more | - | - | - | - | 2 | - | - | - |

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Table 24. **Selected Crops Harvested: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Soybeans for beans - Con. | | | | | | | | |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sugarbeets for sugar ... farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| tons | - | - | - | - | - | - | - | - |
| Irrigated ... farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sunflower seed, all ... farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| pounds | - | - | - | - | - | - | - | - |
| Irrigated ... farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Wheat for grain, all ... farms | 19 | 1 | - | 3 | 5 | 30 | - | 9 |
| acres | 13,958 | (D) | - | (D) | 45 | 7,851 | - | 1,355 |
| bushels | 553,194 | (D) | - | (D) | 1,035 | 498,776 | - | 87,794 |
| Irrigated ... farms | 5 | 1 | - | - | - | 2 | - | - |
| acres | 860 | (D) | - | - | - | (D) | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 1 | 1 | - | 2 | 5 | 6 | - | 2 |
| 25 to 99 acres | 4 | - | - | - | - | 6 | - | 4 |
| 100 to 249 acres | 1 | - | - | - | - | 8 | - | 2 |
| 250 to 499 acres | 1 | - | - | 1 | - | 7 | - | - |
| 500 to 999 acres | 9 | - | - | - | - | 2 | - | 1 |
| 1,000 acres or more | 3 | - | - | - | - | 1 | - | - |
| Vegetables harvested for sale (see text) ... farms | 90 | 9 | 13 | 167 | 44 | 134 | 22 | 117 |
| acres | (D) | 7 | 11 | 1,324 | (D) | 17,880 | 9 | 1,846 |
| Farms by acres harvested: | | | | | | | | |
| 0.1 to 4.9 acres | 89 | 9 | 13 | 146 | 39 | 83 | 22 | 90 |
| 5.0 to 24.9 acres | 1 | - | - | 12 | 5 | 10 | - | 12 |
| 25.0 to 99.9 acres | - | - | - | 6 | - | 11 | - | 14 |
| 100.0 to 249.9 acres | - | - | - | 3 | - | 11 | - | - |
| 250.0 to 499.9 acres | - | - | - | - | - | 7 | - | - |
| 500.0 acres or more | - | - | - | - | - | 12 | - | 1 |
| 500.0 to 749.9 acres | - | - | - | - | - | 4 | - | - |
| 750.0 to 999.9 acres | - | - | - | - | - | 2 | - | - |
| 1,000.0 acres or more | - | - | - | - | - | 6 | - | 1 |
| Land in orchards ... farms | 396 | 3 | 5 | 93 | 58 | 88 | 19 | 68 |
| acres | 29,804 | (D) | 2 | 139 | 101 | 562 | 274 | 184 |
| Irrigated ... farms | 396 | 3 | 5 | 93 | 48 | 88 | 19 | 68 |
| acres | 29,804 | (D) | 2 | 139 | 69 | 562 | 274 | 184 |
| Farms by bearing and nonbearing acres: | | | | | | | | |
| 0.1 to 4.9 acres | 83 | 3 | 5 | 86 | 52 | 70 | 11 | 60 |
| 5.0 to 24.9 acres | 112 | - | - | 7 | 6 | 12 | 6 | 6 |
| 25.0 to 99.9 acres | 139 | - | - | - | - | 5 | 1 | 2 |
| 100.0 to 249.9 acres | 49 | - | - | - | - | 1 | 1 | - |
| 250.0 to 499.9 acres | 6 | - | - | - | - | - | - | - |
| 500.0 acres or more | 7 | - | - | - | - | - | - | - |
| 500.0 to 749.9 acres | 5 | - | - | - | - | - | - | - |
| 750.0 to 999.9 acres | - | - | - | - | - | - | - | - |
| 1,000.0 acres or more | 2 | - | - | - | - | - | - | - |

--continued

Table 24. **Selected Crops Harvested: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Soybeans for beans - Con. | | | | | | | | |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | 1 | - | - | - |
| 100 to 249 acres | - | - | - | - | 1 | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sugarbeets for sugar ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| tons | - | - | - | - | - | - | - | - |
| Irrigated ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | - | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Sunflower seed, all ....farms | - | 1 | - | - | - | - | - | - |
| acres | - | (D) | - | - | - | - | - | - |
| pounds | - | (D) | - | - | - | - | - | - |
| Irrigated ....farms | - | - | - | - | - | - | - | - |
| acres | - | - | - | - | - | - | - | - |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | - | - | - | - | - | - | - | - |
| 25 to 99 acres | - | 1 | - | - | - | - | - | - |
| 100 to 249 acres | - | - | - | - | - | - | - | - |
| 250 to 499 acres | - | - | - | - | - | - | - | - |
| 500 to 999 acres | - | - | - | - | - | - | - | - |
| 1,000 acres or more | - | - | - | - | - | - | - | - |
| Wheat for grain, all ....farms | 276 | 65 | - | - | 238 | 15 | 523 | 77 |
| acres | 159,047 | 9,348 | - | - | 192,570 | 1,183 | 441,417 | 16,337 |
| bushels | 9,860,319 | 417,649 | - | - | 15,461,867 | 58,388 | 32,943,471 | 1,400,003 |
| Irrigated ....farms | 13 | 5 | - | - | 82 | 5 | 6 | 68 |
| acres | 1,991 | 139 | - | - | 22,699 | (D) | 151 | 11,119 |
| Farms by acres harvested: | | | | | | | | |
| 1 to 24 acres | 41 | 14 | - | - | 31 | 4 | 23 | 23 |
| 25 to 99 acres | 41 | 24 | - | - | 34 | 3 | 27 | 24 |
| 100 to 249 acres | 57 | 13 | - | - | 42 | 8 | 84 | 12 |
| 250 to 499 acres | 47 | 12 | - | - | 20 | - | 117 | 7 |
| 500 to 999 acres | 30 | 2 | - | - | 43 | - | 130 | 7 |
| 1,000 acres or more | 60 | - | - | - | 68 | - | 142 | 4 |
| Vegetables harvested for sale (see text) ....farms | 131 | 81 | 119 | 5 | 68 | 103 | 13 | 199 |
| acres | 1,613 | 129 | 233 | 5 | 19,619 | 3,152 | 11 | 7,305 |
| Farms by acres harvested: | | | | | | | | |
| 0.1 to 4.9 acres | 115 | 76 | 105 | 5 | 33 | 89 | 13 | 129 |
| 5.0 to 24.9 acres | 10 | 5 | 12 | - | 15 | 2 | - | 40 |
| 25.0 to 99.9 acres | 4 | - | 2 | - | 11 | 6 | - | 15 |
| 100.0 to 249.9 acres | 1 | - | - | - | 4 | - | - | 10 |
| 250.0 to 499.9 acres | - | - | - | - | 1 | 4 | - | 2 |
| 500.0 acres or more | 1 | - | - | - | 4 | 2 | - | 3 |
| 500.0 to 749.9 acres | - | - | - | - | 1 | 2 | - | - |
| 750.0 to 999.9 acres | - | - | - | - | - | - | - | 1 |
| 1,000.0 acres or more | 1 | - | - | - | 3 | - | - | 2 |
| Land in orchards ....farms | 104 | 47 | 58 | 7 | 106 | 98 | 8 | 1,101 |
| acres | 434 | 164 | 79 | (D) | 12,200 | 479 | 52 | 87,607 |
| Irrigated ....farms | 104 | 47 | 58 | 7 | 106 | 98 | 8 | 1,101 |
| acres | 434 | 164 | 79 | (D) | 12,200 | 479 | 52 | 87,607 |
| Farms by bearing and nonbearing acres: | | | | | | | | |
| 0.1 to 4.9 acres | 77 | 35 | 53 | 7 | 47 | 82 | 2 | 247 |
| 5.0 to 24.9 acres | 24 | 11 | 5 | - | 36 | 9 | 6 | 365 |
| 25.0 to 99.9 acres | 3 | 1 | - | - | 14 | 7 | - | 305 |
| 100.0 to 249.9 acres | - | - | - | - | 2 | - | - | 117 |
| 250.0 to 499.9 acres | - | - | - | - | 4 | - | - | 37 |
| 500.0 acres or more | - | - | - | - | 3 | - | - | 30 |
| 500.0 to 749.9 acres | - | - | - | - | - | - | - | 11 |
| 750.0 to 999.9 acres | - | - | - | - | - | - | - | 6 |
| 1,000.0 acres or more | - | - | - | - | 3 | - | - | 13 |

## Table 25. **Field Crops: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **AUSTRIAN WINTER PEAS (CWT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 1 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| **Counties** | | | | | | | | | | |
| Columbia | 1 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| **BARLEY FOR GRAIN (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 817 | 175,074 | 12,073,493 | 66 | 5,551 | 843 | 223,598 | 13,928,713 | 67 | 3,641 |
| **Counties** | | | | | | | | | | |
| Adams | 11 | 3,238 | 173,084 | 6 | 964 | 19 | 1,957 | 112,970 | 13 | 1,000 |
| Asotin | 12 | 1,568 | 97,673 | - | - | 14 | 2,096 | 78,481 | - | - |
| Benton | 2 | (D) | (D) | 2 | (D) | 3 | 180 | 8,715 | 3 | 180 |
| Chelan | - | - | - | - | - | 3 | 12 | 402 | 3 | 12 |
| Clallam | 4 | 428 | 33,298 | 2 | (D) | 5 | 273 | 26,531 | 3 | 235 |
| Clark | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Columbia | 30 | 4,866 | 357,635 | 1 | (D) | 28 | 11,591 | 832,321 | 1 | (D) |
| Cowlitz | 5 | 802 | 76,890 | - | - | - | - | - | - | - |
| Douglas | 10 | 3,894 | 128,643 | - | - | 18 | 2,781 | 104,502 | 1 | (D) |
| Ferry | 2 | (D) | (D) | 1 | (D) | 3 | 88 | (D) | 2 | (D) |
| Franklin | 8 | 925 | 99,398 | 8 | 925 | 3 | 256 | (D) | 1 | (D) |
| Garfield | 33 | 5,070 | 342,190 | 1 | (D) | 42 | 11,010 | 593,129 | - | - |
| Grant | 10 | 1,672 | 46,949 | 1 | (D) | 11 | 2,170 | 92,158 | 7 | 173 |
| Grays Harbor | 1 | (D) | (D) | - | - | 6 | 98 | 6,025 | 2 | (D) |
| Island | 5 | 640 | 60,464 | 1 | (D) | 9 | 777 | 77,973 | - | - |
| King | 3 | 3 | 15 | 1 | (D) | - | - | - | - | - |
| Kitsap | - | - | - | - | - | 2 | (D) | (D) | - | - |
| Kittitas | 2 | (D) | (D) | 2 | (D) | 1 | (D) | (D) | 1 | (D) |
| Klickitat | 11 | 797 | 53,083 | 4 | (D) | 15 | 1,786 | 63,584 | 1 | (D) |
| Lewis | 18 | 693 | 48,478 | 1 | (D) | 7 | 358 | 25,118 | 1 | (D) |
| Lincoln | 104 | 32,799 | 2,163,476 | 8 | 975 | 114 | 39,870 | 1,935,593 | 7 | 740 |
| Okanogan | 9 | 1,873 | 65,740 | 4 | 43 | 7 | 3,218 | 79,091 | - | - |
| Pend Oreille | 1 | (D) | (D) | - | - | 2 | (D) | (D) | 2 | (D) |
| San Juan | 2 | (D) | (D) | - | - | 1 | (D) | (D) | - | - |
| Skagit | 29 | 3,307 | 221,689 | 3 | 812 | 20 | 1,100 | 89,349 | - | - |
| Snohomish | 9 | 386 | 22,558 | - | - | 7 | 566 | 39,689 | - | - |
| Spokane | 122 | 20,499 | 1,307,888 | 3 | 312 | 122 | 26,482 | 1,568,845 | 3 | 298 |
| Stevens | 58 | 5,400 | 317,310 | 4 | 150 | 39 | 3,176 | 129,263 | 5 | 179 |
| Thurston | 1 | (D) | (D) | - | - | 1 | (D) | (D) | - | - |
| Walla Walla | 14 | 1,670 | 123,125 | 4 | 304 | 23 | 4,498 | 316,048 | 8 | 362 |
| Whatcom | 3 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| Whitman | 293 | 83,709 | 6,267,724 | 6 | 146 | 313 | 108,689 | 7,668,570 | 2 | (D) |
| Yakima | 5 | 268 | 28,953 | 3 | (D) | 2 | (D) | (D) | 1 | (D) |
| **BUCKWHEAT (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 27 | 4,270 | 203,740 | 23 | 3,205 | 24 | 5,245 | 308,729 | 22 | 4,969 |
| **Counties** | | | | | | | | | | |
| Adams | 4 | (D) | (D) | 3 | (D) | - | - | - | - | - |
| Franklin | 10 | 1,027 | 53,912 | 10 | 1,027 | 7 | (D) | (D) | 5 | (D) |
| Grant | 11 | 1,884 | 77,121 | 8 | 954 | 14 | 2,565 | 179,345 | 14 | 2,565 |
| Lincoln | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Walla Walla | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) | 2 | (D) |
| **CAMELINA (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 5 | (D) | 57,448 | - | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| **Counties** | | | | | | | | | | |
| Adams | 5 | (D) | 57,448 | - | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| **CANOLA (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 72 | 14,687 | 26,291,447 | 22 | 5,165 | 56 | 10,449 | 17,679,136 | 19 | 3,537 |
| **Counties** | | | | | | | | | | |
| Adams | 8 | 1,487 | 4,025,172 | 6 | (D) | 13 | 3,228 | 4,917,478 | 5 | 1,022 |
| Asotin | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Benton | 1 | (D) | (D) | 1 | (D) | 2 | (D) | (D) | 2 | (D) |
| Columbia | 2 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| Douglas | 10 | 2,814 | 3,306,400 | 1 | (D) | 5 | 1,302 | 1,556,888 | - | - |
| Franklin | 1 | (D) | (D) | 1 | (D) | 2 | (D) | (D) | 2 | (D) |
| Garfield | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Grant | 15 | 4,674 | 7,575,973 | 9 | 3,406 | 3 | 1,423 | 2,931,100 | 3 | 1,423 |
| Kittitas | - | - | - | - | - | 3 | 37 | 78,200 | 2 | (D) |
| Lincoln | 10 | 1,370 | 3,623,558 | 4 | 446 | 8 | 1,144 | 2,343,326 | 5 | 783 |
| Okanogan | 3 | 260 | 182,960 | - | - | - | - | - | - | - |

--continued

Table 25. **Field Crops: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **CANOLA (POUNDS)** - Con. | | | | | | | | | | |
| **Counties** - Con. | | | | | | | | | | |
| Snohomish | 1 | (D) | (D) | - | - | 3 | 105 | 237,939 | - | - |
| Spokane | 10 | 1,561 | 2,748,012 | - | - | 3 | 709 | 828,020 | - | - |
| Stevens | 2 | (D) | (D) | - | - | 1 | (D) | (D) | - | - |
| Walla Walla | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Whitman | 7 | 1,198 | 2,204,068 | - | - | 10 | 1,900 | 3,501,192 | - | - |
| **CORN FOR GRAIN (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 575 | 114,516 | 23,824,561 | 567 | 113,685 | 550 | 118,665 | 24,553,928 | 547 | (D) |
| **Counties** | | | | | | | | | | |
| Adams | 65 | 13,646 | 2,282,753 | 65 | 13,646 | 49 | 8,603 | 1,696,947 | 49 | 8,603 |
| Benton | 9 | 14,038 | 3,571,120 | 9 | 14,038 | 9 | 12,672 | 2,943,121 | 9 | 12,672 |
| Chelan | 3 | 8 | 1,232 | 3 | 8 | 2 | (D) | (D) | 2 | (D) |
| Clark | 5 | (D) | (D) | 3 | (D) | - | - | - | - | - |
| Columbia | 2 | (D) | (D) | 2 | (D) | 1 | (D) | (D) | 1 | (D) |
| Douglas | 3 | 275 | 42,078 | 3 | 275 | 1 | (D) | (D) | 1 | (D) |
| Ferry | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Franklin | 131 | 20,400 | 4,592,711 | 131 | 20,400 | 134 | 16,369 | 3,355,745 | 134 | 16,369 |
| Grant | 212 | 46,337 | 9,516,688 | 212 | 46,337 | 254 | 57,432 | 11,598,665 | 254 | 57,432 |
| Island | 2 | (D) | (D) | - | - | - | - | - | - | - |
| King | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Kittitas | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) | 2 | (D) |
| Lincoln | 2 | (D) | (D) | 2 | (D) | - | - | - | - | - |
| Mason | - | - | - | - | - | 4 | 5 | (D) | 4 | 5 |
| Okanogan | 2 | (D) | (D) | 2 | (D) | 1 | (D) | (D) | 1 | (D) |
| Pacific | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Pierce | 3 | 3 | 213 | 1 | (D) | - | - | - | - | - |
| Skagit | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Snohomish | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Spokane | 1 | (D) | (D) | 1 | (D) | 2 | (D) | (D) | 1 | (D) |
| Walla Walla | 37 | 2,924 | 547,670 | 37 | 2,924 | 9 | 4,758 | 1,210,644 | 9 | 4,758 |
| Whatcom | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Whitman | 1 | (D) | (D) | 1 | (D) | 2 | (D) | (D) | 2 | (D) |
| Yakima | 91 | 14,303 | 2,918,853 | 91 | 14,303 | 78 | 16,755 | 3,442,047 | 78 | 16,755 |
| **DRY EDIBLE BEANS, EXCLUDING LIMAS (CWT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 420 | 114,506 | 2,275,125 | 192 | 35,041 | 269 | 61,055 | 1,049,750 | 152 | 22,017 |
| **Counties** | | | | | | | | | | |
| Adams | 33 | 7,882 | 195,817 | 33 | 7,882 | 20 | 6,018 | 154,124 | 16 | 5,634 |
| Asotin | 3 | 1,165 | 16,978 | - | - | 1 | (D) | (D) | - | - |
| Benton | 2 | (D) | (D) | 2 | (D) | 3 | 410 | 7,012 | 2 | (D) |
| Chelan | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Clallam | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Clark | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Columbia | 13 | 2,922 | 49,608 | - | - | 2 | (D) | (D) | 1 | (D) |
| Franklin | 28 | 3,233 | 81,988 | 28 | 3,233 | 18 | 1,178 | 17,759 | 16 | 822 |
| Garfield | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Grant | 102 | 20,467 | 555,524 | 102 | 20,467 | 87 | 13,117 | 296,647 | 87 | 13,117 |
| Grays Harbor | - | - | - | - | - | 3 | 3 | 82 | 1 | (D) |
| Island | 1 | (D) | (D) | - | - | - | - | - | - | - |
| King | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Kitsap | - | - | - | - | - | 6 | 6 | 72 | - | - |
| Kittitas | 2 | (D) | (D) | 2 | (D) | 1 | (D) | (D) | 1 | (D) |
| Klickitat | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Lewis | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Lincoln | 7 | 1,558 | 28,807 | 7 | 1,558 | 1 | (D) | (D) | 1 | (D) |
| Okanogan | 2 | (D) | (D) | 2 | (D) | 3 | 3 | 81 | 3 | 3 |
| Pacific | - | - | - | - | - | 2 | (D) | (D) | 2 | (D) |
| Pierce | 3 | 3 | 45 | - | - | - | - | - | - | - |
| Skagit | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Snohomish | 3 | 3 | 45 | - | - | - | - | - | - | - |
| Spokane | 11 | 715 | 10,518 | - | - | 1 | (D) | (D) | - | - |
| Thurston | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Walla Walla | 38 | 10,270 | 174,083 | 5 | 797 | 23 | 4,826 | 66,608 | 6 | 663 |
| Whatcom | 3 | 3 | 63 | 3 | 3 | - | - | - | - | - |
| Whitman | 153 | 65,037 | 1,128,052 | - | - | 82 | 32,832 | 459,953 | 1 | (D) |
| Yakima | 6 | 218 | 3,950 | 6 | 218 | 13 | 537 | 13,245 | 13 | 537 |
| **DRY LIMA BEANS (CWT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 11 | 1,264 | 26,068 | 7 | (D) | 10 | 877 | 13,895 | 9 | (D) |
| **Counties** | | | | | | | | | | |
| Adams | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Franklin | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Grant | 7 | 958 | 20,450 | 4 | (D) | 6 | 731 | 11,364 | 6 | 731 |
| Klickitat | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |

--continued

Table 25. **Field Crops: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **DRY LIMA BEANS (CWT)** - Con. | | | | | | | | | | |
| **Counties** - Con. | | | | | | | | | | |
| Walla Walla | 1 | (D) | (D) | - | - | 1 | (D) | (D) | - | - |
| Yakima | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| **DRY EDIBLE PEAS (CWT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 255 | 63,067 | 1,462,850 | 62 | 7,978 | 266 | 65,243 | 1,228,583 | 45 | 2,910 |
| **Counties** | | | | | | | | | | |
| Adams | 9 | 1,581 | 52,326 | 9 | 1,581 | 7 | 532 | 10,324 | 7 | 532 |
| Asotin | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Clallam | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Columbia | 25 | 12,400 | 319,728 | - | - | 21 | 11,416 | 216,680 | 1 | (D) |
| Douglas | 3 | 459 | 6,426 | 3 | 459 | 8 | 761 | 14,701 | - | - |
| Franklin | 16 | 2,117 | 87,794 | 15 | (D) | 15 | 1,034 | 24,443 | 12 | 684 |
| Garfield | 2 | (D) | (D) | - | - | 3 | (D) | (D) | - | - |
| Grant | 16 | 2,945 | 86,811 | 16 | 2,945 | 14 | 1,207 | 28,358 | 13 | 957 |
| Island | 1 | (D) | (D) | - | - | - | - | - | - | - |
| King | 4 | (D) | (D) | - | - | - | - | - | - | - |
| Klickitat | 3 | 158 | (D) | 3 | 158 | - | - | - | - | - |
| Lewis | - | - | - | - | - | 3 | 105 | 2,100 | 3 | 105 |
| Lincoln | 4 | 560 | 15,850 | 4 | 560 | 4 | 588 | 12,451 | 2 | (D) |
| Okanogan | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Skagit | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Snohomish | 3 | 3 | 117 | - | - | - | - | - | - | - |
| Spokane | 46 | 12,597 | 241,988 | - | - | 28 | 5,961 | 94,968 | 1 | (D) |
| Stevens | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Thurston | 3 | 3 | 42 | 2 | (D) | - | - | - | - | - |
| Walla Walla | 34 | 8,529 | 211,738 | 8 | 412 | 23 | 5,245 | 102,480 | 5 | 243 |
| Whitman | 84 | 20,612 | 412,184 | 1 | (D) | 137 | 37,187 | 700,510 | 1 | (D) |
| **EMMER AND SPELT (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 3 | 822 | 28,514 | 2 | (D) | - | - | - | - | - |
| **Counties** | | | | | | | | | | |
| Lincoln | 3 | 822 | 28,514 | 2 | (D) | - | - | - | - | - |
| **FLAXSEED (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 3 | (D) | (D) | 2 | (D) | 2 | (D) | (D) | 1 | (D) |
| **Counties** | | | | | | | | | | |
| Franklin | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Lincoln | 2 | (D) | (D) | 2 | (D) | - | - | - | - | - |
| Skagit | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Thurston | 1 | (D) | (D) | - | - | - | - | - | - | - |
| **LENTILS (CWT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 178 | 64,707 | 895,100 | - | - | 176 | 67,474 | 809,400 | 2 | (D) |
| **Counties** | | | | | | | | | | |
| Adams | 2 | (D) | (D) | - | - | 1 | (D) | (D) | 1 | (D) |
| Columbia | - | - | - | - | - | 3 | (D) | (D) | 1 | (D) |
| Spokane | 64 | (D) | (D) | - | - | 70 | 34,106 | (D) | - | - |
| Whitman | 112 | 40,368 | 556,207 | - | - | 102 | 32,969 | 412,026 | - | - |
| **MUSTARD SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 24 | 3,229 | 3,624,305 | 3 | 416 | 32 | 5,112 | 4,332,970 | 5 | 601 |
| **Counties** | | | | | | | | | | |
| Adams | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Columbia | 6 | 993 | 1,147,968 | - | - | 3 | 378 | 468,213 | 1 | (D) |
| Ferry | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Franklin | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Garfield | 1 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| Grant | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| King | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Lincoln | 2 | (D) | (D) | 1 | (D) | 5 | 1,062 | 734,967 | 1 | (D) |
| Skagit | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Spokane | 4 | 361 | (D) | - | - | 4 | 782 | 543,637 | 1 | (D) |
| Stevens | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Whitman | 6 | 1,081 | 1,210,566 | - | - | 14 | 2,400 | 1,914,998 | - | - |

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Table 25. **Field Crops: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **OATS FOR GRAIN (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 139 | 6,129 | 466,810 | 24 | 671 | 138 | 8,956 | 426,027 | 19 | 471 |
| **Counties** | | | | | | | | | | |
| Adams | 7 | (D) | (D) | 2 | (D) | 4 | 408 | 30,050 | 3 | (D) |
| Asotin | 5 | 434 | 14,804 | - | - | 2 | (D) | (D) | - | - |
| Benton | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Clallam | 2 | (D) | (D) | 2 | (D) | - | - | - | - | - |
| Clark | 10 | 302 | 33,552 | 1 | (D) | 8 | 405 | 28,607 | - | - |
| Columbia | 2 | (D) | (D) | - | - | 4 | 862 | 68,260 | - | - |
| Cowlitz | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Douglas | 2 | (D) | (D) | - | - | 8 | 1,510 | 56,718 | - | - |
| Ferry | 1 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| Franklin | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Grant | - | - | - | - | - | 1 | (D) | (D) | - | - |
| King | 3 | 18 | 2,133 | - | - | - | - | - | - | - |
| Kittitas | 10 | 544 | 56,218 | 8 | (D) | 13 | 624 | 50,520 | 9 | 293 |
| Klickitat | 6 | 90 | 3,920 | 2 | (D) | 2 | (D) | (D) | - | - |
| Lewis | 6 | 515 | 41,811 | - | - | 4 | 60 | 5,340 | 1 | (D) |
| Lincoln | - | - | - | - | - | 7 | 368 | 22,305 | 1 | (D) |
| Okanogan | 6 | 323 | 25,340 | 3 | 7 | 11 | 923 | 29,515 | 1 | (D) |
| Pacific | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Pend Oreille | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Pierce | 2 | (D) | (D) | - | - | - | - | - | - | - |
| San Juan | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Skagit | 4 | 17 | 1,314 | - | - | 8 | 114 | 4,889 | - | - |
| Snohomish | 3 | 11 | 550 | - | - | - | - | - | - | - |
| Spokane | 31 | 1,252 | 70,828 | - | - | 28 | 1,389 | 61,546 | - | - |
| Stevens | 26 | 1,027 | 57,649 | - | - | 27 | 823 | 24,363 | - | - |
| Thurston | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Walla Walla | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Whatcom | 4 | 4 | 349 | 3 | (D) | - | - | - | - | - |
| Whitman | 2 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| Yakima | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) | 2 | (D) |
| **POPCORN (POUNDS, SHELLED)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| **Counties** | | | | | | | | | | |
| Franklin | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| **RAPESEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 4 | 411 | 917,657 | - | - | 1 | (D) | (D) | - | - |
| **Counties** | | | | | | | | | | |
| Adams | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Asotin | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Garfield | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Grant | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Lincoln | 1 | (D) | (D) | - | - | - | - | - | - | - |
| **RYE FOR GRAIN (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 4 | 42 | 1,274 | - | - | 3 | 41 | 1,084 | 1 | (D) |
| **Counties** | | | | | | | | | | |
| Jefferson | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Lewis | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Okanogan | 3 | (D) | (D) | - | - | 1 | (D) | (D) | - | - |
| Whatcom | 1 | (D) | (D) | - | - | - | - | - | - | - |
| **SAFFLOWER (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 8 | 1,090 | 2,412,300 | 8 | 1,090 | - | - | - | - | - |
| **Counties** | | | | | | | | | | |
| Lincoln | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Walla Walla | 7 | (D) | (D) | 7 | (D) | - | - | - | - | - |
| **SORGHUM FOR GRAIN (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2 | (D) | (D) | - | - | - | - | - | - | - |

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Table 25. **Field Crops: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **SORGHUM FOR GRAIN (BUSHELS)** - Con. | | | | | | | | | | |
| **Counties** | | | | | | | | | | |
| Spokane | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Whatcom | 1 | (D) | (D) | - | - | - | - | - | - | - |
| **SOYBEANS FOR BEANS (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2 | (D) | (D) | 1 | (D) | 8 | 725 | 27,781 | 5 | 385 |
| **Counties** | | | | | | | | | | |
| Walla Walla | 2 | (D) | (D) | 1 | (D) | 7 | (D) | (D) | 5 | 385 |
| Yakima | - | - | - | - | - | 1 | (D) | (D) | - | - |
| **SUGARBEETS FOR SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 13 | 1,351 | 3,157,335 | 13 | 1,351 | 9 | (D) | (D) | 9 | (D) |
| **Counties** | | | | | | | | | | |
| Franklin | 2 | (D) | (D) | 2 | (D) | - | - | - | - | - |
| Grant | 10 | (D) | (D) | 10 | (D) | 9 | (D) | (D) | 9 | (D) |
| Yakima | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| **SUGARBEETS FOR SUGAR (TONS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 4 | (D) | (D) | 4 | (D) | 3 | 2,076 | 80,206 | 3 | 2,076 |
| **Counties** | | | | | | | | | | |
| Benton | 2 | (D) | (D) | 2 | (D) | 3 | 2,076 | 80,206 | 3 | 2,076 |
| Franklin | 2 | (D) | (D) | 2 | (D) | - | - | - | - | - |
| **SUNFLOWER SEED, ALL (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 15 | 1,603 | 2,144,124 | 13 | (D) | 4 | (D) | 61,858 | 2 | (D) |
| **Counties** | | | | | | | | | | |
| Adams | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) | - | - |
| Benton | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Douglas | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Grant | 11 | 1,303 | 1,752,445 | 10 | (D) | - | - | - | - | - |
| Grays Harbor | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Stevens | 1 | (D) | (D) | - | - | - | - | - | - | - |
| **SUNFLOWER SEED, OIL VARIETIES (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 11 | 1,231 | 1,537,022 | 10 | (D) | 2 | (D) | (D) | - | - |
| **Counties** | | | | | | | | | | |
| Adams | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) | - | - |
| Douglas | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Grant | 7 | 931 | 1,145,343 | 7 | 931 | - | - | - | - | - |
| Stevens | 1 | (D) | (D) | - | - | - | - | - | - | - |
| **SUNFLOWER SEED, NON-OIL VARIETIES (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 4 | 372 | 607,102 | 3 | (D) | 2 | (D) | (D) | 2 | (D) |
| **Counties** | | | | | | | | | | |
| Benton | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Grant | 4 | 372 | 607,102 | 3 | (D) | - | - | - | - | - |
| Grays Harbor | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| **TRITICALE (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 52 | 5,446 | 273,017 | 16 | 1,645 | 58 | 9,427 | 481,099 | 23 | 1,454 |
| **Counties** | | | | | | | | | | |
| Adams | 9 | 731 | 49,611 | 6 | (D) | 9 | 1,787 | 62,321 | 5 | 281 |
| Benton | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Chelan | - | - | - | - | - | 2 | (D) | (D) | 2 | (D) |

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Table 25. **Field Crops: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **TRITICALE (BUSHELS)** - Con. | | | | | | | | | | |
| **Counties** - Con. | | | | | | | | | | |
| Clallam | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Columbia | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Douglas | - | - | - | - | - | 3 | 853 | (D) | - | - |
| Franklin | 5 | (D) | (D) | - | - | 6 | (D) | 22,393 | 5 | 360 |
| Grant | 3 | 667 | 19,642 | 1 | (D) | 4 | 292 | 31,826 | 4 | 292 |
| Grays Harbor | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Kittitas | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Lewis | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Lincoln | 11 | 1,155 | 72,481 | 6 | 819 | 12 | 1,470 | 73,941 | 1 | (D) |
| Okanogan | 1 | (D) | (D) | - | - | 9 | 1,844 | 114,342 | 2 | (D) |
| Snohomish | 4 | (D) | (D) | - | - | - | - | - | - | - |
| Spokane | 10 | 633 | 28,615 | - | - | 7 | 2,027 | 99,120 | - | - |
| Stevens | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Yakima | 4 | (D) | (D) | 2 | (D) | 4 | 622 | 53,356 | 3 | (D) |
| **WHEAT FOR GRAIN, ALL (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2,871 | 2,186,813 | 141,020,565 | 687 | 180,802 | 2,612 | 2,096,350 | 120,617,390 | 614 | 155,021 |
| **Counties** | | | | | | | | | | |
| Adams | 224 | 276,807 | 15,969,949 | 74 | 35,584 | 224 | 262,101 | 12,765,373 | 58 | 25,702 |
| Asotin | 38 | 27,172 | 1,628,205 | 1 | (D) | 28 | 25,642 | 1,014,605 | - | - |
| Benton | 48 | 119,533 | 6,867,150 | 16 | 15,436 | 46 | 94,268 | 4,512,161 | 14 | 14,678 |
| Chelan | 6 | 1,104 | 21,069 | 4 | (D) | 3 | 360 | 14,032 | 2 | (D) |
| Clallam | 2 | (D) | (D) | 2 | (D) | 1 | (D) | (D) | 1 | (D) |
| Clark | 10 | 570 | 31,817 | - | - | - | - | - | - | - |
| Columbia | 94 | 74,251 | 5,861,603 | 6 | 1,231 | 77 | 77,970 | 5,095,533 | 8 | 1,150 |
| Cowlitz | 15 | 1,248 | 105,716 | 1 | (D) | 2 | (D) | (D) | 2 | (D) |
| Douglas | 159 | 163,595 | 7,043,342 | 2 | (D) | 132 | 157,898 | 6,760,910 | 3 | 595 |
| Ferry | 8 | 502 | 24,903 | 1 | (D) | 2 | (D) | (D) | - | - |
| Franklin | 161 | 73,387 | 4,548,014 | 97 | 18,934 | 143 | 76,863 | 4,584,764 | 97 | 16,009 |
| Garfield | 94 | 82,649 | 5,320,258 | 3 | 110 | 78 | 68,447 | 3,482,031 | 2 | (D) |
| Grant | 281 | 150,364 | 10,736,634 | 197 | 47,952 | 292 | 145,979 | 10,295,197 | 206 | 51,578 |
| Grays Harbor | 13 | 2,281 | 217,627 | 6 | 2,034 | - | - | - | - | - |
| Island | 1 | (D) | (D) | 1 | (D) | 6 | 228 | 18,328 | 1 | (D) |
| King | 3 | 3 | 234 | - | - | 3 | (D) | (D) | - | - |
| Kitsap | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Kittitas | 28 | 3,299 | 216,535 | 26 | (D) | 12 | 911 | 69,292 | 12 | 859 |
| Klickitat | 78 | 38,349 | 1,214,327 | 14 | 1,944 | 74 | 38,668 | 1,126,093 | 7 | 974 |
| Lewis | 20 | 1,864 | 142,336 | 4 | 374 | 2 | (D) | (D) | 1 | (D) |
| Lincoln | 327 | 326,071 | 19,744,297 | 45 | 16,276 | 308 | 313,441 | 16,754,595 | 38 | 14,549 |
| Okanogan | 19 | 13,958 | 553,194 | 5 | 860 | 21 | 11,621 | 487,433 | 2 | (D) |
| Pacific | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | - | - |
| Pierce | 3 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| San Juan | 5 | 45 | 1,035 | - | - | - | - | - | - | - |
| Skagit | 30 | 7,851 | 498,776 | 2 | (D) | 28 | 4,686 | 401,904 | 1 | (D) |
| Snohomish | 9 | 1,355 | 87,794 | - | - | 6 | 311 | 19,241 | - | - |
| Spokane | 276 | 159,047 | 9,860,319 | 13 | 1,991 | 232 | 140,746 | 8,115,549 | 9 | 1,576 |
| Stevens | 65 | 9,348 | 417,649 | 5 | 139 | 33 | 5,121 | 223,669 | 1 | (D) |
| Walla Walla | 238 | 192,570 | 15,461,867 | 82 | 22,699 | 213 | 190,973 | 12,661,018 | 66 | 14,842 |
| Whatcom | 15 | 1,183 | 58,388 | 5 | (D) | 8 | 430 | 24,263 | - | - |
| Whitman | 523 | 441,417 | 32,943,471 | 6 | 151 | 542 | 457,973 | 30,592,763 | 1 | (D) |
| Yakima | 77 | 16,337 | 1,400,003 | 68 | 11,119 | 92 | 20,427 | 1,519,644 | 82 | 11,350 |
| **WINTER WHEAT FOR GRAIN (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2,415 | 1,669,175 | 112,180,184 | 438 | 122,289 | 2,303 | 1,652,961 | 100,463,766 | 429 | 112,393 |
| **Counties** | | | | | | | | | | |
| Adams | 204 | 258,623 | 14,824,688 | 58 | 27,733 | 204 | 234,604 | 11,725,725 | 51 | 22,132 |
| Asotin | 38 | 22,469 | 1,428,433 | 1 | (D) | 26 | 20,381 | 903,743 | - | - |
| Benton | 46 | 96,099 | 5,774,072 | 14 | (D) | 40 | 80,546 | 4,105,301 | 9 | 13,457 |
| Chelan | 2 | (D) | (D) | 1 | (D) | 3 | (D) | (D) | 2 | (D) |
| Clallam | 2 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Clark | 6 | 468 | 25,838 | - | - | - | - | - | - | - |
| Columbia | 88 | 55,052 | 4,727,810 | 6 | (D) | 73 | 58,543 | 4,286,362 | 7 | (D) |
| Douglas | 148 | 149,939 | 6,503,843 | 1 | (D) | 128 | 145,455 | 6,488,822 | 2 | (D) |
| Ferry | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Franklin | 121 | 61,713 | 3,601,962 | 67 | 13,101 | 115 | 61,579 | 3,742,665 | 69 | 10,335 |
| Garfield | 90 | 54,730 | 3,943,017 | 2 | (D) | 76 | 48,757 | 2,721,390 | 1 | (D) |
| Grant | 186 | 110,323 | 7,329,724 | 114 | (D) | 219 | 117,172 | 7,929,923 | 140 | 33,682 |
| Grays Harbor | 13 | (D) | (D) | 6 | 2,034 | - | - | - | - | - |
| Island | 1 | (D) | (D) | 1 | (D) | 6 | 228 | 18,328 | 1 | (D) |
| King | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Kitsap | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Kittitas | 9 | 593 | 42,628 | 7 | (D) | 5 | 195 | 16,560 | 4 | 155 |
| Klickitat | 65 | 20,250 | 750,906 | 13 | 1,323 | 61 | 16,401 | 622,633 | 5 | (D) |
| Lewis | 12 | 1,263 | 87,891 | 1 | (D) | 2 | (D) | (D) | 1 | (D) |
| Lincoln | 303 | 226,703 | 15,097,187 | 37 | 12,948 | 289 | 236,314 | 13,913,622 | 31 | 11,760 |
| Okanogan | 15 | 8,927 | 378,542 | 1 | (D) | 14 | 9,714 | 436,388 | - | - |
| Pacific | - | - | - | - | - | 1 | (D) | (D) | - | - |

--continued

Table 25. **Field Crops: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **WINTER WHEAT FOR GRAIN (BUSHELS)** - Con. | | | | | | | | | | |
| **Counties** - Con. | | | | | | | | | | |
| Pierce | 3 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| Skagit | 28 | 6,471 | 432,999 | 1 | (D) | 28 | 4,385 | 375,849 | 1 | (D) |
| Snohomish | 8 | 1,131 | 78,852 | - | - | 6 | 311 | 19,241 | - | - |
| Spokane | 219 | 99,074 | 6,622,418 | 4 | 1,120 | 202 | 98,638 | 6,194,552 | 6 | 1,190 |
| Stevens | 52 | 7,380 | 330,675 | - | - | 26 | 3,600 | 180,513 | - | - |
| Walla Walla | 197 | 166,843 | 13,891,655 | 55 | 18,074 | 190 | 165,205 | 11,200,522 | 48 | 8,675 |
| Whatcom | 15 | (D) | (D) | 5 | (D) | 8 | 430 | 24,263 | - | - |
| Whitman | 497 | 307,462 | 25,067,031 | 4 | (D) | 520 | 334,197 | 24,310,965 | 1 | (D) |
| Yakima | 46 | 9,359 | 923,338 | 38 | 7,360 | 57 | 15,261 | 1,186,340 | 50 | 8,547 |
| **DURUM WHEAT FOR GRAIN (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 3 | 3,264 | (D) | 1 | (D) | 9 | 1,793 | 138,646 | 2 | (D) |
| **Counties** | | | | | | | | | | |
| Adams | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Columbia | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Franklin | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Grant | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | - | - |
| Lincoln | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Walla Walla | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Whitman | - | - | - | - | - | 5 | 1,061 | 77,206 | - | - |
| **OTHER SPRING WHEAT FOR GRAIN (BUSHELS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 1,408 | 514,374 | (D) | 368 | (D) | 1,232 | 441,596 | 20,014,978 | 272 | (D) |
| **Counties** | | | | | | | | | | |
| Adams | 71 | 18,184 | 1,145,261 | 41 | 7,851 | 86 | (D) | (D) | 22 | 3,570 |
| Asotin | 18 | 4,703 | 199,772 | - | - | 8 | 5,261 | 110,862 | - | - |
| Benton | 19 | 23,434 | 1,093,078 | 6 | (D) | 24 | 13,722 | 406,860 | 7 | 1,221 |
| Chelan | 5 | (D) | (D) | 4 | (D) | 1 | (D) | (D) | - | - |
| Clallam | 2 | (D) | (D) | 2 | (D) | 1 | (D) | (D) | 1 | (D) |
| Clark | 4 | 102 | 5,979 | - | - | - | - | - | - | - |
| Columbia | 41 | (D) | (D) | 3 | (D) | 40 | 19,427 | 809,171 | 4 | (D) |
| Cowlitz | 15 | 1,248 | 105,716 | 1 | (D) | 2 | (D) | (D) | 2 | (D) |
| Douglas | 42 | 13,656 | 539,499 | 1 | (D) | 33 | 12,443 | 272,088 | 1 | (D) |
| Ferry | 7 | (D) | (D) | 1 | (D) | 2 | (D) | (D) | - | - |
| Franklin | 62 | 11,674 | 946,052 | 42 | 5,833 | 50 | (D) | (D) | 37 | (D) |
| Garfield | 61 | 27,919 | 1,377,241 | 1 | (D) | 49 | 19,690 | 760,641 | 1 | (D) |
| Grant | 141 | (D) | (D) | 113 | 24,787 | 125 | (D) | (D) | 94 | 17,896 |
| Grays Harbor | 1 | (D) | (D) | - | - | - | - | - | - | - |
| King | 3 | 3 | 234 | - | - | 2 | (D) | (D) | - | - |
| Kittitas | 22 | 2,706 | 173,907 | 20 | (D) | 9 | 716 | 52,732 | 9 | 704 |
| Klickitat | 34 | 18,099 | 463,421 | 3 | 621 | 29 | 22,267 | 503,460 | 2 | (D) |
| Lewis | 10 | 601 | 54,445 | 3 | (D) | - | - | - | - | - |
| Lincoln | 181 | 99,368 | 4,647,110 | 22 | 3,328 | 174 | (D) | (D) | 15 | (D) |
| Okanogan | 14 | 5,031 | 174,652 | 4 | (D) | 11 | 1,907 | 51,045 | 2 | (D) |
| Pacific | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| San Juan | 5 | 45 | 1,035 | - | - | - | - | - | - | - |
| Skagit | 9 | 1,380 | 65,777 | 1 | (D) | 4 | 301 | 26,055 | - | - |
| Snohomish | 4 | 224 | 8,942 | - | - | - | - | - | - | - |
| Spokane | 176 | 59,973 | 3,237,901 | 10 | 871 | 128 | 42,108 | 1,920,997 | 4 | 386 |
| Stevens | 20 | 1,968 | 86,974 | 5 | 139 | 16 | 1,521 | 43,156 | 1 | (D) |
| Walla Walla | 89 | (D) | (D) | 40 | 4,625 | 75 | 25,768 | 1,460,496 | 32 | 6,167 |
| Whatcom | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Whitman | 305 | 133,955 | 7,876,440 | 4 | (D) | 321 | 122,715 | 6,204,592 | 1 | (D) |
| Yakima | 45 | 6,978 | 476,665 | 40 | 3,759 | 42 | 5,166 | 333,304 | 37 | 2,803 |

## Table 26. **Field Seeds, Grass Seeds, Hay, Forage, and Silage: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **FIELD AND GRASS SEED CROPS, ALL (SEE TEXT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 202 | 44,173 | (X) | 86 | 22,719 | 284 | 81,081 | (X) | 135 | 39,928 |
| **Counties** | | | | | | | | | | |
| Adams | 14 | 3,957 | (X) | 11 | 3,291 | 17 | 7,703 | (X) | 12 | 3,463 |
| Asotin | 1 | (D) | (X) | - | - | 3 | 402 | (X) | - | - |
| Benton | 12 | 3,411 | (X) | 11 | (D) | 10 | 7,060 | (X) | 8 | 6,124 |
| Chelan | 1 | (D) | (X) | - | - | - | - | (X) | - | - |
| Clallam | - | - | (X) | - | - | 4 | (D) | (X) | - | - |
| Clark | 1 | (D) | (X) | - | - | 7 | 400 | (X) | - | - |
| Columbia | - | - | (X) | - | - | 1 | (D) | (X) | - | - |
| Cowlitz | 10 | 3,690 | (X) | - | - | 3 | 1,540 | (X) | 2 | (D) |
| Ferry | - | - | (X) | - | - | 1 | (D) | (X) | 1 | (D) |
| Franklin | 15 | 5,095 | (X) | 11 | 3,285 | 34 | 8,052 | (X) | 21 | 5,866 |
| Garfield | 2 | (D) | (X) | - | - | 4 | 768 | (X) | - | - |
| Grant | 27 | 4,657 | (X) | 23 | 3,855 | 39 | 8,243 | (X) | 39 | 7,863 |
| Island | 2 | (D) | (X) | - | - | - | - | (X) | - | - |
| Jefferson | - | - | (X) | - | - | 1 | (D) | (X) | - | - |
| King | 1 | (D) | (X) | - | - | - | - | (X) | - | - |
| Kittitas | 3 | 143 | (X) | 3 | 143 | 6 | (D) | (X) | 6 | (D) |
| Klickitat | - | - | (X) | - | - | 2 | (D) | (X) | 1 | (D) |
| Lewis | 3 | (D) | (X) | 1 | (D) | - | - | (X) | - | - |
| Lincoln | 4 | 1,342 | (X) | 3 | (D) | 12 | 4,871 | (X) | 7 | 3,265 |
| Okanogan | 6 | 117 | (X) | 4 | (D) | 7 | 129 | (X) | 5 | 99 |
| Pend Oreille | 1 | (D) | (X) | - | - | - | - | (X) | - | - |
| Pierce | 2 | (D) | (X) | - | - | - | - | (X) | - | - |
| Skagit | 7 | 862 | (X) | 2 | (D) | 7 | 897 | (X) | 1 | (D) |
| Skamania | 2 | (D) | (X) | 1 | (D) | - | - | (X) | - | - |
| Snohomish | 4 | 730 | (X) | - | - | 5 | 1,040 | (X) | - | - |
| Spokane | 51 | 10,519 | (X) | - | - | 63 | 24,200 | (X) | 1 | (D) |
| Stevens | 5 | 49 | (X) | - | - | 6 | 253 | (X) | - | - |
| Thurston | - | - | (X) | - | - | 1 | (D) | (X) | - | - |
| Walla Walla | 15 | 8,272 | (X) | 11 | 7,806 | 18 | 11,803 | (X) | 16 | 10,807 |
| Whatcom | 2 | (D) | (X) | - | - | 5 | 206 | (X) | - | - |
| Whitman | 2 | (D) | (X) | - | - | 15 | 1,684 | (X) | 3 | (D) |
| Yakima | 9 | 400 | (X) | 5 | 384 | 13 | 1,195 | (X) | 12 | 1,165 |
| **ALFALFA SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 55 | 11,485 | 10,285,708 | 37 | 10,397 | 82 | 17,127 | 10,860,608 | 63 | 15,233 |
| **Counties** | | | | | | | | | | |
| Adams | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Benton | 1 | (D) | (D) | 1 | (D) | 3 | (D) | 43,225 | 1 | (D) |
| Ferry | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Franklin | 1 | (D) | (D) | 1 | (D) | 5 | 311 | 238,526 | 4 | 305 |
| Grant | 14 | 2,446 | 1,780,060 | 12 | (D) | 25 | 4,249 | 2,308,614 | 25 | 3,869 |
| Kittitas | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Klickitat | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Lincoln | 2 | (D) | (D) | 2 | (D) | 1 | (D) | (D) | - | - |
| Okanogan | 6 | 117 | (D) | 4 | (D) | 7 | 129 | 25,731 | 5 | 99 |
| Skamania | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Spokane | 6 | 62 | 20,666 | - | - | 3 | (D) | 19,200 | - | - |
| Stevens | 1 | (D) | (D) | - | - | 6 | (D) | 46,112 | - | - |
| Walla Walla | 13 | (D) | 7,738,190 | 10 | (D) | 14 | 10,759 | 7,510,760 | 12 | 9,793 |
| Whitman | - | - | - | - | - | 2 | (D) | (D) | 2 | (D) |
| Yakima | 9 | 400 | 274,533 | 5 | 384 | 12 | 713 | 409,045 | 11 | 683 |
| **BROMEGRASS SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 3 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | - | - |
| **Counties** | | | | | | | | | | |
| Benton | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Garfield | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Spokane | 1 | (D) | (D) | - | - | 1 | (D) | (D) | - | - |
| **CRIMSON CLOVER SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | - | - | - | - | - | 3 | (D) | 57,200 | 1 | (D) |
| **Counties** | | | | | | | | | | |
| Clark | - | - | - | - | - | 2 | (D) | (D) | - | - |
| Franklin | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |

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Table 26. **Field Seeds, Grass Seeds, Hay, Forage, and Silage: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **FESCUE SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 27 | 5,052 | 8,958,453 | 5 | 613 | 26 | 3,601 | 4,762,252 | 11 | 1,171 |
| **Counties** | | | | | | | | | | |
| Adams | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Benton | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Clark | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Cowlitz | 10 | 3,690 | 6,813,000 | - | - | 3 | 1,540 | 2,918,000 | 2 | (D) |
| Franklin | 4 | 645 | 966,125 | 3 | (D) | 4 | 143 | 146,800 | 2 | (D) |
| Grant | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Island | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Jefferson | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Lincoln | - | - | - | - | - | 3 | 580 | (D) | 3 | 580 |
| Skagit | 3 | 180 | 349,412 | 1 | (D) | 2 | (D) | (D) | - | - |
| Skamania | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Snohomish | 2 | (D) | (D) | - | - | 3 | 333 | 468,650 | - | - |
| Spokane | 2 | (D) | (D) | - | - | 4 | 336 | 281,946 | - | - |
| Walla Walla | - | - | - | - | - | 2 | (D) | (D) | 2 | (D) |
| Whitman | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Yakima | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| **KENTUCKY BLUEGRASS SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 96 | 24,254 | 16,669,281 | 38 | 10,528 | 140 | 52,269 | 31,141,242 | 52 | 18,153 |
| **Counties** | | | | | | | | | | |
| Adams | 14 | 3,957 | 3,437,937 | 11 | 3,291 | 15 | 7,346 | 4,984,552 | 10 | (D) |
| Asotin | 1 | (D) | (D) | - | - | 3 | 402 | 172,614 | - | - |
| Benton | 11 | 3,380 | 4,495,456 | 10 | (D) | 6 | 4,523 | 3,505,170 | 6 | 3,607 |
| Columbia | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Franklin | 9 | 3,530 | 2,065,988 | 4 | 1,970 | 24 | 6,472 | 4,374,207 | 13 | 4,385 |
| Garfield | 1 | (D) | (D) | - | - | 4 | 768 | 326,696 | - | - |
| Grant | 12 | 2,079 | 2,728,100 | 10 | (D) | 12 | 3,808 | 3,907,803 | 12 | 3,808 |
| King | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Klickitat | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Lincoln | 3 | (D) | (D) | 2 | (D) | 6 | 2,546 | 1,355,059 | 4 | (D) |
| Spokane | 43 | 10,371 | 3,536,304 | - | - | 57 | 23,705 | 10,536,502 | 1 | (D) |
| Walla Walla | 1 | (D) | (D) | 1 | (D) | 3 | (D) | (D) | 3 | (D) |
| Whitman | - | - | - | - | - | 7 | 1,215 | 801,099 | 1 | (D) |
| Yakima | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| **ORCHARDGRASS SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | - | - | - | - | - | 10 | 252 | (D) | - | - |
| **Counties** | | | | | | | | | | |
| Clallam | - | - | - | - | - | 4 | (D) | 336 | - | - |
| Stevens | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Whatcom | - | - | - | - | - | 5 | 206 | (D) | - | - |
| **RED CLOVER SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | - | - | - | - | - | 8 | 531 | 295,360 | 4 | (D) |
| **Counties** | | | | | | | | | | |
| Clark | - | - | - | - | - | 2 | (D) | (D) | - | - |
| Franklin | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Grant | - | - | - | - | - | 2 | (D) | (D) | 2 | (D) |
| Lincoln | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Yakima | - | - | - | - | - | 2 | (D) | (D) | 2 | (D) |
| **RYEGRASS SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 23 | 1,494 | 1,810,159 | 4 | 137 | 20 | 2,359 | 2,765,213 | 7 | 610 |
| **Counties** | | | | | | | | | | |
| Adams | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Benton | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Clark | - | - | - | - | - | 3 | 300 | 330,000 | - | - |
| Franklin | 2 | (D) | (D) | 1 | (D) | 2 | (D) | (D) | 2 | (D) |
| Grant | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Island | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Lewis | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Lincoln | - | - | - | - | - | 2 | (D) | (D) | 1 | (D) |
| Pierce | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Skagit | 6 | 682 | 775,385 | 1 | (D) | 6 | (D) | 914,083 | 1 | (D) |
| Snohomish | 4 | (D) | 732,125 | - | - | 3 | 707 | 1,143,414 | - | - |

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Table 26. **Field Seeds, Grass Seeds, Hay, Forage, and Silage: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **RYEGRASS SEED (POUNDS)** - Con. | | | | | | | | | | |
| **Counties** - Con. | | | | | | | | | | |
| Stevens | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Walla Walla | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Whatcom | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Whitman | - | - | - | - | - | 1 | (D) | (D) | - | - |
| **SUDANGRASS SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2 | (D) | (D) | 2 | (D) | - | - | - | - | - |
| **Counties** | | | | | | | | | | |
| Franklin | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Grant | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| **TIMOTHY SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 6 | 414 | (D) | 2 | (D) | 6 | 147 | 73,792 | 6 | 147 |
| **Counties** | | | | | | | | | | |
| Franklin | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Kittitas | 2 | (D) | (D) | 2 | (D) | 5 | (D) | (D) | 5 | (D) |
| Pend Oreille | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Stevens | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Walla Walla | 1 | (D) | (D) | - | - | - | - | - | - | - |
| **VETCH SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| **Counties** | | | | | | | | | | |
| Chelan | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Franklin | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| **WHEATGRASS SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 5 | 968 | 659,343 | 3 | (D) | 11 | 2,282 | 1,233,451 | 8 | 2,119 |
| **Counties** | | | | | | | | | | |
| Franklin | 2 | (D) | (D) | 2 | (D) | 5 | (D) | 467,688 | 5 | (D) |
| Lincoln | 1 | (D) | (D) | 1 | (D) | 3 | (D) | (D) | 3 | (D) |
| Whitman | 2 | (D) | (D) | - | - | 3 | (D) | (D) | - | - |
| **WHITE CLOVER SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2 | (D) | (D) | - | - | - | - | - | - | - |
| **Counties** | | | | | | | | | | |
| Lewis | 2 | (D) | (D) | - | - | - | - | - | - | - |
| **OTHER FIELD AND GRASS SEED CROPS (POUNDS) (SEE TEXT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2 | (D) | (D) | 2 | (D) | 11 | 2,310 | (D) | 8 | 2,159 |
| **Counties** | | | | | | | | | | |
| Benton | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Franklin | 2 | (D) | (D) | 2 | (D) | 4 | (D) | 53,030 | 4 | (D) |
| Grant | - | - | - | - | - | 2 | (D) | (D) | 2 | (D) |
| Lincoln | - | - | - | - | - | 2 | (D) | (D) | 1 | (D) |
| Thurston | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Whitman | - | - | - | - | - | 1 | (D) | (D) | - | - |
| **FORAGE - LAND USED FOR ALL HAY AND ALL HAYLAGE, GRASS SILAGE, AND GREENCHOP (TONS, DRY EQUIVALENT) (SEE TEXT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 10,396 | 748,909 | 2,873,198 | 3,780 | 385,037 | 10,243 | 846,140 | 3,595,392 | 4,262 | 493,255 |
| **Counties** | | | | | | | | | | |
| Adams | 101 | 19,947 | 114,000 | 96 | 19,241 | 123 | 28,132 | 163,003 | 121 | 26,255 |
| Asotin | 40 | 5,447 | 5,938 | 4 | 26 | 27 | 3,702 | 8,785 | 6 | 58 |
| Benton | 249 | 15,844 | 84,966 | 243 | 14,952 | 236 | 16,244 | 85,927 | 236 | 16,200 |

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Table 26. **Field Seeds, Grass Seeds, Hay, Forage, and Silage: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **FORAGE - LAND USED FOR ALL HAY AND ALL HAYLAGE, GRASS SILAGE, AND GREENCHOP (TONS, DRY EQUIVALENT) (SEE TEXT)** - Con. | | | | | | | | | | |
| **Counties** - Con. | | | | | | | | | | |
| Chelan | 69 | 1,514 | 2,932 | 53 | 825 | 55 | 2,359 | 8,345 | 48 | 1,750 |
| Clallam | 161 | 5,147 | 14,064 | 51 | 2,206 | 139 | 5,797 | 20,187 | 61 | 2,345 |
| Clark | 592 | 17,541 | 33,320 | 37 | 833 | 663 | 19,049 | 34,771 | 36 | 1,155 |
| Columbia | 57 | 3,420 | 8,235 | 40 | 1,469 | 59 | 3,499 | 6,768 | 27 | 1,301 |
| Cowlitz | 121 | 3,851 | 7,638 | 2 | (D) | 119 | 5,040 | 9,893 | 6 | 499 |
| Douglas | 54 | 6,735 | 17,167 | 41 | 2,247 | 61 | 4,099 | 11,304 | 49 | 2,324 |
| Ferry | 120 | 8,137 | 17,935 | 38 | 2,395 | 90 | 6,784 | 13,620 | 39 | 2,859 |
| Franklin | 206 | 69,541 | 479,494 | 203 | 68,979 | 310 | 99,386 | 706,672 | 309 | 99,136 |
| Garfield | 36 | 1,816 | 4,992 | 12 | 561 | 38 | 2,128 | 5,038 | 8 | 328 |
| Grant | 485 | 117,492 | 694,181 | 471 | 111,657 | 624 | 147,793 | 940,125 | 621 | 145,909 |
| Grays Harbor | 195 | 10,130 | 21,098 | 32 | 2,209 | 219 | 10,675 | 26,820 | 35 | 2,248 |
| Island | 128 | 4,967 | 13,094 | 11 | 695 | 134 | 5,258 | 14,054 | 9 | 816 |
| Jefferson | 85 | 2,701 | 4,110 | 12 | 771 | 72 | 1,842 | 3,014 | 13 | 321 |
| King | 305 | 7,627 | 17,030 | 11 | 811 | 211 | 5,641 | 20,049 | 7 | 880 |
| Kitsap | 54 | 867 | 1,190 | 4 | 9 | 63 | 990 | 1,269 | 7 | 57 |
| Kittitas | 439 | 44,062 | 201,863 | 391 | 42,925 | 440 | 48,442 | 226,508 | 435 | 48,155 |
| Klickitat | 223 | 32,540 | 44,022 | 76 | 7,170 | 222 | 38,603 | 49,787 | 58 | 6,557 |
| Lewis | 755 | 33,358 | 69,557 | 75 | 3,717 | 662 | 27,624 | 64,297 | 69 | 3,140 |
| Lincoln | 190 | 23,392 | 63,127 | 59 | 7,467 | 201 | 24,754 | 62,943 | 60 | 7,979 |
| Mason | 65 | 2,474 | 3,941 | 6 | 31 | 56 | 2,063 | 4,364 | 12 | 194 |
| Okanogan | 523 | 31,869 | 75,750 | 401 | 15,717 | 457 | 32,510 | 88,479 | 367 | 18,963 |
| Pacific | 108 | 4,791 | 13,801 | 5 | 982 | 135 | 6,264 | 12,226 | 8 | 576 |
| Pend Oreille | 155 | 12,274 | 19,742 | 18 | 766 | 121 | 10,766 | 13,138 | 17 | 575 |
| Pierce | 288 | 6,339 | 10,917 | 19 | 418 | 248 | 7,493 | 16,880 | 25 | 982 |
| San Juan | 102 | 3,922 | 8,363 | 7 | 48 | 118 | 5,233 | 8,480 | 3 | 66 |
| Skagit | 333 | 16,272 | 60,050 | 20 | 1,042 | 360 | 18,594 | 73,826 | 41 | 2,247 |
| Skamania | 31 | 560 | 970 | 1 | (D) | 27 | 764 | 1,098 | 3 | 30 |
| Snohomish | 300 | 11,960 | 38,896 | 20 | 1,810 | 325 | 12,485 | 49,270 | 41 | 2,308 |
| Spokane | 971 | 58,922 | 114,183 | 126 | 3,829 | 912 | 61,222 | 128,097 | 113 | 5,964 |
| Stevens | 544 | 41,522 | 85,953 | 91 | 4,604 | 546 | 45,077 | 79,708 | 139 | 8,039 |
| Thurston | 364 | 15,850 | 42,663 | 49 | 2,065 | 316 | 14,265 | 34,164 | 60 | 2,796 |
| Wahkiakum | 55 | 2,176 | 3,963 | 1 | (D) | 58 | 2,060 | 4,757 | 7 | 84 |
| Walla Walla | 166 | 13,188 | 71,565 | 128 | 10,427 | 161 | 16,341 | 97,687 | 137 | 13,452 |
| Whatcom | 726 | 35,858 | 165,065 | 147 | 12,979 | 543 | 32,876 | 190,809 | 181 | 14,372 |
| Whitman | 205 | 18,007 | 44,723 | 26 | 3,656 | 261 | 17,991 | 44,080 | 33 | 2,902 |
| Yakima | 795 | 36,849 | 192,700 | 753 | 35,026 | 831 | 52,295 | 265,150 | 815 | 49,433 |
| **HAY - ALL HAY INCLUDING ALFALFA, OTHER TAME, SMALL GRAIN, AND WILD (TONS, DRY) (SEE TEXT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 9,592 | 675,963 | 2,502,677 | 3,436 | 354,270 | 9,666 | 789,524 | 3,173,489 | 3,967 | 464,606 |
| **Counties** | | | | | | | | | | |
| Adams | 98 | 19,505 | 110,808 | 93 | 18,799 | 118 | 26,731 | 151,770 | 116 | 25,194 |
| Asotin | 40 | 5,251 | 5,793 | 4 | 26 | 27 | 3,702 | 8,785 | 6 | 58 |
| Benton | 231 | 16,996 | 83,863 | 227 | 14,885 | 232 | 15,941 | 84,886 | 232 | 15,911 |
| Chelan | 67 | 1,476 | 2,912 | 50 | 787 | 54 | 2,340 | (D) | 47 | 1,731 |
| Clallam | 152 | 5,047 | 13,621 | 51 | 2,201 | 135 | 5,486 | 15,042 | 60 | 2,109 |
| Clark | 568 | 14,521 | 25,704 | 30 | (D) | 640 | 17,832 | 27,195 | 27 | 466 |
| Columbia | 52 | 2,767 | 7,589 | 36 | 1,090 | 58 | 3,155 | (D) | 26 | 1,006 |
| Cowlitz | 118 | 3,586 | 6,241 | 1 | (D) | 114 | 4,551 | 7,927 | 6 | 419 |
| Douglas | 51 | 4,094 | 13,475 | 40 | 2,242 | 60 | 4,132 | (D) | 48 | 2,357 |
| Ferry | 117 | 7,987 | 15,902 | 38 | 2,365 | 88 | 6,853 | (D) | 39 | 2,899 |
| Franklin | 201 | 67,710 | 465,715 | 198 | 67,428 | 306 | 98,255 | 684,974 | 305 | 98,005 |
| Garfield | 35 | 1,799 | 4,676 | 11 | 483 | 38 | 2,133 | 5,038 | 8 | 328 |
| Grant | 474 | 115,995 | 686,381 | 462 | 110,424 | 612 | 147,570 | 924,026 | 609 | 144,858 |
| Grays Harbor | 160 | 6,180 | 11,269 | 12 | 787 | 188 | 7,636 | 14,061 | 22 | 1,043 |
| Island | 119 | 3,938 | 6,321 | 10 | 340 | 128 | 4,709 | 8,338 | 8 | 488 |
| Jefferson | 74 | 2,247 | 2,788 | 8 | 587 | 70 | 1,717 | 2,421 | 12 | 251 |
| King | 251 | 4,937 | 7,153 | 9 | 341 | 182 | 3,824 | 9,701 | 4 | 310 |
| Kitsap | 49 | 849 | 1,133 | 4 | 9 | 57 | 941 | 1,152 | 7 | 57 |
| Kittitas | 427 | 43,757 | 200,836 | 381 | 42,765 | 433 | 49,501 | 225,548 | 428 | 49,298 |
| Klickitat | 213 | 31,910 | 40,156 | 73 | 6,758 | 217 | 37,300 | 48,300 | 54 | 6,203 |
| Lewis | 692 | 26,711 | 50,964 | 58 | 2,422 | 624 | 24,509 | 52,521 | 55 | 2,152 |
| Lincoln | 182 | 23,338 | 61,746 | 55 | 7,195 | 197 | 25,365 | 62,178 | 59 | 7,926 |
| Mason | 63 | 2,432 | 3,909 | 6 | 31 | 53 | 1,963 | 4,252 | 11 | 189 |
| Okanogan | 505 | 30,578 | 71,302 | 383 | 14,908 | 451 | 33,393 | 86,427 | 361 | 19,003 |
| Pacific | 101 | 2,958 | 4,942 | 1 | (D) | 127 | 5,301 | 8,461 | 4 | 66 |
| Pend Oreille | 153 | 12,179 | 19,696 | 18 | 766 | 121 | 10,776 | 13,138 | 17 | 575 |
| Pierce | 272 | 6,046 | 10,377 | 15 | 394 | 232 | 6,531 | 14,054 | 19 | 487 |
| San Juan | 87 | 3,275 | 7,510 | 6 | 28 | 98 | 3,917 | 7,282 | 1 | (D) |
| Skagit | 274 | 9,509 | 26,398 | 14 | 768 | 314 | 11,421 | 27,302 | 32 | 1,187 |
| Skamania | 29 | 520 | 936 | 1 | (D) | 25 | 693 | 1,006 | 3 | 30 |
| Snohomish | 242 | 8,100 | 17,190 | 11 | 548 | 279 | 8,400 | 17,602 | 24 | 825 |
| Spokane | 926 | 57,364 | 109,816 | 112 | 3,552 | 900 | 60,755 | 125,842 | 112 | 5,886 |
| Stevens | 532 | 41,167 | 84,753 | 90 | 4,678 | 537 | 44,320 | 76,040 | 136 | 7,583 |
| Thurston | 337 | 12,587 | 21,988 | 42 | 1,292 | 295 | 9,727 | 19,084 | 52 | 2,157 |
| Wahkiakum | 51 | 1,810 | 2,802 | - | - | 55 | 1,782 | 3,268 | 5 | (D) |
| Walla Walla | 160 | 13,158 | 70,175 | 126 | 10,401 | 159 | 16,422 | (D) | 135 | 13,407 |
| Whatcom | 573 | 15,385 | 29,080 | 59 | 2,122 | 405 | 14,795 | 38,568 | 79 | 3,432 |
| Whitman | 200 | 18,172 | 44,526 | 26 | 3,746 | 256 | 18,057 | 43,857 | 32 | 2,871 |
| Yakima | 716 | 30,122 | 152,231 | 675 | 28,471 | 781 | 47,088 | 216,184 | 766 | 43,779 |

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Table 26. **Field Seeds, Grass Seeds, Hay, Forage, and Silage: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **ALFALFA HAY (TONS, DRY)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 3,891 | 363,923 | 1,676,815 | 2,373 | 248,488 | 4,294 | 448,588 | 2,192,001 | 2,822 | 334,005 |
| **Counties** | | | | | | | | | | |
| Adams | 81 | 15,144 | 94,181 | 79 | (D) | 104 | 20,982 | 125,759 | 104 | 20,982 |
| Asotin | 18 | 1,887 | 1,805 | 1 | (D) | 10 | 673 | (D) | 2 | (D) |
| Benton | 135 | 9,146 | 52,675 | 133 | (D) | 162 | 12,412 | 67,352 | 162 | 12,412 |
| Chelan | 41 | 1,150 | 2,438 | 34 | 605 | 44 | 1,561 | (D) | 40 | (D) |
| Clallam | 44 | 1,566 | 5,333 | 25 | 1,329 | 40 | 1,633 | 4,025 | 28 | 1,066 |
| Clark | 27 | 2,394 | 3,690 | 3 | 50 | 12 | 431 | 1,356 | 4 | (D) |
| Columbia | 29 | 984 | 3,197 | 23 | 601 | 29 | 1,284 | 3,462 | 18 | 824 |
| Cowlitz | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Douglas | 38 | 1,880 | 10,089 | 36 | (D) | 44 | 1,624 | 6,336 | 44 | 1,624 |
| Ferry | 83 | 5,329 | 12,306 | 33 | 2,165 | 56 | 3,866 | 9,124 | 33 | 2,118 |
| Franklin | 177 | 54,189 | 395,616 | 177 | 54,189 | 272 | 77,441 | 573,937 | 272 | 77,441 |
| Garfield | 15 | (D) | 1,700 | 6 | (D) | 12 | 394 | (D) | 5 | (D) |
| Grant | 424 | 90,696 | 556,725 | 419 | 89,487 | 549 | 117,488 | 752,332 | 549 | 117,488 |
| Grays Harbor | 1 | (D) | (D) | 1 | (D) | 6 | 108 | 121 | 4 | (D) |
| Island | 21 | 1,422 | 2,197 | 4 | 182 | 20 | 1,612 | 3,186 | 1 | (D) |
| Jefferson | 2 | (D) | (D) | 1 | (D) | 5 | 77 | 105 | - | - |
| King | 12 | 303 | 155 | - | - | - | - | - | - | - |
| Kitsap | 3 | 14 | 31 | - | - | 2 | (D) | (D) | - | - |
| Kittitas | 153 | 8,703 | 33,906 | 131 | 8,218 | 165 | 8,721 | 35,824 | 165 | 8,721 |
| Klickitat | 128 | 20,056 | 26,070 | 38 | 3,180 | 160 | 26,515 | 35,517 | 36 | 2,686 |
| Lewis | 22 | 747 | 1,613 | 6 | 165 | 18 | 638 | 2,079 | 7 | 160 |
| Lincoln | 123 | 16,195 | 47,062 | 45 | 6,100 | 127 | 14,545 | 41,293 | 48 | 6,485 |
| Mason | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Okanogan | 425 | 18,438 | 56,996 | 361 | 13,611 | 399 | 23,253 | 73,994 | 348 | 17,592 |
| Pacific | - | - | - | - | - | 2 | (D) | (D) | 2 | (D) |
| Pend Oreille | 29 | 1,944 | 3,262 | 5 | 400 | 36 | 1,603 | (D) | 8 | 285 |
| Pierce | 9 | 163 | 447 | 4 | 108 | 7 | 105 | 399 | - | - |
| San Juan | 1 | (D) | (D) | - | - | 2 | (D) | (D) | 1 | (D) |
| Skagit | 11 | 374 | (D) | 3 | (D) | 8 | 254 | 843 | 2 | (D) |
| Skamania | 3 | 26 | 40 | 1 | (D) | 2 | (D) | (D) | - | - |
| Snohomish | 11 | 166 | 422 | 1 | (D) | 14 | 632 | 2,432 | 3 | 130 |
| Spokane | 624 | 36,675 | 71,674 | 83 | 2,683 | 656 | 36,386 | 77,020 | 88 | 4,376 |
| Stevens | 401 | 29,978 | 67,480 | 72 | 3,660 | 436 | 32,477 | 58,452 | 107 | 5,958 |
| Thurston | 5 | 480 | 1,170 | 1 | (D) | 16 | 307 | 641 | 2 | (D) |
| Wahkiakum | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Walla Walla | 116 | 10,337 | 64,637 | 96 | 9,350 | 123 | 14,772 | 93,678 | 103 | 12,159 |
| Whatcom | 23 | 305 | 541 | - | - | 16 | 791 | 2,208 | 2 | (D) |
| Whitman | 108 | 8,985 | 27,854 | 21 | 2,716 | 130 | 8,456 | 27,003 | 26 | 2,106 |
| Yakima | 547 | 23,520 | 129,934 | 530 | 23,304 | 608 | 37,363 | 184,071 | 608 | 37,363 |
| **SMALL GRAIN HAY (TONS, DRY)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 710 | 33,744 | 65,291 | 230 | 7,879 | 816 | 46,899 | 87,307 | 267 | 10,250 |
| **Counties** | | | | | | | | | | |
| Adams | 10 | 1,206 | (D) | 8 | (D) | 11 | 1,969 | 6,373 | 7 | 432 |
| Asotin | 9 | 610 | 929 | 1 | (D) | 11 | (D) | 1,690 | 1 | (D) |
| Benton | 16 | 1,750 | 3,240 | 15 | (D) | 12 | 239 | 483 | 11 | 209 |
| Chelan | 1 | (D) | (D) | - | - | 2 | (D) | (D) | 2 | (D) |
| Clallam | 1 | (D) | (D) | - | - | 7 | 197 | 212 | 2 | (D) |
| Clark | 36 | 702 | 1,495 | 1 | (D) | 41 | 898 | 1,853 | 1 | (D) |
| Columbia | 6 | 327 | (D) | 4 | (D) | 9 | 265 | 424 | 3 | (D) |
| Cowlitz | 5 | 140 | (D) | 1 | (D) | 2 | (D) | (D) | 1 | (D) |
| Douglas | 5 | 1,268 | 1,776 | 3 | (D) | 9 | 1,915 | 2,619 | 2 | (D) |
| Ferry | 16 | 447 | 1,151 | 4 | 138 | 29 | 1,087 | 1,911 | 9 | 287 |
| Franklin | 8 | (D) | (D) | 8 | (D) | 6 | (D) | (D) | 6 | (D) |
| Garfield | 23 | 1,106 | 2,639 | 4 | 230 | 24 | 1,541 | 3,509 | 4 | 167 |
| Grant | 17 | 1,154 | (D) | 16 | (D) | 27 | (D) | (D) | 24 | (D) |
| Grays Harbor | 13 | (D) | (D) | 1 | (D) | 10 | 285 | 550 | 1 | (D) |
| Island | 4 | 88 | 321 | - | - | 4 | (D) | (D) | 1 | (D) |
| Jefferson | 2 | (D) | (D) | - | - | - | - | - | - | - |
| King | 4 | 70 | 145 | - | - | - | - | - | - | - |
| Kitsap | - | - | - | - | - | 3 | (D) | (D) | - | - |
| Kittitas | 38 | 917 | 2,502 | 31 | 804 | 42 | 1,355 | 4,284 | 37 | 1,232 |
| Klickitat | 54 | 4,024 | 5,649 | 18 | 584 | 53 | 3,522 | 4,121 | 9 | 347 |
| Lewis | 23 | 1,618 | 2,762 | 3 | 16 | 29 | 798 | 1,987 | 6 | 251 |
| Lincoln | 22 | 975 | 1,908 | 6 | (D) | 26 | 2,878 | 4,410 | 4 | (D) |
| Mason | 4 | (D) | (D) | - | - | - | - | - | - | - |
| Okanogan | 63 | 5,650 | 7,412 | 19 | 540 | 54 | 4,928 | 3,467 | 27 | 664 |
| Pacific | 1 | (D) | (D) | - | - | 4 | (D) | (D) | - | - |
| Pend Oreille | 12 | 544 | 919 | - | - | 12 | 317 | (D) | 3 | (D) |
| Pierce | 3 | 140 | 255 | 1 | (D) | 11 | 161 | 235 | 7 | 72 |
| San Juan | 5 | (D) | (D) | - | - | 4 | (D) | (D) | - | - |
| Skagit | 8 | 161 | (D) | - | - | 5 | 106 | 75 | 1 | (D) |
| Skamania | 4 | 53 | 154 | 1 | (D) | 7 | (D) | 354 | 3 | 30 |
| Snohomish | 10 | 348 | 821 | 2 | (D) | 10 | 132 | 200 | 3 | (D) |
| Spokane | 75 | 2,337 | 3,378 | 6 | 36 | 98 | 5,405 | 8,263 | 10 | 203 |
| Stevens | 86 | 2,545 | 4,279 | 12 | 415 | 111 | 4,109 | 6,279 | 21 | 602 |
| Thurston | 4 | 27 | 26 | - | - | 14 | 258 | 426 | 5 | (D) |
| Wahkiakum | 3 | 105 | 200 | - | - | 3 | (D) | (D) | - | - |
| Walla Walla | 11 | (D) | (D) | 7 | 146 | 9 | 452 | 854 | 3 | 264 |
| Whatcom | 19 | 244 | 424 | 2 | (D) | 9 | 284 | 251 | - | - |

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Table 26. **Field Seeds, Grass Seeds, Hay, Forage, and Silage: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **SMALL GRAIN HAY (TONS, DRY)** - Con. | | | | | | | | | | |
| **Counties** - Con. | | | | | | | | | | |
| Whitman | 25 | 2,321 | 6,005 | 4 | 675 | 51 | 5,298 | 9,754 | 8 | 225 |
| Yakima | 64 | 1,782 | 6,047 | 52 | 1,101 | 57 | 2,858 | 7,874 | 45 | 1,203 |
| **OTHER TAME HAY (TONS, DRY)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 3,461 | 194,533 | 639,060 | 1,062 | 92,419 | 3,777 | 226,539 | 793,608 | 1,223 | 114,398 |
| **Counties** | | | | | | | | | | |
| Adams | 25 | (D) | 14,520 | 24 | (D) | 25 | 3,780 | 19,638 | 25 | 3,780 |
| Asotin | 20 | 1,688 | 2,568 | 2 | (D) | 17 | 1,895 | 5,617 | 2 | (D) |
| Benton | 93 | (D) | 27,485 | 92 | (D) | 69 | 3,232 | 16,881 | 69 | 3,232 |
| Chelan | 13 | 211 | (D) | 8 | 156 | 8 | (D) | 119 | 8 | (D) |
| Clallam | 50 | 2,168 | 6,001 | 18 | 789 | 61 | 2,763 | 8,875 | 27 | 956 |
| Clark | 206 | 4,667 | 9,186 | 13 | 74 | 322 | 9,296 | 14,115 | 13 | 83 |
| Columbia | 33 | (D) | 3,545 | 24 | (D) | 23 | 1,556 | 2,448 | 8 | (D) |
| Cowlitz | 45 | 1,852 | 3,299 | 1 | (D) | 57 | 2,006 | 4,289 | 3 | 320 |
| Douglas | 4 | 279 | (D) | 4 | 279 | 7 | 544 | 2,299 | 6 | (D) |
| Ferry | 27 | 1,164 | 1,273 | 3 | (D) | 19 | 1,105 | 1,095 | 4 | (D) |
| Franklin | 64 | (D) | 69,129 | 62 | (D) | 92 | (D) | 107,021 | 92 | (D) |
| Garfield | 10 | (D) | (D) | 3 | (D) | 7 | (D) | 192 | 3 | (D) |
| Grant | 119 | 24,031 | 124,762 | 99 | 20,012 | 149 | 27,988 | 166,184 | 134 | 25,555 |
| Grays Harbor | 58 | 3,077 | 6,358 | 9 | 678 | 106 | 4,492 | 9,094 | 18 | 856 |
| Island | 43 | 1,096 | 2,049 | 4 | 118 | 60 | 1,866 | 3,554 | 4 | 261 |
| Jefferson | 25 | 1,266 | 1,277 | 6 | (D) | 33 | 888 | 1,261 | 9 | 227 |
| King | 95 | 2,507 | 3,672 | 7 | (D) | 84 | 2,308 | 7,290 | 2 | (D) |
| Kitsap | 19 | 402 | 552 | - | - | 19 | 434 | 495 | 2 | (D) |
| Kittitas | 282 | 33,544 | 163,408 | 276 | 33,458 | 304 | 39,136 | 184,823 | 303 | 39,116 |
| Klickitat | 76 | 5,271 | 6,402 | 30 | 1,826 | 36 | 4,044 | 4,436 | 18 | 1,350 |
| Lewis | 332 | 13,084 | 25,984 | 38 | 1,615 | 350 | 13,627 | 32,637 | 38 | 1,344 |
| Lincoln | 48 | 2,917 | 7,469 | 10 | 963 | 67 | 5,335 | 12,625 | 13 | 1,252 |
| Mason | 21 | 1,392 | 2,617 | 1 | (D) | 24 | 1,232 | 3,107 | 5 | 127 |
| Okanogan | 46 | 1,725 | 2,328 | 23 | 278 | 35 | 2,787 | 6,904 | 10 | (D) |
| Pacific | 48 | (D) | (D) | - | - | 51 | 3,006 | 5,536 | 3 | 42 |
| Pend Oreille | 82 | 7,812 | 13,904 | 12 | (D) | 78 | 7,260 | 8,480 | 8 | 136 |
| Pierce | 122 | 3,041 | 5,249 | 8 | (D) | 114 | 2,710 | 7,349 | 8 | 320 |
| San Juan | 30 | 1,256 | 2,805 | - | - | 57 | 2,729 | 5,031 | - | - |
| Skagit | 143 | 6,386 | 18,962 | 7 | 341 | 188 | 7,580 | 20,788 | 27 | 931 |
| Skamania | 6 | 141 | 232 | 1 | (D) | 11 | 227 | 347 | - | - |
| Snohomish | 130 | 5,079 | 11,680 | 7 | (D) | 148 | 5,721 | 12,551 | 18 | 669 |
| Spokane | 264 | 12,979 | 29,093 | 28 | 785 | 253 | 14,620 | 35,005 | 24 | 1,221 |
| Stevens | 152 | 6,982 | 11,490 | 13 | 483 | 138 | 5,458 | 8,705 | 21 | 809 |
| Thurston | 160 | 6,932 | 12,704 | 24 | (D) | 164 | 5,536 | 12,303 | 32 | 1,236 |
| Wahkiakum | 19 | 605 | 1,077 | - | - | 26 | 979 | 2,082 | 2 | (D) |
| Walla Walla | 42 | (D) | 4,314 | 32 | 905 | 44 | 1,149 | 2,988 | 39 | 935 |
| Whatcom | 291 | 8,396 | 18,722 | 39 | 1,869 | 243 | 9,525 | 29,066 | 62 | 2,868 |
| Whitman | 69 | 3,131 | 6,672 | 4 | 189 | 113 | 3,225 | 5,191 | 10 | 110 |
| Yakima | 149 | 3,971 | 14,500 | 130 | 3,480 | 175 | 6,387 | 23,187 | 153 | 5,134 |
| **WILD HAY (TONS, DRY)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2,825 | 83,763 | 121,511 | 228 | 5,484 | 2,230 | 67,498 | 100,573 | 183 | 5,953 |
| **Counties** | | | | | | | | | | |
| Adams | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Asotin | 7 | 1,066 | 491 | - | - | 2 | (D) | (D) | 1 | (D) |
| Benton | 10 | (D) | 463 | 9 | (D) | 10 | 58 | 170 | 10 | 58 |
| Chelan | 14 | (D) | (D) | 8 | 26 | 5 | (D) | 85 | 2 | (D) |
| Clallam | 72 | (D) | (D) | 12 | 83 | 41 | 893 | 1,930 | 6 | (D) |
| Clark | 319 | 6,758 | 11,333 | 13 | 154 | 296 | 7,207 | 9,871 | 11 | 121 |
| Columbia | 2 | (D) | (D) | - | - | 5 | 50 | (D) | - | - |
| Cowlitz | 73 | 1,594 | (D) | - | - | 59 | (D) | (D) | 3 | (D) |
| Douglas | 8 | 667 | (D) | - | - | 7 | 49 | (D) | 3 | 9 |
| Ferry | 19 | 1,047 | 1,172 | 2 | (D) | 14 | 795 | (D) | 2 | (D) |
| Franklin | 1 | (D) | (D) | - | - | 1 | (D) | (D) | - | - |
| Garfield | 1 | (D) | (D) | - | - | 3 | (D) | (D) | - | - |
| Grant | 3 | 114 | (D) | 2 | (D) | 2 | (D) | (D) | 2 | (D) |
| Grays Harbor | 95 | 2,669 | 4,362 | 2 | (D) | 78 | 2,751 | 4,296 | 1 | (D) |
| Island | 64 | 1,332 | 1,754 | 3 | 40 | 54 | (D) | (D) | 2 | (D) |
| Jefferson | 50 | 888 | (D) | 1 | (D) | 34 | 752 | 1,055 | 4 | 24 |
| King | 148 | 2,057 | 3,181 | 2 | (D) | 101 | 1,516 | 2,411 | 2 | (D) |
| Kitsap | 31 | 433 | 550 | 4 | 9 | 36 | 482 | 604 | 5 | (D) |
| Kittitas | 47 | 593 | 1,020 | 25 | 285 | 18 | 289 | 617 | 13 | 229 |
| Klickitat | 23 | 2,559 | 2,035 | 7 | 1,168 | 26 | 3,219 | 4,226 | 4 | 1,820 |
| Lewis | 352 | 11,262 | 20,605 | 13 | 626 | 279 | 9,446 | 15,818 | 9 | 397 |
| Lincoln | 62 | 3,251 | 5,307 | 2 | (D) | 43 | 2,607 | 3,850 | 1 | (D) |
| Mason | 38 | 930 | 987 | 5 | (D) | 29 | 731 | 1,145 | 6 | 62 |
| Okanogan | 68 | 4,765 | 4,566 | 11 | 479 | 51 | 2,425 | 2,062 | 6 | (D) |
| Pacific | 55 | 1,679 | 2,848 | 1 | (D) | 73 | 2,168 | (D) | 1 | (D) |
| Pend Oreille | 48 | 1,879 | 1,611 | 2 | (D) | 25 | 1,596 | 2,200 | 1 | (D) |
| Pierce | 138 | 2,702 | 4,426 | 2 | (D) | 115 | 3,555 | 6,071 | 4 | 95 |
| San Juan | 54 | 1,888 | 4,413 | 6 | 28 | 37 | 1,099 | 2,057 | - | - |
| Skagit | 122 | 2,588 | 5,567 | 4 | (D) | 126 | 3,481 | 5,596 | 4 | 122 |
| Skamania | 22 | 300 | 510 | - | - | 8 | 230 | (D) | - | - |
| Snohomish | 100 | 2,507 | 4,267 | 1 | (D) | 114 | 1,915 | 2,419 | 1 | (D) |

--continued

Table 26. **Field Seeds, Grass Seeds, Hay, Forage, and Silage: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **WILD HAY (TONS, DRY)** - Con. | | | | | | | | | | |
| **Counties** - Con. | | | | | | | | | | |
| Spokane | 157 | 5,373 | 5,671 | 13 | 48 | 117 | 4,344 | 5,554 | 4 | 86 |
| Stevens | 54 | 1,662 | 1,504 | 4 | 120 | 54 | 2,276 | 2,604 | 13 | 214 |
| Thurston | 177 | 5,148 | 8,088 | 18 | 882 | 122 | 3,626 | 5,714 | 16 | 721 |
| Wahkiakum | 30 | 1,100 | 1,525 | - | - | 27 | 640 | 865 | 3 | 6 |
| Walla Walla | 5 | (D) | (D) | - | - | 5 | 49 | (D) | 5 | 49 |
| Whatcom | 250 | 6,440 | 9,393 | 18 | (D) | 154 | 4,195 | 7,043 | 19 | (D) |
| Whitman | 64 | 3,735 | 3,995 | 3 | 166 | 39 | 1,078 | 1,909 | 4 | 430 |
| Yakima | 40 | 849 | 1,750 | 35 | 586 | 20 | 480 | 1,052 | 15 | 79 |
| **ALL HAYLAGE, GRASS SILAGE, AND GREENCHOP (TONS, GREEN) (SEE TEXT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 1,312 | 96,376 | 749,607 | 482 | 41,796 | 1,080 | 94,803 | 853,537 | 464 | 46,305 |
| **Counties** | | | | | | | | | | |
| Adams | 5 | 442 | (D) | 5 | 442 | 12 | 1,863 | 22,726 | 12 | 1,773 |
| Asotin | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Benton | 19 | 254 | 2,229 | 17 | (D) | 8 | 291 | 2,106 | 8 | 291 |
| Chelan | 4 | 42 | 41 | 3 | (D) | 1 | (D) | (D) | 1 | (D) |
| Clallam | 15 | 400 | 897 | 4 | 271 | 21 | 1,363 | 10,408 | 14 | 1,011 |
| Clark | 54 | 3,205 | 15,412 | 12 | 548 | 52 | 2,390 | 15,327 | 11 | 809 |
| Columbia | 9 | 653 | 1,306 | 7 | (D) | 2 | (D) | (D) | 2 | (D) |
| Cowlitz | 6 | 490 | 2,827 | 2 | (D) | 9 | 488 | 3,978 | 2 | (D) |
| Douglas | 6 | (D) | (D) | 4 | (D) | 1 | (D) | (D) | 1 | (D) |
| Ferry | 5 | 350 | (D) | 2 | (D) | 2 | (D) | (D) | - | - |
| Franklin | 14 | 4,033 | 27,874 | 13 | (D) | 19 | 4,809 | 43,896 | 18 | 4,657 |
| Garfield | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Grant | 26 | 4,455 | 15,785 | 23 | 3,903 | 27 | 3,962 | 32,570 | 27 | 3,962 |
| Grays Harbor | 62 | 4,592 | 19,861 | 26 | 1,771 | 62 | 4,484 | 25,813 | 17 | 1,428 |
| Island | 21 | 1,710 | 13,694 | 3 | 395 | 20 | 1,967 | 11,563 | 2 | (D) |
| Jefferson | 15 | 954 | 2,676 | 6 | 584 | 4 | 215 | 1,199 | 3 | 205 |
| King | 76 | 2,974 | 19,983 | 4 | 490 | 45 | 2,803 | 20,935 | 4 | 728 |
| Kitsap | 5 | 18 | 116 | - | - | 11 | 49 | 236 | - | - |
| Kittitas | 16 | 416 | 2,075 | 13 | 362 | 12 | 467 | 1,942 | 11 | 437 |
| Klickitat | 15 | 1,434 | 7,819 | 6 | 860 | 10 | 2,167 | 3,009 | 5 | 563 |
| Lewis | 131 | 8,786 | 37,619 | 25 | 1,501 | 76 | 5,440 | 23,824 | 22 | 1,423 |
| Lincoln | 11 | 748 | 2,797 | 5 | 523 | 7 | 881 | 1,548 | 3 | (D) |
| Mason | 4 | 42 | 64 | - | - | 3 | 100 | 226 | 1 | (D) |
| Okanogan | 31 | 1,504 | 8,997 | 24 | 864 | 13 | 814 | 4,152 | 10 | 763 |
| Pacific | 14 | 1,857 | 17,924 | 5 | 956 | 19 | 1,392 | 7,616 | 6 | 544 |
| Pend Oreille | 4 | 96 | 92 | - | - | - | - | - | - | - |
| Pierce | 24 | 326 | 1,092 | 4 | 24 | 23 | 1,153 | 5,717 | 6 | 495 |
| San Juan | 16 | 648 | 1,727 | 1 | (D) | 33 | 1,319 | 2,424 | 2 | (D) |
| Skagit | 102 | 7,982 | 68,082 | 8 | 354 | 112 | 10,954 | 94,120 | 21 | 1,460 |
| Skamania | 2 | (D) | (D) | - | - | 3 | 71 | 187 | - | - |
| Snohomish | 94 | 5,558 | 43,918 | 14 | 1,313 | 70 | 4,983 | 64,066 | 19 | 1,621 |
| Spokane | 65 | 2,820 | 8,853 | 16 | 309 | 31 | 1,466 | 4,563 | 6 | 262 |
| Stevens | 25 | 880 | 2,429 | 5 | 132 | 20 | 1,247 | 7,420 | 7 | 456 |
| Thurston | 52 | 3,814 | 41,831 | 16 | 1,003 | 45 | 5,948 | 30,508 | 17 | 1,169 |
| Wahkiakum | 11 | 409 | 2,348 | 1 | (D) | 8 | 469 | 3,012 | 2 | (D) |
| Walla Walla | 8 | (D) | (D) | 4 | (D) | 3 | 54 | (D) | 3 | 54 |
| Whatcom | 230 | 22,227 | 275,108 | 102 | 11,461 | 213 | 22,015 | 307,993 | 128 | 12,667 |
| Whitman | 7 | 105 | 403 | - | - | 8 | 288 | 452 | 1 | (D) |
| Yakima | 106 | 8,811 | 81,874 | 101 | 8,506 | 75 | 8,495 | 99,062 | 72 | 8,000 |
| **HAYLAGE OR GREENCHOP FROM ALFALFA OR ALFALFA MIXTURES (TONS, GREEN)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 290 | 19,513 | 113,764 | 164 | 13,644 | 243 | 21,145 | 182,548 | 153 | 14,822 |
| **Counties** | | | | | | | | | | |
| Adams | 2 | (D) | (D) | 2 | (D) | 6 | (D) | (D) | 6 | (D) |
| Benton | 11 | 152 | 1,968 | 10 | (D) | 2 | (D) | (D) | 2 | (D) |
| Chelan | 1 | (D) | (D) | - | - | 1 | (D) | (D) | 1 | (D) |
| Clallam | 6 | 325 | 562 | 3 | (D) | 13 | 774 | 4,798 | 11 | 602 |
| Clark | 3 | (D) | (D) | - | - | 12 | 760 | 5,156 | 3 | 105 |
| Douglas | 3 | 3 | 3 | 3 | 3 | 1 | (D) | (D) | 1 | (D) |
| Franklin | 9 | 1,948 | 11,207 | 9 | 1,948 | 16 | 3,598 | 33,110 | 15 | 3,446 |
| Garfield | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Grant | 16 | 3,420 | 10,458 | 15 | (D) | 16 | 2,580 | 16,695 | 16 | 2,580 |
| Grays Harbor | 3 | (D) | 548 | 2 | (D) | 6 | 468 | 800 | 5 | 73 |
| Island | 4 | 618 | 4,383 | 1 | (D) | 10 | 1,024 | 7,069 | - | - |
| Jefferson | 2 | (D) | (D) | 2 | (D) | - | - | - | - | - |
| King | 11 | 376 | 1,223 | 1 | (D) | 8 | 129 | 1,286 | - | - |
| Kitsap | 2 | (D) | (D) | - | - | - | - | - | - | - |
| Kittitas | 2 | (D) | (D) | 2 | (D) | 1 | (D) | (D) | 1 | (D) |
| Klickitat | 7 | 898 | 6,084 | 6 | (D) | 3 | 477 | 1,139 | 3 | 311 |
| Lewis | 17 | 661 | 2,613 | 2 | (D) | 10 | 548 | 2,252 | 3 | 25 |
| Lincoln | 5 | 464 | (D) | 3 | (D) | 1 | (D) | (D) | 1 | (D) |
| Mason | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Okanogan | 20 | 440 | 1,579 | 14 | (D) | 8 | 790 | 4,114 | 7 | 745 |
| Pacific | 4 | 220 | 656 | - | - | 8 | 193 | 1,001 | 2 | (D) |
| Pierce | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) | 2 | (D) |

--continued

Table 26. **Field Seeds, Grass Seeds, Hay, Forage, and Silage: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **HAYLAGE OR GREENCHOP FROM ALFALFA OR ALFALFA MIXTURES (TONS, GREEN)** - Con. | | | | | | | | | | |
| **Counties** - Con. | | | | | | | | | | |
| San Juan | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Skagit | 12 | 309 | 1,637 | 3 | 126 | 13 | 847 | 5,901 | 3 | 184 |
| Snohomish | 8 | 214 | 791 | 2 | (D) | 8 | 211 | 1,077 | - | - |
| Spokane | 28 | 1,541 | 6,785 | 9 | 277 | 10 | 447 | 2,783 | 2 | (D) |
| Stevens | 10 | 576 | 1,946 | 3 | (D) | 14 | 1,121 | (D) | 7 | 456 |
| Thurston | 11 | 325 | 1,004 | 3 | 190 | 4 | 515 | 1,611 | 4 | 307 |
| Wahkiakum | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Walla Walla | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Whatcom | 21 | 556 | 4,167 | 5 | 242 | 15 | 847 | 12,739 | 10 | 468 |
| Whitman | 3 | (D) | (D) | - | - | 6 | (D) | (D) | 1 | (D) |
| Yakima | 64 | 4,234 | 41,365 | 60 | (D) | 47 | 4,069 | 57,538 | 46 | 4,017 |
| **OTHER HAYLAGE, GRASS SILAGE, AND GREENCHOP (TONS, GREEN)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 1,052 | 76,863 | 635,843 | 331 | 28,152 | 874 | 73,658 | 670,989 | 330 | 31,483 |
| **Counties** | | | | | | | | | | |
| Adams | 3 | (D) | 450 | 3 | (D) | 7 | (D) | (D) | 7 | (D) |
| Asotin | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Benton | 8 | 102 | 261 | 7 | (D) | 6 | (D) | (D) | 6 | (D) |
| Chelan | 3 | (D) | (D) | 3 | (D) | - | - | - | - | - |
| Clallam | 9 | 75 | 335 | 1 | (D) | 9 | 589 | 5,610 | 4 | 409 |
| Clark | 52 | (D) | (D) | 12 | 548 | 43 | 1,630 | 10,171 | 11 | 704 |
| Columbia | 9 | 653 | 1,306 | 7 | (D) | 2 | (D) | (D) | 2 | (D) |
| Cowlitz | 6 | 490 | 2,827 | 2 | (D) | 9 | 488 | 3,978 | 2 | (D) |
| Douglas | 3 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Ferry | 5 | 350 | (D) | 2 | (D) | 2 | (D) | (D) | - | - |
| Franklin | 7 | 2,085 | 16,667 | 6 | (D) | 4 | 1,211 | 10,786 | 4 | 1,211 |
| Grant | 10 | 1,035 | 5,327 | 8 | (D) | 12 | 1,382 | 15,875 | 12 | 1,382 |
| Grays Harbor | 59 | (D) | 19,313 | 24 | (D) | 56 | 4,016 | 25,013 | 12 | 1,355 |
| Island | 17 | 1,092 | 9,311 | 2 | (D) | 11 | 943 | 4,494 | 2 | (D) |
| Jefferson | 13 | (D) | (D) | 4 | (D) | 4 | 215 | 1,199 | 3 | 205 |
| King | 66 | 2,598 | 18,760 | 3 | (D) | 38 | 2,674 | 19,649 | 4 | 728 |
| Kitsap | 3 | (D) | (D) | - | - | 11 | 49 | 236 | - | - |
| Kittitas | 14 | (D) | (D) | 11 | (D) | 11 | (D) | (D) | 10 | (D) |
| Klickitat | 9 | 536 | 1,735 | 1 | (D) | 10 | 1,690 | 1,870 | 5 | 252 |
| Lewis | 119 | 8,125 | 35,006 | 24 | (D) | 72 | 4,892 | 21,572 | 20 | 1,398 |
| Lincoln | 7 | 284 | (D) | 3 | (D) | 7 | (D) | (D) | 3 | 57 |
| Mason | 4 | 42 | 64 | - | - | 2 | (D) | (D) | - | - |
| Okanogan | 14 | 1,064 | 7,418 | 10 | (D) | 5 | 24 | 38 | 3 | 18 |
| Pacific | 10 | 1,637 | 17,268 | 5 | 956 | 13 | 1,199 | 6,615 | 6 | (D) |
| Pend Oreille | 4 | 96 | 92 | - | - | - | - | - | - | - |
| Pierce | 22 | (D) | (D) | 2 | (D) | 21 | (D) | (D) | 4 | (D) |
| San Juan | 15 | (D) | (D) | 1 | (D) | 33 | 1,319 | 2,424 | 2 | (D) |
| Skagit | 92 | 7,673 | 66,445 | 5 | 228 | 105 | 10,107 | 88,219 | 19 | 1,276 |
| Skamania | 2 | (D) | (D) | - | - | 3 | 71 | 187 | - | - |
| Snohomish | 86 | 5,344 | 43,127 | 12 | (D) | 65 | 4,772 | 62,989 | 19 | 1,621 |
| Spokane | 40 | 1,279 | 2,068 | 7 | 32 | 21 | 1,019 | 1,780 | 4 | (D) |
| Stevens | 15 | 304 | 483 | 2 | (D) | 6 | 126 | (D) | - | - |
| Thurston | 41 | 3,489 | 40,827 | 13 | 813 | 41 | 5,433 | 28,897 | 13 | 862 |
| Wahkiakum | 11 | 409 | 2,348 | 1 | (D) | 7 | (D) | (D) | 2 | (D) |
| Walla Walla | 7 | (D) | 95 | 3 | (D) | 3 | 54 | (D) | 3 | 54 |
| Whatcom | 211 | 21,671 | 270,941 | 97 | 11,219 | 203 | 21,168 | 295,254 | 120 | 12,199 |
| Whitman | 4 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| Yakima | 51 | 4,577 | 40,509 | 49 | (D) | 29 | 4,426 | 41,524 | 27 | 3,983 |
| **CORN FOR SILAGE OR GREENCHOP (TONS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 529 | 93,239 | 2,320,924 | 360 | 67,068 | 537 | 83,353 | 2,129,010 | 360 | 57,381 |
| **Counties** | | | | | | | | | | |
| Adams | 13 | 2,216 | 34,793 | 13 | 2,216 | 9 | 4,034 | 117,467 | 9 | 4,034 |
| Benton | 13 | 1,361 | 37,649 | 13 | 1,361 | 2 | (D) | (D) | 2 | (D) |
| Clallam | 1 | (D) | (D) | 1 | (D) | 2 | (D) | (D) | 1 | (D) |
| Clark | 10 | 2,181 | 35,590 | 7 | 187 | 10 | 1,883 | 37,533 | 5 | 709 |
| Cowlitz | 8 | 601 | 13,840 | 2 | (D) | 2 | (D) | (D) | 2 | (D) |
| Douglas | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Franklin | 32 | 9,020 | 228,568 | 32 | 9,020 | 35 | 6,126 | 170,971 | 35 | 6,126 |
| Grant | 49 | 13,130 | 357,943 | 49 | 13,130 | 49 | 8,334 | 223,139 | 49 | 8,334 |
| Grays Harbor | 8 | 730 | 18,230 | 8 | 730 | 8 | 2,285 | 53,894 | 6 | 1,510 |
| Island | 3 | 408 | (D) | 2 | (D) | 6 | 357 | 5,394 | 1 | (D) |
| King | 21 | 1,945 | 40,719 | - | - | 17 | 1,181 | 28,336 | 1 | (D) |
| Kitsap | - | - | - | - | - | 3 | 3 | 45 | - | - |
| Kittitas | 3 | (D) | (D) | 3 | (D) | 1 | (D) | (D) | 1 | (D) |
| Klickitat | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Lewis | 8 | 915 | 16,855 | 6 | (D) | 6 | 770 | 16,385 | 5 | 635 |
| Lincoln | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Okanogan | 8 | 1,090 | 23,292 | 8 | 1,090 | 5 | 795 | 16,726 | 5 | 795 |
| Pierce | 6 | 96 | 1,084 | 2 | (D) | 1 | (D) | (D) | - | - |
| Skagit | 29 | 7,117 | 158,592 | 4 | 280 | 42 | 7,395 | 186,154 | 4 | 328 |
| Skamania | - | - | - | - | - | 1 | (D) | (D) | - | - |

--continued

Table 26. **Field Seeds, Grass Seeds, Hay, Forage, and Silage: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **CORN FOR SILAGE OR GREENCHOP (TONS)** - Con. | | | | | | | | | | |
| **Counties** - Con. | | | | | | | | | | |
| Snohomish | 33 | 4,192 | 93,478 | 10 | 690 | 34 | 5,582 | 133,518 | 5 | 916 |
| Spokane | 4 | (D) | (D) | 4 | (D) | 6 | 115 | (D) | 6 | 115 |
| Stevens | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Thurston | 4 | (D) | (D) | 2 | (D) | 5 | (D) | (D) | 3 | (D) |
| Walla Walla | - | - | - | - | - | 4 | (D) | 1,042 | 4 | (D) |
| Whatcom | 134 | 15,304 | 339,373 | 53 | 4,671 | 144 | 16,478 | 387,648 | 71 | 5,955 |
| Yakima | 138 | 31,879 | 889,519 | 138 | 31,879 | 143 | 25,047 | 679,666 | 143 | 25,047 |
| **SORGHUM FOR SILAGE OR GREENCHOP (TONS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| **Counties** | | | | | | | | | | |
| Yakima | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |

## Table 27. **Other Crops: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **DILL FOR OIL (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) | 2 | (D) |
| **Counties** | | | | | | | | | | |
| Yakima | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) | 2 | (D) |
| **HERBS, DRIED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 19 | 1,240 | (D) | 10 | 1,187 | 21 | 903 | 1,761,417 | 11 | (D) |
| **Counties** | | | | | | | | | | |
| Adams | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Clallam | 3 | 3 | 1,400 | 3 | 3 | 3 | 14 | 4,375 | 3 | 14 |
| Clark | - | - | - | - | - | 5 | 15 | 11,774 | 2 | (D) |
| Grant | 4 | (D) | (D) | 3 | (D) | 1 | (D) | (D) | 1 | (D) |
| King | 5 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | - | - |
| Kitsap | 1 | (D) | (D) | - | - | - | - | - | - | - |
| Klickitat | 2 | (D) | (D) | 2 | (D) | - | - | - | - | - |
| Okanogan | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Pend Oreille | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Skagit | 1 | (D) | (D) | - | - | 1 | (D) | (D) | - | - |
| Snohomish | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Spokane | - | - | - | - | - | 2 | (D) | (D) | 1 | (D) |
| Thurston | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Walla Walla | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Whatcom | 2 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Yakima | 1 | (D) | (D) | - | - | 2 | (D) | (D) | 1 | (D) |
| **HOPS (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 40 | 22,424 | 46,241,105 | 39 | (D) | 38 | 22,907 | 46,962,954 | 38 | 22,907 |
| **Counties** | | | | | | | | | | |
| Benton | 5 | (D) | 13,510,563 | 5 | (D) | 5 | 4,320 | 9,149,063 | 5 | 4,320 |
| Pierce | 1 | (D) | (D) | - | - | - | - | - | - | - |
| San Juan | 2 | (D) | (D) | 2 | (D) | - | - | - | - | - |
| Yakima | 32 | 16,232 | 32,728,792 | 32 | 16,232 | 33 | 18,587 | 37,813,891 | 33 | 18,587 |
| **MINT FOR OIL, ALL (POUNDS OF OIL)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 72 | 26,280 | 3,257,479 | 72 | 26,280 | 100 | 29,241 | 3,945,255 | 100 | 29,241 |
| **Counties** | | | | | | | | | | |
| Adams | 12 | 3,531 | 499,333 | 12 | 3,531 | 13 | (D) | (D) | 13 | (D) |
| Benton | 1 | (D) | (D) | 1 | (D) | 2 | (D) | (D) | 2 | (D) |
| Franklin | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Grant | 10 | 8,930 | 1,037,013 | 10 | 8,930 | 20 | 9,165 | 1,091,993 | 20 | 9,165 |
| Kittitas | 1 | (D) | (D) | 1 | (D) | 2 | (D) | (D) | 2 | (D) |
| Walla Walla | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Yakima | 46 | 7,587 | 1,062,644 | 46 | 7,587 | 63 | 12,561 | 1,746,186 | 63 | 12,561 |
| **MINT FOR OIL, PEPPERMINT (POUNDS OF OIL)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 28 | 13,637 | 1,437,723 | 28 | 13,637 | 48 | 16,424 | 1,989,263 | 48 | 16,424 |
| **Counties** | | | | | | | | | | |
| Adams | 7 | 943 | 106,315 | 7 | 943 | 12 | (D) | (D) | 12 | (D) |
| Benton | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Franklin | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Grant | 7 | 4,787 | 498,595 | 7 | 4,787 | 17 | 7,545 | 810,937 | 17 | 7,545 |
| Kittitas | 1 | (D) | (D) | 1 | (D) | 2 | (D) | (D) | 2 | (D) |
| Walla Walla | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Yakima | 10 | 1,675 | 174,324 | 10 | 1,675 | 16 | 3,775 | 448,345 | 16 | 3,775 |
| **MINT FOR OIL, SPEARMINT (POUNDS OF OIL)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 64 | 12,643 | 1,819,756 | 64 | 12,643 | 81 | 12,817 | 1,955,992 | 81 | 12,817 |
| **Counties** | | | | | | | | | | |
| Adams | 12 | 2,588 | 393,018 | 12 | 2,588 | 11 | (D) | (D) | 11 | (D) |
| Benton | - | - | - | - | - | 2 | (D) | (D) | 2 | (D) |
| Grant | 9 | 4,143 | 538,418 | 9 | 4,143 | 10 | 1,620 | 281,056 | 10 | 1,620 |
| Yakima | 43 | 5,912 | 888,320 | 43 | 5,912 | 58 | 8,786 | 1,297,841 | 58 | 8,786 |

--continued

Table 27. **Other Crops: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Harvested | | | Irrigated | | Harvested | | | Irrigated | |
| | Farms | Acres | Quantity | Farms | Acres | Farms | Acres | Quantity | Farms | Acres |
| **MINT TEA LEAVES (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 3 | (D) | (D) | 1 | (D) | (NA) | (NA) | (NA) | (NA) | (NA) |
| **Counties** | | | | | | | | | | |
| Adams | 1 | (D) | (D) | 1 | (D) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Spokane | 2 | (D) | (D) | - | - | (NA) | (NA) | (NA) | (NA) | (NA) |
| **SWEET CORN FOR SEED (POUNDS)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 2 | (D) | (D) | - | - | 16 | 934 | 947,307 | 16 | 934 |
| **Counties** | | | | | | | | | | |
| Adams | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Franklin | - | - | - | - | - | 3 | (D) | 99,023 | 3 | (D) |
| Grant | 1 | (D) | (D) | - | - | 10 | 667 | 710,252 | 10 | 667 |
| Kittitas | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Klickitat | - | - | - | - | - | 1 | (D) | (D) | 1 | (D) |
| Walla Walla | 1 | (D) | (D) | - | - | - | - | - | - | - |
| **OTHER CROPS (SEE TEXT)** | | | | | | | | | | |
| **State Total** | | | | | | | | | | |
| Washington | 49 | 5,685 | (X) | 33 | 3,598 | 58 | 14,396 | (X) | 48 | 12,053 |
| **Counties** | | | | | | | | | | |
| Adams | 4 | (D) | (X) | 4 | (D) | 14 | 3,404 | (X) | 12 | 3,128 |
| Benton | - | - | (X) | - | - | 5 | (D) | (X) | 5 | (D) |
| Chelan | 1 | (D) | (X) | 1 | (D) | - | - | (X) | - | - |
| Clallam | 1 | (D) | (X) | 1 | (D) | 1 | (D) | (X) | 1 | (D) |
| Columbia | - | - | (X) | - | - | 2 | (D) | (X) | - | - |
| Douglas | 1 | (D) | (X) | - | - | - | - | (X) | - | - |
| Franklin | 7 | 843 | (X) | 7 | 843 | 4 | (D) | (X) | 4 | (D) |
| Grant | 9 | 1,059 | (X) | 7 | (D) | 15 | 4,272 | (X) | 15 | 4,272 |
| Klickitat | - | - | (X) | - | - | 1 | (D) | (X) | 1 | (D) |
| Lincoln | 4 | 836 | (X) | 3 | (D) | 4 | 1,350 | (X) | 4 | 1,350 |
| Okanogan | 1 | (D) | (X) | 1 | (D) | - | - | (X) | - | - |
| Pierce | 3 | 6 | (X) | 1 | (D) | - | - | (X) | - | - |
| Skagit | - | - | (X) | - | - | 1 | (D) | (X) | 1 | (D) |
| Snohomish | 2 | (D) | (X) | - | - | - | - | (X) | - | - |
| Spokane | 1 | (D) | (X) | - | - | - | - | (X) | - | - |
| Stevens | 1 | (D) | (X) | - | - | 1 | (D) | (X) | - | - |
| Walla Walla | 6 | 409 | (X) | 4 | (D) | 5 | 942 | (X) | 4 | 783 |
| Whatcom | 3 | (D) | (X) | 3 | (D) | - | - | (X) | - | - |
| Whitman | 4 | 786 | (X) | - | - | 4 | 598 | (X) | 1 | (D) |
| Yakima | 1 | (D) | (X) | 1 | (D) | 1 | (D) | (X) | - | - |

## Table 28. **Land Used For Vegetables and Vegetables Harvested For Sale: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Land used for vegetables (see text) | | | | Vegetables harvested (see text) (acres) | Land used for vegetables (see text) | | | | Vegetables harvested (see text) (acres) |
| | Harvested | | Irrigated | | | Harvested | | Irrigated | | |
| | Farms | Acres | Farms | Acres | | Farms | Acres | Farms | Acres | |
| **State Total** | | | | | | | | | | |
| Washington | 2,836 | 337,859 | 2,278 | 320,914 | 351,639 | 2,026 | 332,477 | 1,471 | 302,496 | 343,787 |
| **Counties** | | | | | | | | | | |
| Adams | 49 | 28,642 | 46 | 28,639 | 28,642 | 45 | 33,926 | 45 | 33,909 | 34,348 |
| Asotin | 5 | 59 | 5 | 57 | 59 | 6 | 24 | 6 | 24 | 24 |
| Benton | 61 | 78,502 | 61 | 78,496 | 83,081 | 46 | 72,355 | 42 | 72,116 | 73,530 |
| Chelan | 40 | 38 | 31 | 23 | 40 | 14 | 23 | 13 | 20 | 24 |
| Clallam | 41 | 123 | 28 | 108 | 133 | 46 | 304 | 39 | (D) | 307 |
| Clark | 177 | 388 | 130 | 211 | 418 | 102 | 218 | 64 | 125 | 222 |
| Columbia | 5 | 3 | 4 | (D) | 4 | 6 | (D) | 5 | 7 | (D) |
| Cowlitz | 42 | 6,263 | 33 | 5,647 | 6,273 | 23 | 1,182 | 17 | 599 | 1,184 |
| Douglas | 15 | 11 | 15 | 11 | 11 | 7 | 10 | 5 | 8 | 10 |
| Ferry | 7 | 32 | 3 | (D) | 32 | 7 | 4 | 7 | 4 | 4 |
| Franklin | 141 | 59,962 | 135 | 59,692 | 63,696 | 129 | 52,032 | 127 | 51,352 | 55,330 |
| Garfield | 3 | (D) | 3 | 4 | (D) | - | - | - | - | - |
| Grant | 199 | 92,652 | 195 | 91,391 | 97,142 | 205 | 96,965 | 199 | 95,896 | 101,663 |
| Grays Harbor | 43 | 6,588 | 31 | 2,852 | 6,678 | 30 | 3,339 | 14 | 165 | 3,339 |
| Island | 60 | 110 | 43 | (D) | (D) | 36 | 141 | 25 | 111 | 146 |
| Jefferson | 25 | 52 | 22 | 46 | 53 | 26 | 37 | 9 | 20 | 37 |
| King | 245 | 984 | 156 | 560 | 1,021 | 167 | 938 | 75 | 527 | 960 |
| Kitsap | 144 | 116 | 102 | 82 | (D) | 84 | 101 | 64 | (D) | 111 |
| Kittitas | 51 | 2,465 | 50 | (D) | 2,635 | 42 | 1,568 | 42 | 1,563 | 1,829 |
| Klickitat | 49 | (D) | 49 | (D) | (D) | 25 | (D) | 16 | (D) | (D) |
| Lewis | 77 | 3,925 | 59 | 1,591 | 3,925 | 48 | 3,022 | 29 | 1,003 | 3,132 |
| Lincoln | 14 | 2,967 | 11 | 2,701 | 2,967 | 10 | 2,489 | 10 | 2,489 | 2,489 |
| Mason | 28 | 88 | 24 | 24 | (D) | 28 | 83 | 22 | 35 | 83 |
| Okanogan | 90 | 97 | 82 | 85 | (D) | 75 | 133 | 60 | 88 | 139 |
| Pacific | 9 | 7 | 9 | 6 | 7 | 2 | (D) | 2 | (D) | (D) |
| Pend Oreille | 13 | 9 | 12 | (D) | 11 | 2 | (D) | 2 | (D) | (D) |
| Pierce | 167 | 1,254 | 119 | 691 | 1,324 | 84 | 1,448 | 47 | 864 | 1,622 |
| San Juan | 44 | (D) | 36 | (D) | (D) | 55 | 48 | 37 | 38 | 49 |
| Skagit | 134 | 17,809 | 100 | 12,262 | 17,880 | 107 | 19,317 | 50 | 8,380 | 19,456 |
| Skamania | 22 | 9 | 14 | 8 | 9 | - | - | - | - | - |
| Snohomish | 117 | 1,828 | 74 | 1,332 | 1,846 | 98 | 4,109 | 50 | 266 | 4,140 |
| Spokane | 131 | 1,603 | 118 | 1,466 | 1,613 | 80 | 1,514 | 57 | 1,440 | 1,528 |
| Stevens | 81 | 125 | 66 | 101 | 129 | 29 | 52 | 23 | 47 | 54 |
| Thurston | 119 | 219 | 77 | 139 | 233 | 64 | 372 | 42 | 281 | 390 |
| Wahkiakum | 5 | 4 | 5 | 2 | 5 | 5 | 4 | 5 | 4 | 4 |
| Walla Walla | 68 | 19,253 | 58 | 18,614 | 19,619 | 62 | 20,407 | 52 | 18,402 | 21,126 |
| Whatcom | 103 | 3,140 | 85 | 3,094 | 3,152 | 83 | 2,763 | 49 | 1,860 | 2,765 |
| Whitman | 13 | 10 | 7 | 6 | 11 | 13 | 2,443 | 4 | 3 | 2,443 |
| Yakima | 199 | 7,272 | 180 | 7,197 | 7,305 | 135 | 9,863 | 116 | 9,777 | 10,051 |

## Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **VEGETABLES HARVESTED FOR SALE (SEE TEXT)** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 2,836 | 351,639 | 734 | 273,086 | 2,399 | 78,553 | 2,026 | 343,787 |
| **Counties** | | | | | | | | |
| Adams | 49 | 28,642 | 30 | 22,489 | 30 | 6,153 | 45 | 34,348 |
| Asotin | 5 | 59 | - | - | 5 | 59 | 6 | 24 |
| Benton | 61 | 83,081 | 26 | 71,949 | 49 | 11,132 | 46 | 73,530 |
| Chelan | 40 | 40 | 9 | 7 | 34 | 33 | 14 | 24 |
| Clallam | 41 | 133 | 2 | (D) | 40 | (D) | 46 | 307 |
| Clark | 177 | 418 | 32 | 97 | 162 | 321 | 102 | 222 |
| Columbia | 5 | 4 | - | - | 5 | 4 | 6 | (D) |
| Cowlitz | 42 | 6,273 | 20 | 6,147 | 26 | 126 | 23 | 1,184 |
| Douglas | 15 | 11 | - | - | 15 | 11 | 7 | 10 |
| Ferry | 7 | 32 | 2 | (D) | 6 | (D) | 7 | 4 |
| Franklin | 141 | 63,696 | 91 | 49,805 | 75 | 13,892 | 129 | 55,330 |
| Garfield | 3 | (D) | 2 | (D) | 1 | (D) | - | - |
| Grant | 199 | 97,142 | 168 | 80,710 | 72 | 16,433 | 205 | 101,663 |
| Grays Harbor | 43 | 6,678 | 14 | 6,497 | 31 | 181 | 30 | 3,339 |
| Island | 60 | (D) | 9 | 6 | 57 | (D) | 36 | 146 |
| Jefferson | 25 | 53 | 3 | 2 | 24 | 51 | 26 | 37 |
| King | 245 | 1,021 | 25 | 16 | 238 | 1,005 | 167 | 960 |
| Kitsap | 144 | (D) | 18 | 5 | 138 | (D) | 84 | 111 |
| Kittitas | 51 | 2,635 | 23 | 2,364 | 36 | 271 | 42 | 1,829 |
| Klickitat | 49 | (D) | 7 | (D) | 48 | 62 | 25 | (D) |
| Lewis | 77 | 3,925 | 34 | 3,585 | 51 | 340 | 48 | 3,132 |
| Lincoln | 14 | 2,967 | 10 | (D) | 5 | (D) | 10 | 2,489 |
| Mason | 28 | (D) | 9 | 2 | 28 | (D) | 28 | 83 |
| Okanogan | 90 | (D) | 7 | 2 | 89 | (D) | 75 | 139 |
| Pacific | 9 | 7 | 2 | (D) | 7 | (D) | 2 | (D) |
| Pend Oreille | 13 | 11 | 2 | (D) | 11 | (D) | 2 | (D) |
| Pierce | 167 | 1,324 | 12 | 5 | 164 | 1,320 | 84 | 1,622 |
| San Juan | 44 | (D) | 10 | (D) | 39 | 70 | 55 | 49 |
| Skagit | 134 | 17,880 | 25 | 4,250 | 119 | 13,630 | 107 | 19,456 |
| Skamania | 22 | 9 | 8 | 1 | 14 | 8 | - | - |
| Snohomish | 117 | 1,846 | 11 | (D) | 114 | (D) | 98 | 4,140 |
| Spokane | 131 | 1,613 | 38 | (D) | 117 | (D) | 80 | 1,528 |
| Stevens | 81 | 129 | 12 | 7 | 76 | 122 | 29 | 54 |
| Thurston | 119 | 233 | 18 | 16 | 111 | 218 | 64 | 390 |
| Wahkiakum | 5 | 5 | 2 | (D) | 4 | (D) | 5 | 4 |
| Walla Walla | 68 | 19,619 | 17 | 18,432 | 57 | 1,187 | 62 | 21,126 |
| Whatcom | 103 | 3,152 | 12 | 18 | 100 | 3,134 | 83 | 2,765 |
| Whitman | 13 | 11 | - | - | 13 | 11 | 13 | 2,443 |
| Yakima | 199 | 7,305 | 24 | 881 | 188 | 6,424 | 135 | 10,051 |
| **ARTICHOKES, EXCLUDING JERUSALEM** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 13 | 6 | - | - | 13 | 6 | 15 | (D) |
| **Counties** | | | | | | | | |
| Adams | - | - | - | - | - | - | 2 | (D) |
| Clallam | 1 | (D) | - | - | 1 | (D) | 4 | (Z) |
| Ferry | 1 | (D) | - | - | 1 | (D) | - | - |
| King | - | - | - | - | - | - | 1 | (D) |
| Lewis | - | - | - | - | - | - | 1 | (D) |
| San Juan | 1 | (D) | - | - | 1 | (D) | 3 | 1 |
| Snohomish | 3 | (Z) | - | - | 3 | (Z) | - | - |
| Thurston | 2 | (D) | - | - | 2 | (D) | - | - |
| Wahkiakum | 1 | (D) | - | - | 1 | (D) | - | - |
| Whatcom | 3 | (Z) | - | - | 3 | (Z) | 3 | (Z) |
| Whitman | - | - | - | - | - | - | 1 | (D) |
| Yakima | 1 | (D) | - | - | 1 | (D) | - | - |
| **ASPARAGUS, BEARING AGE** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 103 | 4,462 | 13 | 752 | 96 | 3,709 | 140 | 7,005 |
| **Counties** | | | | | | | | |
| Adams | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Benton | 3 | (D) | - | - | 3 | (D) | 5 | (D) |
| Chelan | 1 | (D) | - | - | 1 | (D) | - | - |
| Clallam | - | - | - | - | - | - | 2 | (D) |
| Ferry | 1 | (D) | - | - | 1 | (D) | - | - |
| Franklin | 18 | 2,068 | 1 | (D) | 18 | (D) | 30 | 3,274 |
| Grant | 4 | (D) | - | - | 4 | (D) | 6 | 792 |
| Grays Harbor | - | - | - | - | - | - | 1 | (D) |
| Jefferson | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| King | 5 | 1 | - | - | 5 | 1 | - | - |
| Kittitas | 1 | (D) | - | - | 1 | (D) | - | - |
| Klickitat | - | - | - | - | - | - | 2 | (D) |
| Mason | - | - | - | - | - | - | 4 | 1 |
| Okanogan | 2 | (D) | - | - | 2 | (D) | 4 | 1 |
| Pend Oreille | 3 | 1 | - | - | 3 | 1 | - | - |
| Pierce | 4 | (Z) | - | - | 4 | (Z) | - | - |
| San Juan | 1 | (D) | - | - | 1 | (D) | 3 | 1 |

--continued

Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **ASPARAGUS, BEARING AGE** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Skagit | 3 | 7 | - | - | 3 | 7 | 4 | 2 |
| Spokane | 3 | 3 | - | - | 3 | 3 | - | - |
| Stevens | 1 | (D) | - | - | 1 | (D) | - | - |
| Thurston | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Wahkiakum | - | - | - | - | - | - | 2 | (D) |
| Walla Walla | 5 | 72 | - | - | 5 | 72 | 12 | 313 |
| Whatcom | - | - | - | - | - | - | 2 | (D) |
| Whitman | - | - | - | - | - | - | 1 | (D) |
| Yakima | 44 | 1,915 | 12 | (D) | 37 | (D) | 58 | 2,540 |
| **BEANS, GREEN LIMA** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 15 | 2,510 | 10 | 2,215 | 6 | 296 | 17 | 2,466 |
| **Counties** | | | | | | | | |
| Adams | 1 | (D) | - | - | 1 | (D) | - | - |
| Benton | - | - | - | - | - | - | 1 | (D) |
| Cowlitz | - | - | - | - | - | - | 2 | (D) |
| Grant | 11 | (D) | 9 | (D) | 3 | 295 | 11 | (D) |
| Klickitat | 1 | (D) | 1 | (D) | - | - | - | - |
| Lincoln | 2 | (D) | - | - | 2 | (D) | - | - |
| Spokane | - | - | - | - | - | - | 1 | (D) |
| Yakima | - | - | - | - | - | - | 2 | (D) |
| **BEANS, SNAP (BUSH AND POLE)** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 965 | 5,297 | 120 | 3,739 | 883 | 1,558 | 453 | 3,346 |
| **Counties** | | | | | | | | |
| Adams | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Asotin | 2 | (D) | - | - | 2 | (D) | 5 | 1 |
| Benton | 14 | (D) | 7 | (D) | 8 | (D) | 5 | (D) |
| Chelan | 17 | 2 | 8 | 1 | 9 | 1 | 6 | 1 |
| Clallam | 23 | 7 | 1 | (D) | 23 | (D) | 18 | 10 |
| Clark | 80 | 25 | 7 | 3 | 76 | 23 | 31 | 12 |
| Cowlitz | 9 | 4 | 2 | (D) | 7 | (D) | 16 | 176 |
| Douglas | 4 | (Z) | - | - | 4 | (Z) | - | - |
| Ferry | 1 | (D) | 1 | (D) | - | - | - | - |
| Franklin | 7 | 975 | 4 | (D) | 3 | (D) | 2 | (D) |
| Grant | 17 | 1,099 | 11 | 859 | 6 | 240 | 12 | 935 |
| Grays Harbor | 11 | (D) | - | - | 11 | (D) | 11 | (D) |
| Island | 37 | 8 | 4 | 1 | 34 | 7 | 15 | 2 |
| Jefferson | 12 | 3 | - | - | 12 | 3 | 6 | 2 |
| King | 110 | 55 | 5 | 2 | 108 | 53 | 48 | 50 |
| Kitsap | 72 | 12 | 5 | 1 | 70 | 11 | 33 | 6 |
| Kittitas | 21 | 3 | - | - | 21 | 3 | 11 | 16 |
| Klickitat | 14 | 4 | 1 | (D) | 14 | (D) | 5 | (D) |
| Lewis | 25 | 15 | 6 | 1 | 24 | 14 | 27 | 299 |
| Lincoln | 2 | (D) | 1 | (D) | 1 | (D) | 1 | (D) |
| Mason | 22 | 5 | 3 | (Z) | 22 | 5 | 8 | 3 |
| Okanogan | 24 | 5 | - | - | 24 | 5 | 8 | 2 |
| Pacific | 6 | 1 | 2 | (D) | 4 | (D) | - | - |
| Pend Oreille | 8 | 1 | 2 | (D) | 6 | (D) | 1 | (D) |
| Pierce | 59 | 257 | 8 | 1 | 55 | 256 | 11 | (D) |
| San Juan | 14 | 3 | 1 | (D) | 13 | (D) | 22 | 3 |
| Skagit | 49 | 24 | 4 | 1 | 46 | 23 | 21 | 12 |
| Skamania | 6 | 2 | - | - | 6 | 2 | - | - |
| Snohomish | 46 | (D) | 4 | (D) | 43 | 14 | 20 | 13 |
| Spokane | 51 | 16 | 16 | 4 | 42 | 12 | 22 | 26 |
| Stevens | 41 | 9 | 9 | 2 | 34 | 7 | 8 | 10 |
| Thurston | 60 | 15 | 5 | 2 | 57 | 14 | 16 | 8 |
| Wahkiakum | 5 | 1 | 1 | (D) | 4 | (D) | 2 | (D) |
| Walla Walla | 10 | 2 | - | - | 10 | 2 | 2 | (D) |
| Whatcom | 45 | 27 | 2 | (D) | 43 | (D) | 36 | 578 |
| Whitman | 3 | (Z) | - | - | 3 | (Z) | 1 | (D) |
| Yakima | 37 | 153 | - | - | 37 | 153 | 21 | 97 |
| **BEETS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 207 | 140 | 5 | 1 | 202 | 139 | 145 | 88 |
| **Counties** | | | | | | | | |
| Adams | 2 | (D) | - | - | 2 | (D) | - | - |
| Asotin | - | - | - | - | - | - | 1 | (D) |
| Benton | - | - | - | - | - | - | 3 | (Z) |
| Chelan | 2 | (D) | - | - | 2 | (D) | 5 | 1 |
| Clallam | 1 | (D) | - | - | 1 | (D) | 4 | 1 |
| Clark | 12 | 1 | - | - | 12 | 1 | 12 | 3 |
| Cowlitz | 6 | 1 | - | - | 6 | 1 | 3 | (Z) |
| Douglas | 2 | (D) | - | - | 2 | (D) | - | - |
| Franklin | - | - | - | - | - | - | 1 | (D) |
| Grays Harbor | 4 | 1 | - | - | 4 | 1 | 3 | (Z) |
| Island | 12 | 2 | - | - | 12 | 2 | 5 | (D) |

--continued

Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **BEETS** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Jefferson | - | - | - | - | - | - | 2 | (D) |
| King | 28 | 18 | - | - | 28 | 18 | 21 | (D) |
| Kitsap | 3 | (D) | - | - | 3 | (D) | 5 | 1 |
| Kittitas | 6 | 1 | - | - | 6 | 1 | - | - |
| Lewis | 7 | 2 | - | - | 7 | 2 | 14 | 5 |
| Lincoln | - | - | - | - | - | - | 1 | (D) |
| Mason | 6 | 1 | - | - | 6 | 1 | 1 | (D) |
| Okanogan | 3 | (Z) | - | - | 3 | (Z) | 6 | 1 |
| Pend Oreille | 1 | (D) | - | - | 1 | (D) | - | - |
| Pierce | 12 | (D) | 4 | (D) | 8 | (D) | 4 | (Z) |
| San Juan | 6 | 1 | - | - | 6 | 1 | 12 | 2 |
| Skagit | 21 | 60 | - | - | 21 | 60 | 9 | 15 |
| Skamania | 7 | 1 | - | - | 7 | 1 | - | - |
| Snohomish | 16 | 11 | - | - | 16 | 11 | 10 | 4 |
| Spokane | 9 | 2 | - | - | 9 | 2 | 7 | 2 |
| Stevens | 1 | (D) | - | - | 1 | (D) | - | - |
| Thurston | 15 | 2 | - | - | 15 | 2 | 6 | 3 |
| Wahkiakum | 4 | (Z) | 1 | (D) | 3 | (D) | - | - |
| Walla Walla | 4 | (Z) | - | - | 4 | (Z) | - | - |
| Whatcom | 11 | 2 | - | - | 11 | 2 | 9 | 1 |
| Whitman | - | - | - | - | - | - | 1 | (D) |
| Yakima | 6 | 9 | - | - | 6 | 9 | - | - |
| **BROCCOLI** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 138 | 914 | 1 | (D) | 137 | (D) | 120 | 859 |
| **Counties** | | | | | | | | |
| Adams | 1 | (D) | - | - | 1 | (D) | - | - |
| Benton | 4 | (D) | 1 | (D) | 3 | (Z) | 2 | (D) |
| Chelan | 1 | (D) | - | - | 1 | (D) | 5 | 1 |
| Clallam | 1 | (D) | - | - | 1 | (D) | 4 | 1 |
| Clark | 13 | (D) | - | - | 13 | (D) | 13 | 3 |
| Cowlitz | 6 | 2 | - | - | 6 | 2 | 5 | 1 |
| Ferry | 1 | (D) | - | - | 1 | (D) | - | - |
| Grant | 1 | (D) | - | - | 1 | (D) | - | - |
| Grays Harbor | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Island | 8 | 1 | - | - | 8 | 1 | 4 | 1 |
| Jefferson | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| King | 10 | 1 | - | - | 10 | 1 | 4 | 1 |
| Kitsap | 6 | 1 | - | - | 6 | 1 | 14 | 3 |
| Kittitas | 2 | (D) | - | - | 2 | (D) | 5 | 1 |
| Lewis | 2 | (D) | - | - | 2 | (D) | 15 | 3 |
| Lincoln | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Mason | 4 | (Z) | - | - | 4 | (Z) | 1 | (D) |
| Okanogan | 4 | 1 | - | - | 4 | 1 | 5 | 1 |
| Pacific | 1 | (D) | - | - | 1 | (D) | - | - |
| Pend Oreille | 4 | (Z) | - | - | 4 | (Z) | 1 | (D) |
| Pierce | 11 | 4 | - | - | 11 | 4 | 2 | (D) |
| San Juan | 6 | 1 | - | - | 6 | 1 | 5 | 1 |
| Skagit | 13 | (D) | - | - | 13 | (D) | 4 | (D) |
| Snohomish | 6 | 1 | - | - | 6 | 1 | 3 | 7 |
| Spokane | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Thurston | 8 | 2 | - | - | 8 | 2 | 7 | 3 |
| Wahkiakum | 4 | (Z) | - | - | 4 | (Z) | 2 | (D) |
| Walla Walla | 2 | (D) | - | - | 2 | (D) | - | - |
| Whatcom | 9 | (D) | - | - | 9 | (D) | 11 | 6 |
| Whitman | - | - | - | - | - | - | 1 | (D) |
| Yakima | 3 | 1 | - | - | 3 | 1 | - | - |
| **BRUSSELS SPROUTS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 13 | 2 | - | - | 13 | 2 | 20 | 4 |
| **Counties** | | | | | | | | |
| Benton | - | - | - | - | - | - | 2 | (D) |
| Clark | 2 | (D) | - | - | 2 | (D) | 4 | 1 |
| Island | 3 | 1 | - | - | 3 | 1 | - | - |
| Jefferson | 1 | (D) | - | - | 1 | (D) | - | - |
| King | - | - | - | - | - | - | 4 | (Z) |
| Kitsap | - | - | - | - | - | - | 1 | (D) |
| Lewis | - | - | - | - | - | - | 2 | (D) |
| Okanogan | - | - | - | - | - | - | 2 | (D) |
| Pierce | 1 | (D) | - | - | 1 | (D) | - | - |
| San Juan | - | - | - | - | - | - | 2 | (D) |
| Thurston | 3 | (Z) | - | - | 3 | (Z) | 2 | (D) |
| Whatcom | 3 | (Z) | - | - | 3 | (Z) | 1 | (D) |
| **CABBAGE, CHINESE** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 34 | 71 | 4 | (D) | 34 | (D) | 31 | 132 |

--continued

Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **CABBAGE, CHINESE** - Con. | | | | | | | | |
| **Counties** | | | | | | | | |
| Benton | - | - | - | - | - | - | 1 | (D) |
| Chelan | 6 | 1 | - | - | 6 | 1 | 2 | (D) |
| Clark | 1 | (D) | - | - | 1 | (D) | 4 | 1 |
| Island | 2 | (D) | - | - | 2 | (D) | 4 | 1 |
| King | 7 | 13 | - | - | 7 | 13 | 5 | (D) |
| Klickitat | 4 | 2 | 1 | (D) | 4 | (D) | - | - |
| Lewis | - | - | - | - | - | - | 2 | (D) |
| Lincoln | - | - | - | - | - | - | 1 | (D) |
| Pierce | 4 | (D) | - | - | 4 | (D) | 5 | 92 |
| San Juan | - | - | - | - | - | - | 1 | (D) |
| Skagit | 1 | (D) | - | - | 1 | (D) | - | - |
| Snohomish | 3 | (D) | 3 | (D) | 3 | (D) | - | - |
| Spokane | 3 | (Z) | - | - | 3 | (Z) | - | - |
| Thurston | - | - | - | - | - | - | 5 | (D) |
| Walla Walla | 3 | 8 | - | - | 3 | 8 | - | - |
| Whitman | - | - | - | - | - | - | 1 | (D) |
| **CABBAGE, HEAD** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 119 | 201 | 5 | (D) | 114 | (D) | 96 | 266 |
| **Counties** | | | | | | | | |
| Adams | - | - | - | - | - | - | 2 | (D) |
| Asotin | - | - | - | - | - | - | 3 | (Z) |
| Benton | - | - | - | - | - | - | 3 | (Z) |
| Chelan | 5 | 1 | - | - | 5 | 1 | 3 | (Z) |
| Clallam | 1 | (D) | - | - | 1 | (D) | - | - |
| Clark | 14 | 5 | - | - | 14 | 5 | 9 | 2 |
| Columbia | - | - | - | - | - | - | 1 | (D) |
| Cowlitz | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Ferry | 1 | (D) | - | - | 1 | (D) | - | - |
| Grays Harbor | 2 | (D) | - | - | 2 | (D) | 3 | (D) |
| Island | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Jefferson | 2 | (D) | - | - | 2 | (D) | - | - |
| King | 14 | 9 | - | - | 14 | 9 | 5 | 1 |
| Kitsap | 5 | 1 | - | - | 5 | 1 | 7 | 1 |
| Kittitas | 2 | (D) | - | - | 2 | (D) | 6 | 1 |
| Klickitat | - | - | - | - | - | - | 1 | (D) |
| Lewis | 3 | (Z) | - | - | 3 | (Z) | 4 | 1 |
| Lincoln | - | - | - | - | - | - | 1 | (D) |
| Mason | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Okanogan | 8 | 1 | - | - | 8 | 1 | 2 | (D) |
| Pacific | 1 | (D) | - | - | 1 | (D) | - | - |
| Pend Oreille | 3 | (Z) | - | - | 3 | (Z) | 1 | (D) |
| Pierce | 7 | 92 | - | - | 7 | 92 | 5 | 151 |
| San Juan | 2 | (D) | 2 | (D) | - | - | 4 | 1 |
| Skagit | 9 | 62 | 1 | (D) | 8 | (D) | 6 | 52 |
| Snohomish | 8 | 1 | - | - | 8 | 1 | 1 | (D) |
| Spokane | 11 | 11 | 2 | (D) | 9 | (D) | 10 | 1 |
| Thurston | 3 | (Z) | - | - | 3 | (Z) | 3 | (D) |
| Walla Walla | 4 | 4 | - | - | 4 | 4 | 2 | (D) |
| Whatcom | 4 | 1 | - | - | 4 | 1 | 6 | 1 |
| Yakima | 5 | 9 | - | - | 5 | 9 | 4 | (D) |
| **CABBAGE, MUSTARD** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 1 | (D) | (X) | (X) | 1 | (D) | 4 | 1 |
| **Counties** | | | | | | | | |
| Clark | - | - | (X) | (X) | - | - | 2 | (D) |
| Lewis | - | - | (X) | (X) | - | - | 2 | (D) |
| San Juan | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| **CANTALOUPES AND MUSKMELONS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 41 | 96 | - | - | 41 | 96 | 54 | 94 |
| **Counties** | | | | | | | | |
| Asotin | - | - | - | - | - | - | 1 | (D) |
| Benton | 4 | 3 | - | - | 4 | 3 | 1 | (D) |
| Chelan | - | - | - | - | - | - | 2 | (D) |
| Clallam | - | - | - | - | - | - | 1 | (D) |
| Clark | - | - | - | - | - | - | 1 | (D) |
| Columbia | - | - | - | - | - | - | 2 | (D) |
| Franklin | 3 | (D) | - | - | 3 | (D) | 1 | (D) |
| Garfield | 1 | (D) | - | - | 1 | (D) | - | - |
| Grant | 1 | (D) | - | - | 1 | (D) | 5 | (D) |
| Kitsap | - | - | - | - | - | - | 9 | 1 |
| Kittitas | 1 | (D) | - | - | 1 | (D) | - | - |
| Klickitat | 4 | 1 | - | - | 4 | 1 | - | - |
| Lincoln | - | - | - | - | - | - | 1 | (D) |
| Okanogan | 2 | (D) | - | - | 2 | (D) | 7 | 4 |
| Pierce | - | - | - | - | - | - | 4 | (Z) |

--continued

Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **CANTALOUPES AND MUSKMELONS** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| San Juan | 2 | (D) | - | - | 2 | (D) | - | - |
| Skagit | - | - | - | - | - | - | 1 | (D) |
| Spokane | 1 | (D) | - | - | 1 | (D) | 4 | 1 |
| Stevens | 1 | (D) | - | - | 1 | (D) | - | - |
| Thurston | - | - | - | - | - | - | 3 | 1 |
| Walla Walla | 2 | (D) | - | - | 2 | (D) | - | - |
| Whatcom | - | - | - | - | - | - | 3 | (Z) |
| Yakima | 19 | 70 | - | - | 19 | 70 | 8 | 46 |
| **CARROTS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 824 | 7,749 | 66 | 5,406 | 780 | 2,343 | 302 | 6,414 |
| **Counties** | | | | | | | | |
| Adams | 1 | (D) | - | - | 1 | (D) | 3 | (D) |
| Asotin | - | - | - | - | - | - | 4 | (Z) |
| Benton | 6 | (D) | 2 | (D) | 5 | (D) | 4 | (D) |
| Chelan | 7 | 1 | - | - | 7 | 1 | 6 | 1 |
| Clallam | 14 | (D) | - | - | 14 | (D) | 17 | 28 |
| Clark | 47 | 19 | - | - | 47 | 19 | 16 | 2 |
| Columbia | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Cowlitz | 8 | 1 | - | - | 8 | 1 | 10 | (D) |
| Ferry | 2 | (D) | 1 | (D) | 1 | (D) | 2 | (D) |
| Franklin | 10 | (D) | 2 | (D) | 8 | (D) | 3 | (D) |
| Grant | 10 | 1,758 | 5 | (D) | 6 | (D) | 8 | 1,507 |
| Grays Harbor | 9 | 4 | - | - | 9 | 4 | 3 | 1 |
| Island | 28 | 5 | 3 | (D) | 25 | (D) | 13 | 2 |
| Jefferson | 14 | 4 | - | - | 14 | 4 | 7 | 2 |
| King | 108 | 48 | 9 | (D) | 106 | (D) | 31 | 10 |
| Kitsap | 46 | 8 | - | - | 46 | 8 | 23 | 5 |
| Kittitas | 15 | 3 | 3 | (Z) | 12 | 3 | 7 | 2 |
| Klickitat | 19 | 2 | - | - | 19 | 2 | 2 | (D) |
| Lewis | 19 | 10 | - | - | 19 | 10 | 18 | 7 |
| Lincoln | 2 | (D) | 2 | (D) | - | - | 1 | (D) |
| Mason | 15 | 3 | - | - | 15 | 3 | 6 | 1 |
| Okanogan | 35 | (D) | 1 | (D) | 34 | (D) | 7 | 2 |
| Pacific | 7 | 1 | 2 | (D) | 5 | (D) | 2 | (D) |
| Pend Oreille | 8 | 1 | 2 | (D) | 6 | (D) | 1 | (D) |
| Pierce | 55 | 12 | - | - | 55 | 12 | 5 | 1 |
| San Juan | 20 | 4 | 1 | (D) | 19 | (D) | 10 | 1 |
| Skagit | 46 | 22 | 3 | (D) | 43 | (D) | 8 | 12 |
| Skamania | 2 | (D) | - | - | 2 | (D) | - | - |
| Snohomish | 55 | (D) | 1 | (D) | 55 | (D) | 16 | 9 |
| Spokane | 63 | 12 | 19 | (D) | 54 | (D) | 10 | 14 |
| Stevens | 33 | 5 | 6 | (D) | 27 | (D) | 5 | 1 |
| Thurston | 49 | 11 | - | - | 49 | 11 | 14 | 7 |
| Wahkiakum | 4 | (Z) | - | - | 4 | (Z) | 2 | (D) |
| Walla Walla | 10 | 2 | - | - | 10 | 2 | 7 | 1 |
| Whatcom | 43 | 14 | 4 | (D) | 41 | (D) | 26 | 10 |
| Whitman | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Yakima | 10 | 4 | - | - | 10 | 4 | 3 | (Z) |
| **CAULIFLOWER** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 42 | 381 | 5 | (D) | 39 | (D) | 29 | 310 |
| **Counties** | | | | | | | | |
| Clallam | 2 | (D) | - | - | 2 | (D) | 4 | (D) |
| Clark | 2 | (D) | - | - | 2 | (D) | 4 | 1 |
| Cowlitz | 4 | 1 | - | - | 4 | 1 | - | - |
| King | 8 | 1 | - | - | 8 | 1 | 1 | (D) |
| Kitsap | 2 | (D) | - | - | 2 | (D) | 6 | 2 |
| Lewis | 1 | (D) | - | - | 1 | (D) | 4 | 1 |
| Lincoln | - | - | - | - | - | - | 1 | (D) |
| Pend Oreille | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Pierce | 2 | (D) | - | - | 2 | (D) | - | - |
| Skagit | 5 | (D) | 2 | (D) | 5 | (D) | 2 | (D) |
| Snohomish | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Spokane | 3 | (D) | 2 | (D) | 1 | (D) | - | - |
| Thurston | 3 | (Z) | - | - | 3 | (Z) | 3 | (D) |
| Wahkiakum | 1 | (D) | 1 | (D) | - | - | - | - |
| Whatcom | 5 | (D) | - | - | 5 | (D) | 2 | (D) |
| Yakima | 1 | (D) | - | - | 1 | (D) | - | - |
| **CELERY** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 16 | 19 | - | - | 16 | 19 | 11 | 17 |
| **Counties** | | | | | | | | |
| Clallam | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Clark | - | - | - | - | - | - | 2 | (D) |
| Island | 1 | (D) | - | - | 1 | (D) | - | - |
| King | 4 | (Z) | - | - | 4 | (Z) | - | - |

--continued

Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **CELERY** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Lewis | - | - | - | - | - | - | 2 | (D) |
| Lincoln | - | - | - | - | - | - | 1 | (D) |
| Pierce | 1 | (D) | - | - | 1 | (D) | - | - |
| Skagit | 2 | (D) | - | - | 2 | (D) | - | - |
| Snohomish | 1 | (D) | - | - | 1 | (D) | - | - |
| Spokane | 3 | (Z) | - | - | 3 | (Z) | - | - |
| Thurston | - | - | - | - | - | - | 5 | 2 |
| Whatcom | 3 | (Z) | - | - | 3 | (Z) | - | - |
| **CHICORY** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 1 | (D) | (X) | (X) | 1 | (D) | 5 | 1 |
| **Counties** | | | | | | | | |
| Clark | - | - | (X) | (X) | - | - | 2 | (D) |
| Jefferson | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| King | - | - | (X) | (X) | - | - | 1 | (D) |
| Lewis | - | - | (X) | (X) | - | - | 2 | (D) |
| **COLLARDS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 7 | 2 | - | - | 7 | 2 | 5 | 1 |
| **Counties** | | | | | | | | |
| Clark | - | - | - | - | - | - | 2 | (D) |
| King | - | - | - | - | - | - | 1 | (D) |
| Lewis | - | - | - | - | - | - | 2 | (D) |
| Snohomish | 2 | (D) | - | - | 2 | (D) | - | - |
| Spokane | 2 | (D) | - | - | 2 | (D) | - | - |
| Wahkiakum | 1 | (D) | - | - | 1 | (D) | - | - |
| Whatcom | 2 | (D) | - | - | 2 | (D) | - | - |
| **CUCUMBERS AND PICKLES** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 785 | 1,078 | 53 | 271 | 752 | 807 | 345 | 2,072 |
| **Counties** | | | | | | | | |
| Adams | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Asotin | - | - | - | - | - | - | 3 | 1 |
| Benton | 8 | 3 | - | - | 8 | 3 | 4 | (D) |
| Chelan | 7 | 1 | - | - | 7 | 1 | 6 | 1 |
| Clallam | 8 | 3 | 1 | (D) | 8 | (D) | 4 | 1 |
| Clark | 64 | 20 | 2 | (D) | 64 | (D) | 28 | 10 |
| Columbia | 2 | (D) | - | - | 2 | (D) | - | - |
| Cowlitz | 5 | 2 | - | - | 5 | 2 | 8 | 1 |
| Douglas | 7 | 1 | - | - | 7 | 1 | 1 | (D) |
| Ferry | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Franklin | 13 | 8 | - | - | 13 | 8 | 5 | (D) |
| Garfield | 1 | (D) | - | - | 1 | (D) | - | - |
| Grant | 6 | 1 | - | - | 6 | 1 | 4 | 1 |
| Grays Harbor | 8 | 4 | - | - | 8 | 4 | 11 | 6 |
| Island | 23 | 4 | 2 | (D) | 21 | (D) | 6 | 1 |
| Jefferson | 9 | 3 | 2 | (D) | 9 | (D) | 3 | 1 |
| King | 79 | 95 | 6 | 2 | 74 | 93 | 30 | (D) |
| Kitsap | 48 | 6 | 1 | (D) | 47 | (D) | 14 | 4 |
| Kittitas | 14 | 3 | - | - | 14 | 3 | 8 | 2 |
| Klickitat | 10 | 1 | - | - | 10 | 1 | 5 | 3 |
| Lewis | 13 | 8 | 1 | (D) | 12 | (D) | 10 | 8 |
| Lincoln | - | - | - | - | - | - | 1 | (D) |
| Mason | 14 | 2 | - | - | 14 | 2 | 12 | 4 |
| Okanogan | 25 | 4 | 3 | (Z) | 25 | 3 | 10 | 1 |
| Pacific | 4 | 1 | - | - | 4 | 1 | 1 | (D) |
| Pend Oreille | 6 | 1 | 2 | (D) | 4 | (D) | 1 | (D) |
| Pierce | 50 | 65 | 4 | (Z) | 46 | 65 | 10 | (D) |
| San Juan | 16 | 2 | 2 | (D) | 14 | (D) | 16 | 2 |
| Skagit | 47 | 588 | 8 | 257 | 43 | 332 | 27 | 1,516 |
| Skamania | 5 | 2 | - | - | 5 | 2 | - | - |
| Snohomish | 38 | 25 | 3 | (D) | 38 | (D) | 18 | 84 |
| Spokane | 58 | 20 | 5 | 1 | 53 | 20 | 23 | 8 |
| Stevens | 28 | 8 | 4 | 1 | 26 | 6 | 4 | (Z) |
| Thurston | 50 | 17 | 5 | 4 | 47 | 12 | 16 | 8 |
| Wahkiakum | 3 | (Z) | - | - | 3 | (Z) | 2 | (D) |
| Walla Walla | 11 | 3 | - | - | 11 | 3 | 5 | 1 |
| Whatcom | 42 | 13 | 2 | (D) | 40 | (D) | 18 | 6 |
| Whitman | 5 | 2 | - | - | 5 | 2 | 1 | (D) |
| Yakima | 55 | 165 | - | - | 55 | 165 | 26 | 252 |
| **DAIKON** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | - | - | - | - | - | - | 3 | (Z) |

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Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **DAIKON** - Con. | | | | | | | | |
| **Counties** | | | | | | | | |
| Clark | - | - | - | - | - | - | 2 | (D) |
| Lewis | - | - | - | - | - | - | 1 | (D) |
| **EGGPLANT** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 41 | 28 | 2 | (D) | 39 | (D) | 60 | 26 |
| **Counties** | | | | | | | | |
| Adams | - | - | - | - | - | - | 2 | (D) |
| Benton | 2 | (D) | - | - | 2 | (D) | 5 | 1 |
| Chelan | 1 | (D) | - | - | 1 | (D) | 5 | 1 |
| Clark | 5 | 1 | - | - | 5 | 1 | 5 | 1 |
| Columbia | 2 | (D) | - | - | 2 | (D) | - | - |
| Cowlitz | - | - | - | - | - | - | 2 | (D) |
| Franklin | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Grant | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Island | 3 | 1 | 2 | (D) | 1 | (D) | - | - |
| King | - | - | - | - | - | - | 6 | 1 |
| Kitsap | - | - | - | - | - | - | 1 | (D) |
| Klickitat | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Lewis | - | - | - | - | - | - | 2 | (D) |
| Mason | - | - | - | - | - | - | 2 | (D) |
| Okanogan | - | - | - | - | - | - | 5 | 1 |
| Skagit | 1 | (D) | - | - | 1 | (D) | 3 | (Z) |
| Skamania | 4 | (Z) | - | - | 4 | (Z) | - | - |
| Spokane | 8 | 5 | - | - | 8 | 5 | 3 | 1 |
| Stevens | 1 | (D) | - | - | 1 | (D) | - | - |
| Thurston | - | - | - | - | - | - | 1 | (D) |
| Walla Walla | 4 | 1 | - | - | 4 | 1 | 5 | 1 |
| Whatcom | 3 | (Z) | - | - | 3 | (Z) | 4 | (Z) |
| Yakima | 4 | 7 | - | - | 4 | 7 | 6 | 9 |
| **ESCAROLE AND ENDIVE** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | - | - | (X) | (X) | - | - | 12 | 1 |
| **Counties** | | | | | | | | |
| Chelan | - | - | (X) | (X) | - | - | 2 | (D) |
| Clark | - | - | (X) | (X) | - | - | 2 | (D) |
| King | - | - | (X) | (X) | - | - | 1 | (D) |
| Lewis | - | - | (X) | (X) | - | - | 2 | (D) |
| Walla Walla | - | - | (X) | (X) | - | - | 5 | 1 |
| **GARLIC** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 203 | 525 | 17 | (D) | 190 | (D) | 184 | (D) |
| **Counties** | | | | | | | | |
| Adams | 3 | (D) | - | - | 3 | (D) | 1 | (D) |
| Benton | 3 | (D) | 1 | (D) | 3 | (D) | 2 | (D) |
| Chelan | 7 | 3 | - | - | 7 | 3 | 3 | (Z) |
| Clallam | 10 | (D) | - | - | 10 | (D) | 9 | 8 |
| Clark | 15 | (D) | 3 | (D) | 12 | 3 | 6 | 3 |
| Cowlitz | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Douglas | - | - | - | - | - | - | 2 | (D) |
| Grant | 1 | (D) | - | - | 1 | (D) | - | - |
| Grays Harbor | - | - | - | - | - | - | 1 | (D) |
| Island | 4 | 1 | 2 | (D) | 2 | (D) | 1 | (D) |
| Jefferson | 2 | (D) | - | - | 2 | (D) | 6 | 5 |
| King | 7 | 1 | - | - | 7 | 1 | 10 | 3 |
| Kitsap | 6 | (D) | - | - | 6 | (D) | 8 | 1 |
| Kittitas | 5 | 1 | - | - | 5 | 1 | 7 | 1 |
| Klickitat | 5 | 1 | - | - | 5 | 1 | 2 | (D) |
| Lewis | 3 | (D) | 1 | (D) | 3 | (D) | 3 | (D) |
| Mason | 2 | (D) | - | - | 2 | (D) | 3 | (Z) |
| Okanogan | 18 | 6 | 1 | (D) | 17 | (D) | 18 | 13 |
| Pend Oreille | - | - | - | - | - | - | 2 | (D) |
| Pierce | 14 | 5 | - | - | 14 | 5 | 11 | 4 |
| San Juan | 3 | 2 | - | - | 3 | 2 | 5 | 1 |
| Skagit | 9 | 2 | - | - | 9 | 2 | 4 | 1 |
| Skamania | 2 | (D) | - | - | 2 | (D) | - | - |
| Snohomish | 12 | 4 | - | - | 12 | 4 | 9 | 5 |
| Spokane | 12 | 4 | 5 | 2 | 9 | 2 | 18 | 6 |
| Stevens | 11 | 3 | - | - | 11 | 3 | 10 | 5 |
| Thurston | 21 | 8 | 3 | 3 | 18 | 5 | 13 | 5 |
| Wahkiakum | 1 | (D) | 1 | (D) | - | - | 2 | (D) |
| Walla Walla | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Whatcom | 6 | 4 | - | - | 6 | 4 | 15 | 7 |
| Whitman | 1 | (D) | - | - | 1 | (D) | 3 | 1 |
| Yakima | 17 | 10 | - | - | 17 | 10 | 7 | 8 |

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Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **GINSENG** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 6 | 6 | 1 | (D) | 5 | (D) | 5 | 1 |
| **Counties** | | | | | | | | |
| Chelan | - | - | - | - | - | - | 1 | (D) |
| Clark | 6 | 6 | 1 | (D) | 5 | (D) | - | - |
| King | - | - | - | - | - | - | 4 | (D) |
| **HERBS, FRESH CUT** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 96 | 44 | (X) | (X) | 96 | 44 | 106 | 353 |
| **Counties** | | | | | | | | |
| Benton | - | - | (X) | (X) | - | - | 5 | 1 |
| Chelan | 2 | (D) | (X) | (X) | 2 | (D) | 2 | (D) |
| Clallam | - | - | (X) | (X) | - | - | 1 | (D) |
| Clark | 8 | 1 | (X) | (X) | 8 | 1 | 7 | 2 |
| Columbia | 2 | (D) | (X) | (X) | 2 | (D) | - | - |
| Cowlitz | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Grant | 1 | (D) | (X) | (X) | 1 | (D) | 2 | (D) |
| Island | 2 | (D) | (X) | (X) | 2 | (D) | - | - |
| Jefferson | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| King | 16 | 2 | (X) | (X) | 16 | 2 | 17 | (D) |
| Kitsap | 4 | (D) | (X) | (X) | 4 | (D) | 14 | 5 |
| Lewis | 4 | 6 | (X) | (X) | 4 | 6 | 2 | (D) |
| Mason | - | - | (X) | (X) | - | - | 6 | 4 |
| Okanogan | 3 | 8 | (X) | (X) | 3 | 8 | 10 | 17 |
| Pend Oreille | - | - | (X) | (X) | - | - | 1 | (D) |
| Pierce | 3 | (D) | (X) | (X) | 3 | (D) | 1 | (D) |
| Skagit | 7 | 5 | (X) | (X) | 7 | 5 | 3 | (Z) |
| Snohomish | 9 | 4 | (X) | (X) | 9 | 4 | 5 | 2 |
| Spokane | 3 | 1 | (X) | (X) | 3 | 1 | 5 | 1 |
| Stevens | 2 | (D) | (X) | (X) | 2 | (D) | 4 | 1 |
| Thurston | 11 | 2 | (X) | (X) | 11 | 2 | 9 | 3 |
| Walla Walla | 2 | (D) | (X) | (X) | 2 | (D) | 5 | 1 |
| Whatcom | 1 | (D) | (X) | (X) | 1 | (D) | 6 | 47 |
| Yakima | 14 | 7 | (X) | (X) | 14 | 7 | 1 | (D) |
| **HONEYDEW MELONS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 6 | (D) | (X) | (X) | 6 | (D) | 12 | (D) |
| **Counties** | | | | | | | | |
| Chelan | - | - | (X) | (X) | - | - | 2 | (D) |
| Douglas | - | - | (X) | (X) | - | - | 1 | (D) |
| Franklin | 3 | (D) | (X) | (X) | 3 | (D) | - | - |
| Grant | 1 | (D) | (X) | (X) | 1 | (D) | 1 | (D) |
| Kittitas | - | - | (X) | (X) | - | - | 1 | (D) |
| Pierce | 2 | (D) | (X) | (X) | 2 | (D) | - | - |
| Walla Walla | - | - | (X) | (X) | - | - | 5 | 1 |
| Yakima | - | - | (X) | (X) | - | - | 2 | (D) |
| **HORSERADISH** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 3 | 1 | - | - | 3 | 1 | 4 | 1 |
| **Counties** | | | | | | | | |
| King | - | - | - | - | - | - | 4 | 1 |
| Lewis | 1 | (D) | - | - | 1 | (D) | - | - |
| Snohomish | 2 | (D) | - | - | 2 | (D) | - | - |
| **KALE** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 113 | 53 | 6 | (D) | 107 | (D) | 56 | 57 |
| **Counties** | | | | | | | | |
| Adams | - | - | - | - | - | - | 1 | (D) |
| Benton | 1 | (D) | 1 | (D) | - | - | 1 | (D) |
| Chelan | - | - | - | - | - | - | 2 | (D) |
| Clallam | - | - | - | - | - | - | 1 | (D) |
| Clark | 6 | 2 | - | - | 6 | 2 | 2 | (D) |
| Douglas | - | - | - | - | - | - | 1 | (D) |
| Grays Harbor | 1 | (D) | - | - | 1 | (D) | 3 | (Z) |
| Island | 8 | 1 | 2 | (D) | 6 | (D) | - | - |
| King | 22 | (D) | - | - | 22 | (D) | 14 | 5 |
| Kitsap | 10 | (D) | - | - | 10 | (D) | 3 | 1 |
| Kittitas | 2 | (D) | - | - | 2 | (D) | - | - |
| Lewis | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Okanogan | 2 | (D) | - | - | 2 | (D) | - | - |
| Pend Oreille | - | - | - | - | - | - | 1 | (D) |
| Pierce | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| San Juan | 8 | 2 | 2 | (D) | 6 | (D) | 8 | 1 |

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Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **KALE** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Skagit | 16 | 4 | - | - | 16 | 4 | 3 | 1 |
| Skamania | 3 | (Z) | - | - | 3 | (Z) | - | - |
| Snohomish | 7 | 3 | - | - | 7 | 3 | 1 | (D) |
| Spokane | 2 | (D) | - | - | 2 | (D) | - | - |
| Thurston | 8 | 4 | - | - | 8 | 4 | 6 | 8 |
| Wahkiakum | 1 | (D) | 1 | (D) | - | - | - | - |
| Walla Walla | 2 | (D) | - | - | 2 | (D) | 5 | 1 |
| Whatcom | 5 | 1 | - | - | 5 | 1 | 1 | (D) |
| Yakima | 6 | 2 | - | - | 6 | 2 | - | - |
| **LETTUCE, ALL** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 222 | 206 | (X) | (X) | 222 | 206 | 156 | 261 |
| **Counties** | | | | | | | | |
| Benton | - | - | (X) | (X) | - | - | 1 | (D) |
| Chelan | 4 | 1 | (X) | (X) | 4 | 1 | 3 | 1 |
| Clallam | - | - | (X) | (X) | - | - | 7 | 2 |
| Clark | 20 | 7 | (X) | (X) | 20 | 7 | 9 | 7 |
| Columbia | - | - | (X) | (X) | - | - | 2 | (D) |
| Cowlitz | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Franklin | 1 | (D) | (X) | (X) | 1 | (D) | 1 | (D) |
| Grant | - | - | (X) | (X) | - | - | 3 | (Z) |
| Grays Harbor | 3 | 4 | (X) | (X) | 3 | 4 | 4 | 1 |
| Island | 17 | 2 | (X) | (X) | 17 | 2 | 7 | 1 |
| Jefferson | - | - | (X) | (X) | - | - | 2 | (D) |
| King | 16 | (D) | (X) | (X) | 16 | (D) | 21 | 5 |
| Kitsap | 14 | 3 | (X) | (X) | 14 | 3 | 21 | 6 |
| Kittitas | 3 | 1 | (X) | (X) | 3 | 1 | 5 | 1 |
| Klickitat | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Lewis | 3 | (Z) | (X) | (X) | 3 | (Z) | 8 | 11 |
| Mason | - | - | (X) | (X) | - | - | 5 | 1 |
| Okanogan | 11 | 14 | (X) | (X) | 11 | 14 | 1 | (D) |
| Pacific | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Pend Oreille | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Pierce | 17 | (D) | (X) | (X) | 17 | (D) | 6 | 156 |
| San Juan | 9 | 12 | (X) | (X) | 9 | 12 | 8 | 1 |
| Skagit | 22 | 24 | (X) | (X) | 22 | 24 | 6 | 5 |
| Skamania | 7 | 1 | (X) | (X) | 7 | 1 | - | - |
| Snohomish | 24 | 15 | (X) | (X) | 24 | 15 | 12 | 32 |
| Spokane | 13 | 4 | (X) | (X) | 13 | 4 | 2 | (D) |
| Stevens | 7 | 1 | (X) | (X) | 7 | 1 | 1 | (D) |
| Thurston | 4 | 2 | (X) | (X) | 4 | 2 | 11 | (D) |
| Wahkiakum | 3 | (Z) | (X) | (X) | 3 | (Z) | 2 | (D) |
| Walla Walla | 1 | (D) | (X) | (X) | 1 | (D) | 1 | (D) |
| Whatcom | 10 | 3 | (X) | (X) | 10 | 3 | 7 | 4 |
| Yakima | 9 | 11 | (X) | (X) | 9 | 11 | - | - |
| **LETTUCE, HEAD** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 61 | 54 | (X) | (X) | 61 | 54 | 47 | 63 |
| **Counties** | | | | | | | | |
| Chelan | 1 | (D) | (X) | (X) | 1 | (D) | 2 | (D) |
| Clark | 9 | 6 | (X) | (X) | 9 | 6 | 4 | 5 |
| Grays Harbor | 2 | (D) | (X) | (X) | 2 | (D) | - | - |
| Island | 6 | 1 | (X) | (X) | 6 | 1 | - | - |
| King | 5 | 3 | (X) | (X) | 5 | 3 | 13 | 3 |
| Kitsap | 6 | 1 | (X) | (X) | 6 | 1 | 6 | 2 |
| Kittitas | 1 | (D) | (X) | (X) | 1 | (D) | 5 | 1 |
| Lewis | - | - | (X) | (X) | - | - | 1 | (D) |
| Mason | - | - | (X) | (X) | - | - | 2 | (D) |
| Okanogan | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Pierce | 3 | (D) | (X) | (X) | 3 | (D) | 1 | (D) |
| San Juan | 3 | 1 | (X) | (X) | 3 | 1 | 4 | (Z) |
| Skagit | 7 | (D) | (X) | (X) | 7 | (D) | 2 | (D) |
| Snohomish | 5 | 1 | (X) | (X) | 5 | 1 | 5 | (D) |
| Stevens | 3 | (D) | (X) | (X) | 3 | (D) | - | - |
| Thurston | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Wahkiakum | - | - | (X) | (X) | - | - | 2 | (D) |
| Whatcom | 3 | (Z) | (X) | (X) | 3 | (Z) | - | - |
| Yakima | 5 | 3 | (X) | (X) | 5 | 3 | - | - |
| **LETTUCE, LEAF** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 138 | 124 | (X) | (X) | 138 | 124 | 104 | 161 |
| **Counties** | | | | | | | | |
| Chelan | 2 | (D) | (X) | (X) | 2 | (D) | - | - |
| Clallam | - | - | (X) | (X) | - | - | 7 | (D) |
| Clark | 9 | (D) | (X) | (X) | 9 | (D) | 7 | (D) |
| Columbia | - | - | (X) | (X) | - | - | 2 | (D) |
| Cowlitz | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Franklin | 1 | (D) | (X) | (X) | 1 | (D) | 1 | (D) |

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Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **LETTUCE, LEAF** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Grant | - | - | (X) | (X) | - | - | 3 | (Z) |
| Grays Harbor | 1 | (D) | (X) | (X) | 1 | (D) | 3 | (D) |
| Island | 7 | 1 | (X) | (X) | 7 | 1 | 4 | 1 |
| Jefferson | - | - | (X) | (X) | - | - | 2 | (D) |
| King | 9 | 7 | (X) | (X) | 9 | 7 | 8 | 2 |
| Kitsap | 8 | 2 | (X) | (X) | 8 | 2 | 14 | 4 |
| Klickitat | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Lewis | 3 | (Z) | (X) | (X) | 3 | (Z) | 8 | (D) |
| Mason | - | - | (X) | (X) | - | - | 3 | (D) |
| Okanogan | 6 | 12 | (X) | (X) | 6 | 12 | 1 | (D) |
| Pacific | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Pend Oreille | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Pierce | 13 | (D) | (X) | (X) | 13 | (D) | 5 | 100 |
| San Juan | 6 | 11 | (X) | (X) | 6 | 11 | 4 | (Z) |
| Skagit | 16 | 11 | (X) | (X) | 16 | 11 | 4 | (D) |
| Skamania | 7 | 1 | (X) | (X) | 7 | 1 | - | - |
| Snohomish | 12 | 9 | (X) | (X) | 12 | 9 | 7 | (D) |
| Spokane | 12 | (D) | (X) | (X) | 12 | (D) | 1 | (D) |
| Stevens | 4 | (Z) | (X) | (X) | 4 | (Z) | 1 | (D) |
| Thurston | 3 | (D) | (X) | (X) | 3 | (D) | 11 | (D) |
| Wahkiakum | 3 | (Z) | (X) | (X) | 3 | (Z) | - | - |
| Walla Walla | 1 | (D) | (X) | (X) | 1 | (D) | 1 | (D) |
| Whatcom | 7 | 2 | (X) | (X) | 7 | 2 | 7 | 4 |
| Yakima | 4 | 8 | (X) | (X) | 4 | 8 | - | - |
| **LETTUCE, ROMAINE** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 42 | 29 | (X) | (X) | 42 | 29 | 32 | 37 |
| **Counties** | | | | | | | | |
| Benton | - | - | (X) | (X) | - | - | 1 | (D) |
| Chelan | 1 | (D) | (X) | (X) | 1 | (D) | 3 | (D) |
| Clallam | - | - | (X) | (X) | - | - | 1 | (D) |
| Clark | 2 | (D) | (X) | (X) | 2 | (D) | 2 | (D) |
| Cowlitz | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Grays Harbor | 2 | (D) | (X) | (X) | 2 | (D) | 1 | (D) |
| Island | 4 | (Z) | (X) | (X) | 4 | (Z) | 3 | (Z) |
| King | 2 | (D) | (X) | (X) | 2 | (D) | 5 | 1 |
| Kitsap | - | - | (X) | (X) | - | - | 3 | (Z) |
| Kittitas | 2 | (D) | (X) | (X) | 2 | (D) | - | - |
| Lewis | - | - | (X) | (X) | - | - | 2 | (D) |
| Okanogan | 4 | (D) | (X) | (X) | 4 | (D) | - | - |
| Pierce | 7 | (D) | (X) | (X) | 7 | (D) | 5 | (D) |
| Skagit | 5 | (D) | (X) | (X) | 5 | (D) | 1 | (D) |
| Snohomish | 9 | 4 | (X) | (X) | 9 | 4 | 1 | (D) |
| Spokane | 2 | (D) | (X) | (X) | 2 | (D) | 1 | (D) |
| Stevens | 1 | (D) | (X) | (X) | 1 | (D) | - | - |
| Thurston | - | - | (X) | (X) | - | - | 3 | (D) |
| **MUSTARD GREENS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 14 | 2 | - | - | 14 | 2 | 19 | 3 |
| **Counties** | | | | | | | | |
| Chelan | - | - | - | - | - | - | 2 | (D) |
| Clark | - | - | - | - | - | - | 2 | (D) |
| Island | 2 | (D) | - | - | 2 | (D) | 3 | (Z) |
| King | 6 | 1 | - | - | 6 | 1 | 2 | (D) |
| Kitsap | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Lewis | - | - | - | - | - | - | 3 | 1 |
| Mason | - | - | - | - | - | - | 1 | (D) |
| San Juan | - | - | - | - | - | - | 3 | (Z) |
| Snohomish | 2 | (D) | - | - | 2 | (D) | - | - |
| Spokane | - | - | - | - | - | - | 1 | (D) |
| Thurston | - | - | - | - | - | - | 1 | (D) |
| Walla Walla | 3 | 1 | - | - | 3 | 1 | - | - |
| **OKRA** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 4 | 8 | - | - | 4 | 8 | 4 | 3 |
| **Counties** | | | | | | | | |
| Skagit | - | - | - | - | - | - | 1 | (D) |
| Whatcom | 2 | (D) | - | - | 2 | (D) | - | - |
| Yakima | 2 | (D) | - | - | 2 | (D) | 3 | (D) |
| **ONIONS, DRY** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 734 | 22,010 | 57 | 6,700 | 694 | 15,310 | 381 | 24,081 |

--continued

Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **ONIONS, DRY** - Con. | | | | | | | | |
| **Counties** | | | | | | | | |
| Adams | 10 | (D) | 2 | (D) | 8 | 606 | 10 | (D) |
| Benton | 13 | 11,087 | 4 | 4,302 | 12 | 6,785 | 13 | 10,308 |
| Chelan | 14 | 2 | 6 | 1 | 8 | 1 | 6 | 1 |
| Clallam | 9 | 2 | - | - | 9 | 2 | 25 | 7 |
| Clark | 38 | 7 | 1 | (D) | 38 | (D) | 16 | 2 |
| Columbia | - | - | - | - | - | - | 1 | (D) |
| Cowlitz | 3 | (Z) | - | - | 3 | (Z) | 4 | (Z) |
| Douglas | 7 | 1 | - | - | 7 | 1 | - | - |
| Ferry | 3 | (D) | 2 | (D) | 2 | (D) | 2 | (D) |
| Franklin | 17 | 3,238 | 6 | 1,747 | 11 | 1,491 | 23 | 3,484 |
| Grant | 20 | 5,491 | 5 | 466 | 18 | 5,026 | 44 | 8,157 |
| Grays Harbor | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Island | 23 | 4 | 2 | (D) | 21 | (D) | 14 | 2 |
| Jefferson | 12 | 4 | - | - | 12 | 4 | 4 | 1 |
| King | 63 | (D) | - | - | 63 | (D) | 16 | 2 |
| Kitsap | 23 | 7 | - | - | 23 | 7 | 21 | 4 |
| Kittitas | 25 | 4 | - | - | 25 | 4 | 9 | 1 |
| Klickitat | 16 | 2 | - | - | 16 | 2 | 3 | (Z) |
| Lewis | 14 | 8 | - | - | 14 | 8 | 4 | 5 |
| Mason | 11 | 2 | - | - | 11 | 2 | 3 | (Z) |
| Okanogan | 43 | 9 | 2 | (D) | 42 | (D) | 22 | 6 |
| Pacific | 5 | 1 | 2 | (D) | 3 | (D) | - | - |
| Pend Oreille | 6 | 1 | 2 | (D) | 4 | (D) | 1 | (D) |
| Pierce | 50 | 7 | - | - | 50 | 7 | 6 | 1 |
| San Juan | 12 | 3 | - | - | 12 | 3 | 5 | 1 |
| Skagit | 36 | 10 | 3 | (Z) | 33 | 10 | 19 | 9 |
| Snohomish | 29 | 8 | - | - | 29 | 8 | 14 | 9 |
| Spokane | 57 | 11 | 11 | 3 | 48 | 8 | 17 | 5 |
| Stevens | 25 | 7 | - | - | 25 | 7 | 7 | 2 |
| Thurston | 44 | 9 | - | - | 44 | 9 | 8 | 6 |
| Wahkiakum | 4 | (Z) | 1 | (D) | 3 | (D) | 2 | (D) |
| Walla Walla | 26 | 739 | 5 | 116 | 26 | 622 | 23 | 800 |
| Whatcom | 30 | 5 | 3 | 1 | 28 | 4 | 22 | 4 |
| Whitman | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Yakima | 42 | (D) | - | - | 42 | (D) | 14 | (D) |
| **ONIONS, GREEN** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 47 | 99 | 1 | (D) | 46 | (D) | 39 | 171 |
| **Counties** | | | | | | | | |
| Asotin | - | - | - | - | - | - | 1 | (D) |
| Clallam | 3 | 2 | - | - | 3 | 2 | - | - |
| Clark | 4 | 1 | - | - | 4 | 1 | 2 | (D) |
| Cowlitz | 1 | (D) | - | - | 1 | (D) | - | - |
| Douglas | 2 | (D) | - | - | 2 | (D) | - | - |
| Franklin | - | - | - | - | - | - | 1 | (D) |
| Grant | - | - | - | - | - | - | 1 | (D) |
| Jefferson | 1 | (D) | - | - | 1 | (D) | - | - |
| King | 9 | 36 | - | - | 9 | 36 | 8 | 8 |
| Kitsap | - | - | - | - | - | - | 4 | 1 |
| Klickitat | - | - | - | - | - | - | 1 | (D) |
| Lewis | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Okanogan | - | - | - | - | - | - | 1 | (D) |
| Pierce | 5 | (D) | - | - | 5 | (D) | - | - |
| Skagit | 4 | (D) | - | - | 4 | (D) | 4 | 1 |
| Snohomish | 3 | (Z) | - | - | 3 | (Z) | 2 | (D) |
| Spokane | 4 | (Z) | - | - | 4 | (Z) | - | - |
| Stevens | 1 | (D) | - | - | 1 | (D) | - | - |
| Thurston | - | - | - | - | - | - | 6 | 3 |
| Wahkiakum | 1 | (D) | 1 | (D) | - | - | - | - |
| Walla Walla | 2 | (D) | - | - | 2 | (D) | - | - |
| Yakima | 5 | 5 | - | - | 5 | 5 | 6 | 8 |
| **PARSLEY** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 6 | 3 | - | - | 6 | 3 | 6 | 1 |
| **Counties** | | | | | | | | |
| Chelan | 2 | (D) | - | - | 2 | (D) | - | - |
| Clark | - | - | - | - | - | - | 2 | (D) |
| King | - | - | - | - | - | - | 1 | (D) |
| Lewis | 2 | (D) | - | - | 2 | (D) | 3 | (D) |
| Pierce | 1 | (D) | - | - | 1 | (D) | - | - |
| Skagit | 1 | (D) | - | - | 1 | (D) | - | - |
| **PEAS, CHINESE (SUGAR AND SNOW)** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 40 | 1,618 | 9 | (D) | 34 | (D) | 35 | 327 |
| **Counties** | | | | | | | | |
| Asotin | - | - | - | - | - | - | 1 | (D) |

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Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **PEAS, CHINESE (SUGAR AND SNOW)** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Benton | 1 | (D) | 1 | (D) | 1 | (D) | 2 | (D) |
| Chelan | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Clark | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Grant | 6 | (D) | 5 | 1,120 | 1 | (D) | 4 | (D) |
| Island | 7 | 1 | 2 | (D) | 7 | (D) | 2 | (D) |
| King | 5 | 2 | - | - | 5 | 2 | 2 | (D) |
| Lewis | - | - | - | - | - | - | 2 | (D) |
| Okanogan | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Pierce | 3 | 1 | - | - | 3 | 1 | 3 | (Z) |
| Skagit | 5 | 1 | - | - | 5 | 1 | 1 | (D) |
| Snohomish | 7 | 1 | - | - | 7 | 1 | - | - |
| Thurston | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Walla Walla | 1 | (D) | 1 | (D) | - | - | - | - |
| Whatcom | - | - | - | - | - | - | 4 | 1 |
| Yakima | - | - | - | - | - | - | 7 | (D) |
| **PEAS, GREEN (EXCLUDING SOUTHERN)** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 710 | 42,552 | 172 | 41,378 | 548 | 1,174 | 351 | 39,292 |
| **Counties** | | | | | | | | |
| Adams | 2 | (D) | 2 | (D) | - | - | 6 | 1,055 |
| Asotin | - | - | - | - | - | - | 3 | (Z) |
| Benton | 12 | 7,215 | 7 | 7,213 | 5 | 2 | 7 | 3,684 |
| Chelan | 4 | 1 | - | - | 4 | 1 | 4 | (Z) |
| Clallam | 4 | 1 | - | - | 4 | 1 | 7 | 1 |
| Clark | 26 | 4 | - | - | 26 | 4 | 5 | 1 |
| Columbia | - | - | - | - | - | - | 1 | (D) |
| Cowlitz | 17 | 2,868 | 14 | 2,868 | 3 | (Z) | 7 | 335 |
| Douglas | 2 | (D) | - | - | 2 | (D) | - | - |
| Ferry | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Franklin | 32 | 7,574 | 30 | (D) | 2 | (D) | 13 | 1,549 |
| Grant | 57 | 13,428 | 55 | 12,741 | 9 | 687 | 71 | 15,507 |
| Grays Harbor | 23 | 5,509 | 13 | (D) | 10 | (D) | 7 | 948 |
| Island | 19 | 2 | 3 | 1 | 16 | 2 | 7 | 1 |
| Jefferson | 7 | 1 | - | - | 7 | 1 | 4 | (Z) |
| King | 72 | 23 | 2 | (D) | 70 | (D) | 20 | 3 |
| Kitsap | 40 | 6 | - | - | 40 | 6 | 16 | 3 |
| Kittitas | 5 | 1 | - | - | 5 | 1 | 4 | 2 |
| Klickitat | 18 | (D) | 1 | (D) | 17 | 16 | 1 | (D) |
| Lewis | 30 | 2,326 | 12 | 2,316 | 18 | 10 | 10 | 947 |
| Lincoln | 2 | (D) | 2 | (D) | - | - | 4 | 1,015 |
| Mason | 11 | 1 | - | - | 11 | 1 | 6 | 1 |
| Okanogan | 14 | 3 | - | - | 14 | 3 | 2 | (D) |
| Pacific | 4 | 1 | - | - | 4 | 1 | 1 | (D) |
| Pend Oreille | 3 | (Z) | 2 | (D) | 1 | (D) | 1 | (D) |
| Pierce | 47 | 10 | - | - | 47 | 10 | 5 | 1 |
| San Juan | 16 | 4 | 1 | (D) | 15 | (D) | 11 | 1 |
| Skagit | 39 | 1,806 | 7 | 1,798 | 32 | 8 | 37 | 5,203 |
| Snohomish | 33 | 8 | - | - | 33 | 8 | 21 | 3,302 |
| Spokane | 37 | 9 | 7 | 3 | 30 | 6 | 6 | 1 |
| Stevens | 15 | 2 | - | - | 15 | 2 | 1 | (D) |
| Thurston | 45 | 14 | 2 | (D) | 45 | (D) | 13 | 4 |
| Wahkiakum | 3 | (Z) | - | - | 3 | (Z) | 2 | (D) |
| Walla Walla | 13 | 913 | 7 | 912 | 6 | 1 | 12 | 2,418 |
| Whatcom | 33 | 5 | 3 | 1 | 31 | 5 | 15 | 3 |
| Whitman | 3 | (D) | - | - | 3 | (D) | 7 | 2,439 |
| Yakima | 21 | (D) | 2 | (D) | 19 | 15 | 12 | (D) |
| **PEPPERS, BELL (EXCLUDING PIMIENTOS)** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 94 | 552 | 6 | (D) | 88 | (D) | 110 | 519 |
| **Counties** | | | | | | | | |
| Asotin | - | - | - | - | - | - | 1 | (D) |
| Benton | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Chelan | 7 | 1 | 4 | (Z) | 3 | (Z) | 8 | 1 |
| Clallam | - | - | - | - | - | - | 2 | (D) |
| Clark | 12 | 3 | - | - | 12 | 3 | 12 | 2 |
| Cowlitz | 5 | 1 | - | - | 5 | 1 | 5 | 1 |
| Douglas | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Ferry | 1 | (D) | - | - | 1 | (D) | - | - |
| Franklin | - | - | - | - | - | - | 3 | (D) |
| Grant | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Jefferson | 1 | (D) | - | - | 1 | (D) | - | - |
| King | 2 | (D) | - | - | 2 | (D) | 5 | 1 |
| Kitsap | 1 | (D) | - | - | 1 | (D) | 7 | 1 |
| Lewis | - | - | - | - | - | - | 15 | 2 |
| Mason | 1 | (D) | - | - | 1 | (D) | 3 | (Z) |
| Okanogan | 4 | 1 | - | - | 4 | 1 | 6 | (D) |
| Pend Oreille | - | - | - | - | - | - | 1 | (D) |
| Pierce | 3 | (Z) | - | - | 3 | (Z) | - | - |
| Skagit | 2 | (D) | - | - | 2 | (D) | 2 | (D) |

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Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **PEPPERS, BELL (EXCLUDING PIMIENTOS)** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Snohomish | 2 | (D) | - | - | 2 | (D) | - | - |
| Spokane | 9 | 5 | 1 | (D) | 8 | (D) | 10 | 5 |
| Stevens | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Thurston | - | - | - | - | - | - | 2 | (D) |
| Walla Walla | 3 | (Z) | - | - | 3 | (Z) | 2 | (D) |
| Whatcom | 2 | (D) | - | - | 2 | (D) | 3 | 2 |
| Yakima | 32 | 475 | 1 | (D) | 31 | (D) | 16 | 329 |
| **PEPPERS OTHER THAN BELL (INCLUDING CHILE)** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 103 | 86 | 4 | 2 | 101 | 84 | 100 | 55 |
| **Counties** | | | | | | | | |
| Adams | - | - | - | - | - | - | 2 | (D) |
| Benton | 4 | 1 | - | - | 4 | 1 | 5 | 1 |
| Chelan | - | - | - | - | - | - | 2 | (D) |
| Clallam | - | - | - | - | - | - | 2 | (D) |
| Clark | 5 | 1 | - | - | 5 | 1 | 9 | 4 |
| Columbia | - | - | - | - | - | - | 1 | (D) |
| Cowlitz | 5 | 1 | - | - | 5 | 1 | 7 | 1 |
| Douglas | 2 | (D) | - | - | 2 | (D) | - | - |
| Ferry | - | - | - | - | - | - | 3 | (Z) |
| Franklin | - | - | - | - | - | - | 2 | (D) |
| Grant | 3 | (D) | 1 | (D) | 3 | (D) | 2 | (D) |
| Island | - | - | - | - | - | - | 2 | (D) |
| Jefferson | 1 | (D) | 1 | (D) | - | - | - | - |
| King | 5 | 2 | - | - | 5 | 2 | 2 | (D) |
| Kitsap | 2 | (D) | - | - | 2 | (D) | - | - |
| Kittitas | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Klickitat | 4 | 7 | - | - | 4 | 7 | - | - |
| Lewis | - | - | - | - | - | - | 12 | 1 |
| Okanogan | 2 | (D) | - | - | 2 | (D) | 7 | 1 |
| Pend Oreille | - | - | - | - | - | - | 1 | (D) |
| Pierce | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Skagit | 5 | 3 | - | - | 5 | 3 | 1 | (D) |
| Spokane | 9 | 3 | 1 | (D) | 8 | (D) | 4 | (D) |
| Stevens | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Thurston | - | - | - | - | - | - | 1 | (D) |
| Walla Walla | 2 | (D) | - | - | 2 | (D) | 6 | 1 |
| Whatcom | 3 | (Z) | - | - | 3 | (Z) | 2 | (D) |
| Yakima | 48 | 49 | 1 | (D) | 48 | (D) | 22 | 18 |
| **POTATOES** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 1,205 | 163,925 | 238 | 123,768 | 1,015 | 40,157 | 618 | 157,499 |
| **Counties** | | | | | | | | |
| Adams | 40 | 25,766 | 21 | 20,311 | 20 | 5,456 | 31 | 29,462 |
| Asotin | - | - | - | - | - | - | 6 | 1 |
| Benton | 30 | 33,697 | 9 | 32,174 | 23 | 1,523 | 10 | 32,170 |
| Chelan | 12 | 2 | 6 | 1 | 6 | 1 | 8 | 2 |
| Clallam | 21 | 8 | 1 | (D) | 20 | (D) | 22 | 16 |
| Clark | 64 | 11 | 4 | (Z) | 60 | 10 | 25 | 3 |
| Columbia | - | - | - | - | - | - | 1 | (D) |
| Cowlitz | 2 | (D) | 2 | (D) | - | - | 2 | (D) |
| Douglas | 5 | 1 | - | - | 5 | 1 | 1 | (D) |
| Ferry | 2 | (D) | 1 | (D) | 1 | (D) | 4 | 1 |
| Franklin | 70 | 30,853 | 48 | 21,742 | 36 | 9,111 | 59 | 28,343 |
| Grant | 85 | 45,494 | 74 | 37,481 | 26 | 8,013 | 93 | 41,453 |
| Grays Harbor | 21 | 13 | - | - | 21 | 13 | 5 | (D) |
| Island | 35 | 30 | 3 | 1 | 32 | 29 | 16 | (D) |
| Jefferson | 17 | 6 | 1 | (D) | 16 | (D) | 5 | 2 |
| King | 81 | 23 | 2 | (D) | 79 | (D) | 34 | 30 |
| Kitsap | 59 | (D) | 6 | 3 | 54 | (D) | 33 | 7 |
| Kittitas | 26 | 424 | 2 | (D) | 24 | (D) | 5 | (D) |
| Klickitat | 18 | 6 | 1 | (D) | 18 | (D) | 4 | (Z) |
| Lewis | 27 | 19 | 10 | 4 | 17 | 15 | 6 | 4 |
| Lincoln | 2 | (D) | 1 | (D) | 1 | (D) | 8 | (D) |
| Mason | 10 | 2 | - | - | 10 | 2 | 14 | 2 |
| Okanogan | 55 | 16 | 1 | (D) | 54 | (D) | 17 | 5 |
| Pacific | 5 | 1 | - | - | 5 | 1 | 2 | (D) |
| Pend Oreille | 11 | 2 | 2 | (D) | 9 | (D) | 2 | (D) |
| Pierce | 58 | 13 | 1 | (D) | 58 | (D) | 17 | 2 |
| San Juan | 25 | 18 | 1 | (D) | 25 | (D) | 16 | 6 |
| Skagit | 64 | 12,807 | 13 | 2,132 | 52 | 10,674 | 37 | 10,353 |
| Skamania | 3 | 1 | - | - | 3 | 1 | - | - |
| Snohomish | 53 | (D) | 1 | (D) | 53 | (D) | 22 | (D) |
| Spokane | 67 | (D) | 12 | (D) | 58 | 24 | 16 | (D) |
| Stevens | 37 | 35 | 5 | (D) | 32 | (D) | 9 | (D) |
| Thurston | 60 | 18 | 2 | (D) | 60 | (D) | 15 | 12 |
| Wahkiakum | 5 | 1 | 1 | (D) | 4 | (D) | 2 | (D) |
| Walla Walla | 14 | 8,452 | 3 | (D) | 12 | (D) | 17 | 9,705 |
| Whatcom | 62 | 2,953 | 2 | (D) | 62 | (D) | 40 | 1,884 |

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Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **POTATOES** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Whitman | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Yakima | 57 | 1,691 | 2 | (D) | 57 | (D) | 13 | (D) |
| **PUMPKINS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 764 | 2,314 | 36 | 144 | 740 | 2,169 | 419 | 1,968 |
| **Counties** | | | | | | | | |
| Adams | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Asotin | 3 | (D) | - | - | 3 | (D) | 4 | (Z) |
| Benton | 14 | (D) | - | - | 14 | (D) | 7 | (D) |
| Chelan | 7 | 13 | 1 | (D) | 7 | (D) | 6 | 2 |
| Clallam | 5 | 2 | - | - | 5 | 2 | 7 | 1 |
| Clark | 65 | 77 | 10 | 29 | 56 | 48 | 28 | 48 |
| Columbia | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Cowlitz | 10 | 48 | 4 | 24 | 6 | 24 | 7 | (D) |
| Douglas | - | - | - | - | - | - | 1 | (D) |
| Ferry | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Franklin | 19 | 34 | - | - | 19 | 34 | 3 | (D) |
| Garfield | 1 | (D) | - | - | 1 | (D) | - | - |
| Grant | 5 | 3 | - | - | 5 | 3 | 13 | 8 |
| Grays Harbor | 12 | 11 | - | - | 12 | 11 | 5 | (D) |
| Island | 15 | 12 | - | - | 15 | 12 | 7 | 5 |
| Jefferson | 14 | 3 | - | - | 14 | 3 | 9 | 7 |
| King | 100 | 263 | 3 | (Z) | 100 | 262 | 42 | 167 |
| Kitsap | 53 | 13 | 1 | (D) | 52 | (D) | 18 | 14 |
| Kittitas | 13 | 4 | 2 | (D) | 13 | (D) | 14 | 22 |
| Klickitat | 15 | 5 | 4 | 1 | 14 | 4 | 6 | 4 |
| Lewis | 11 | 12 | - | - | 11 | 12 | 7 | 20 |
| Mason | 10 | (D) | - | - | 10 | (D) | 8 | (D) |
| Okanogan | 12 | 7 | - | - | 12 | 7 | 12 | 5 |
| Pend Oreille | 4 | (Z) | - | - | 4 | (Z) | - | - |
| Pierce | 79 | 225 | 2 | (D) | 77 | (D) | 23 | 220 |
| San Juan | 9 | 4 | - | - | 9 | 4 | 8 | 1 |
| Skagit | 40 | 419 | - | - | 40 | 419 | 30 | 496 |
| Snohomish | 48 | 217 | - | - | 48 | 217 | 28 | 127 |
| Spokane | 51 | (D) | 5 | 4 | 46 | (D) | 28 | (D) |
| Stevens | 21 | 11 | - | - | 21 | 11 | 4 | 1 |
| Thurston | 34 | 48 | - | - | 34 | 48 | 28 | 64 |
| Wahkiakum | - | - | - | - | - | - | 2 | (D) |
| Walla Walla | 9 | 93 | 1 | (D) | 8 | (D) | 13 | 19 |
| Whatcom | 41 | 26 | 2 | (D) | 41 | (D) | 29 | 82 |
| Whitman | 6 | 2 | - | - | 6 | 2 | 1 | (D) |
| Yakima | 34 | 69 | 1 | (D) | 33 | (D) | 15 | 140 |
| **RADISHES** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 48 | 86 | 2 | (D) | 48 | (D) | 11 | 128 |
| **Counties** | | | | | | | | |
| Benton | 3 | (Z) | - | - | 3 | (Z) | - | - |
| Clark | 3 | (D) | - | - | 3 | (D) | - | - |
| Cowlitz | 1 | (D) | - | - | 1 | (D) | - | - |
| Franklin | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Grays Harbor | 2 | (D) | - | - | 2 | (D) | - | - |
| Island | 5 | 1 | 2 | (D) | 5 | (D) | - | - |
| King | 11 | 13 | - | - | 11 | 13 | 1 | (D) |
| Kitsap | - | - | - | - | - | - | 1 | (D) |
| Kittitas | - | - | - | - | - | - | 1 | (D) |
| Lewis | - | - | - | - | - | - | 2 | (D) |
| Pierce | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| San Juan | 3 | 1 | - | - | 3 | 1 | - | - |
| Skagit | 3 | 1 | - | - | 3 | 1 | 1 | (D) |
| Snohomish | 2 | (D) | - | - | 2 | (D) | - | - |
| Stevens | 1 | (D) | - | - | 1 | (D) | - | - |
| Thurston | 4 | (Z) | - | - | 4 | (Z) | 2 | (D) |
| Walla Walla | 5 | 6 | - | - | 5 | 6 | - | - |
| Yakima | 2 | (D) | - | - | 2 | (D) | - | - |
| **RHUBARB** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 59 | 181 | 9 | 6 | 50 | 175 | 46 | 437 |
| **Counties** | | | | | | | | |
| Benton | - | - | - | - | - | - | 2 | (D) |
| Clallam | 2 | (D) | - | - | 2 | (D) | - | - |
| Clark | 4 | 1 | - | - | 4 | 1 | - | - |
| Garfield | 2 | (D) | 2 | (D) | - | - | - | - |
| Grant | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Grays Harbor | 1 | (D) | - | - | 1 | (D) | 3 | (Z) |
| Jefferson | - | - | - | - | - | - | 2 | (D) |
| King | 4 | (Z) | - | - | 4 | (Z) | 3 | (D) |
| Kitsap | 5 | (D) | - | - | 5 | (D) | 2 | (D) |
| Okanogan | - | - | - | - | - | - | 1 | (D) |

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Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **RHUBARB** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Pend Oreille | 1 | (D) | - | - | 1 | (D) | - | - |
| Pierce | 12 | 162 | - | - | 12 | 162 | 10 | 332 |
| San Juan | 4 | (Z) | 3 | (D) | 1 | (D) | 15 | 3 |
| Skagit | 9 | 7 | 2 | (D) | 7 | (D) | - | - |
| Snohomish | 5 | 3 | - | - | 5 | 3 | - | - |
| Spokane | - | - | - | - | - | - | 1 | (D) |
| Stevens | 1 | (D) | - | - | 1 | (D) | 4 | (Z) |
| Thurston | - | - | - | - | - | - | 1 | (D) |
| Wahkiakum | 1 | (D) | 1 | (D) | - | - | - | - |
| Whatcom | 2 | (D) | 1 | (D) | 1 | (D) | 1 | (D) |
| Yakima | 5 | 1 | - | - | 5 | 1 | - | - |
| **SPINACH** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 44 | 158 | 1 | (D) | 43 | (D) | 57 | 215 |
| **Counties** | | | | | | | | |
| Benton | 4 | (D) | 1 | (D) | 3 | (Z) | 1 | (D) |
| Chelan | - | - | - | - | - | - | 3 | (Z) |
| Clallam | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Clark | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Grant | - | - | - | - | - | - | 3 | (Z) |
| Grays Harbor | - | - | - | - | - | - | 1 | (D) |
| Island | 1 | (D) | - | - | 1 | (D) | - | - |
| Jefferson | - | - | - | - | - | - | 2 | (D) |
| King | 2 | (D) | - | - | 2 | (D) | 6 | 1 |
| Kitsap | - | - | - | - | - | - | 7 | 5 |
| Kittitas | 2 | (D) | - | - | 2 | (D) | - | - |
| Klickitat | 3 | (Z) | - | - | 3 | (Z) | 1 | (D) |
| Lewis | - | - | - | - | - | - | 3 | 1 |
| Okanogan | - | - | - | - | - | - | 2 | (D) |
| Pend Oreille | 1 | (D) | - | - | 1 | (D) | - | - |
| Pierce | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| San Juan | - | - | - | - | - | - | 2 | (D) |
| Skagit | 9 | (D) | - | - | 9 | (D) | 3 | (D) |
| Snohomish | 4 | (D) | - | - | 4 | (D) | 3 | (D) |
| Spokane | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Stevens | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Thurston | - | - | - | - | - | - | 2 | (D) |
| Walla Walla | - | - | - | - | - | - | 4 | (D) |
| Whatcom | 5 | 1 | - | - | 5 | 1 | 8 | 1 |
| Yakima | 7 | 12 | - | - | 7 | 12 | - | - |
| **SQUASH, ALL** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 291 | 1,117 | 21 | 23 | 274 | 1,094 | 244 | 646 |
| **Counties** | | | | | | | | |
| Adams | 2 | (D) | - | - | 2 | (D) | - | - |
| Asotin | 3 | (Z) | - | - | 3 | (Z) | 3 | (D) |
| Benton | 5 | 4 | - | - | 5 | 4 | 7 | 2 |
| Chelan | 1 | (D) | - | - | 1 | (D) | 4 | 1 |
| Clallam | 1 | (D) | - | - | 1 | (D) | 3 | 1 |
| Clark | 19 | 6 | - | - | 19 | 6 | 22 | 7 |
| Cowlitz | 4 | 1 | - | - | 4 | 1 | 4 | (Z) |
| Douglas | - | - | - | - | - | - | 2 | (D) |
| Franklin | 4 | 2 | - | - | 4 | 2 | 3 | (D) |
| Garfield | 1 | (D) | - | - | 1 | (D) | - | - |
| Grant | 2 | (D) | - | - | 2 | (D) | 5 | 6 |
| Grays Harbor | 5 | 1 | - | - | 5 | 1 | 7 | 3 |
| Island | 8 | 9 | - | - | 8 | 9 | 1 | (D) |
| Jefferson | 5 | 1 | - | - | 5 | 1 | - | - |
| King | 23 | (D) | 1 | (D) | 22 | (D) | 26 | 22 |
| Kitsap | 11 | 7 | - | - | 11 | 7 | 8 | 2 |
| Kittitas | 4 | 3 | - | - | 4 | 3 | 2 | (D) |
| Klickitat | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Lewis | 5 | 1 | - | - | 5 | 1 | 5 | (D) |
| Mason | 4 | 2 | - | - | 4 | 2 | 3 | (D) |
| Okanogan | 7 | 2 | 3 | (Z) | 6 | 1 | 23 | 9 |
| Pend Oreille | 1 | (D) | - | - | 1 | (D) | - | - |
| Pierce | 20 | 41 | - | - | 20 | 41 | 13 | 7 |
| San Juan | 11 | 4 | 2 | (D) | 9 | 3 | 9 | 2 |
| Skagit | 25 | 136 | 2 | (D) | 23 | 136 | 11 | 40 |
| Skamania | 2 | (D) | - | - | 2 | (D) | - | - |
| Snohomish | 21 | 23 | 2 | (D) | 21 | 23 | 8 | 10 |
| Spokane | 30 | 110 | 7 | 3 | 23 | 107 | 20 | 73 |
| Stevens | 2 | (D) | - | - | 2 | (D) | 3 | 1 |
| Thurston | 23 | 8 | 2 | (D) | 21 | 6 | 10 | (D) |
| Wahkiakum | - | - | - | - | - | - | 2 | (D) |
| Walla Walla | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Whatcom | 14 | 7 | - | - | 14 | 7 | 12 | 5 |
| Yakima | 25 | 577 | 2 | (D) | 23 | 560 | 24 | 387 |

--continued

Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **SQUASH, SUMMER** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 182 | 610 | 12 | 3 | 172 | 607 | 165 | 328 |
| **Counties** | | | | | | | | |
| Benton | 2 | (D) | - | - | 2 | (D) | 5 | 1 |
| Chelan | - | - | - | - | - | - | 4 | (D) |
| Clallam | 1 | (D) | - | - | 1 | (D) | 3 | 1 |
| Clark | 11 | 2 | - | - | 11 | 2 | 21 | 5 |
| Cowlitz | 4 | (D) | - | - | 4 | (D) | - | - |
| Douglas | - | - | - | - | - | - | 1 | (D) |
| Franklin | 1 | (D) | - | - | 1 | (D) | 3 | (D) |
| Garfield | 1 | (D) | - | - | 1 | (D) | - | - |
| Grays Harbor | 4 | (Z) | - | - | 4 | (Z) | 3 | (D) |
| Island | 7 | 5 | - | - | 7 | 5 | 1 | (D) |
| Jefferson | 3 | (Z) | - | - | 3 | (Z) | - | - |
| King | 20 | (D) | 1 | (D) | 19 | (D) | 21 | 4 |
| Kitsap | 9 | 2 | - | - | 9 | 2 | 6 | (D) |
| Kittitas | 3 | (D) | - | - | 3 | (D) | - | - |
| Klickitat | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Lewis | 3 | 1 | - | - | 3 | 1 | 4 | (D) |
| Mason | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Okanogan | - | - | - | - | - | - | 17 | 3 |
| Pend Oreille | 1 | (D) | - | - | 1 | (D) | - | - |
| Pierce | 15 | (D) | - | - | 15 | (D) | 10 | 3 |
| San Juan | 5 | (D) | - | - | 5 | (D) | - | - |
| Skagit | 18 | (D) | 2 | (D) | 16 | (D) | 8 | 3 |
| Snohomish | 15 | (D) | 2 | (D) | 15 | (D) | 7 | (D) |
| Spokane | 22 | 54 | 7 | (D) | 15 | (D) | 12 | (D) |
| Stevens | 1 | (D) | - | - | 1 | (D) | 3 | (D) |
| Thurston | 11 | (D) | - | - | 11 | (D) | 9 | (D) |
| Whatcom | 6 | 3 | - | - | 6 | 3 | 8 | (D) |
| Yakima | 16 | (D) | - | - | 16 | (D) | 15 | 238 |
| **SQUASH, WINTER** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 189 | 507 | 14 | 20 | 177 | 487 | 134 | 319 |
| **Counties** | | | | | | | | |
| Adams | 2 | (D) | - | - | 2 | (D) | - | - |
| Asotin | 3 | (Z) | - | - | 3 | (Z) | 3 | (D) |
| Benton | 3 | (D) | - | - | 3 | (D) | 3 | 1 |
| Chelan | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Clark | 16 | 4 | - | - | 16 | 4 | 6 | 2 |
| Cowlitz | 1 | (D) | - | - | 1 | (D) | 4 | (Z) |
| Douglas | - | - | - | - | - | - | 2 | (D) |
| Franklin | 3 | (D) | - | - | 3 | (D) | - | - |
| Garfield | 1 | (D) | - | - | 1 | (D) | - | - |
| Grant | 2 | (D) | - | - | 2 | (D) | 5 | 6 |
| Grays Harbor | 3 | 1 | - | - | 3 | 1 | 5 | (D) |
| Island | 4 | 3 | - | - | 4 | 3 | - | - |
| Jefferson | 3 | 1 | - | - | 3 | 1 | - | - |
| King | 15 | (D) | - | - | 15 | (D) | 18 | 18 |
| Kitsap | 5 | 5 | - | - | 5 | 5 | 2 | (D) |
| Kittitas | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Lewis | 3 | 1 | - | - | 3 | 1 | 2 | (D) |
| Mason | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Okanogan | 7 | 2 | 3 | (Z) | 6 | 1 | 14 | 7 |
| Pend Oreille | 1 | (D) | - | - | 1 | (D) | - | - |
| Pierce | 10 | (D) | - | - | 10 | (D) | 6 | 4 |
| San Juan | 11 | (D) | 2 | (D) | 9 | (D) | 9 | 2 |
| Skagit | 17 | (D) | - | - | 17 | (D) | 7 | 37 |
| Skamania | 2 | (D) | - | - | 2 | (D) | - | - |
| Snohomish | 11 | (D) | - | - | 11 | (D) | 6 | (D) |
| Spokane | 16 | 56 | 5 | (D) | 11 | (D) | 15 | (D) |
| Stevens | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Thurston | 18 | (D) | 2 | (D) | 16 | (D) | 2 | (D) |
| Wahkiakum | - | - | - | - | - | - | 2 | (D) |
| Walla Walla | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Whatcom | 11 | 4 | - | - | 11 | 4 | 4 | (D) |
| Yakima | 12 | (D) | 2 | (D) | 10 | (D) | 9 | 149 |
| **SWEET CORN** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 1,068 | 90,671 | 285 | 85,976 | 820 | 4,695 | 706 | 91,977 |
| **Counties** | | | | | | | | |
| Adams | 15 | 2,109 | 14 | (D) | 3 | (D) | 12 | 2,950 |
| Asotin | 5 | (D) | - | - | 5 | (D) | 6 | (D) |
| Benton | 29 | 25,392 | 15 | (D) | 16 | (D) | 13 | 22,500 |
| Chelan | 4 | (D) | 1 | (D) | 4 | 1 | 8 | 4 |
| Clallam | 8 | 13 | 1 | (D) | 8 | (D) | 17 | (D) |
| Clark | 58 | (D) | 5 | 1 | 53 | (D) | 35 | 63 |
| Columbia | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Cowlitz | 19 | 3,300 | 14 | 3,254 | 5 | 46 | 11 | 538 |
| Douglas | 8 | 5 | - | - | 8 | 5 | 1 | (D) |
| Ferry | - | - | - | - | - | - | 5 | 1 |

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Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **SWEET CORN** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Franklin | 60 | 16,473 | 48 | 15,919 | 12 | 554 | 48 | 16,561 |
| Garfield | 1 | (D) | - | - | 1 | (D) | - | - |
| Grant | 97 | 25,856 | 85 | 24,433 | 17 | 1,423 | 110 | 30,364 |
| Grays Harbor | 12 | (D) | 7 | (D) | 5 | (D) | 13 | 2,276 |
| Island | 21 | 6 | 1 | (D) | 20 | (D) | 15 | 6 |
| Jefferson | 8 | 2 | - | - | 8 | 2 | 3 | 1 |
| King | 95 | 71 | 7 | 2 | 93 | 69 | 49 | 94 |
| Kitsap | 46 | 11 | 3 | (Z) | 46 | 11 | 22 | 14 |
| Kittitas | 34 | 2,168 | 20 | (D) | 19 | (D) | 27 | (D) |
| Klickitat | 18 | (D) | 1 | (D) | 17 | 7 | 9 | (D) |
| Lewis | 42 | 1,275 | 20 | 1,262 | 22 | 13 | 33 | 1,731 |
| Lincoln | 8 | 1,637 | 8 | 1,637 | - | - | 2 | (D) |
| Mason | 17 | 43 | 2 | (D) | 17 | (D) | 9 | 45 |
| Okanogan | 22 | 9 | - | - | 22 | 9 | 21 | 8 |
| Pacific | - | - | - | - | - | - | 1 | (D) |
| Pend Oreille | 6 | 1 | 2 | (D) | 4 | (D) | - | - |
| Pierce | 60 | 120 | - | - | 60 | 120 | 41 | 179 |
| San Juan | 11 | 2 | - | - | 11 | 2 | 4 | 1 |
| Skagit | 44 | 343 | 3 | (Z) | 41 | 343 | 29 | 389 |
| Snohomish | 54 | 146 | - | - | 54 | 146 | 23 | 106 |
| Spokane | 65 | 209 | 10 | (D) | 58 | (D) | 23 | 228 |
| Stevens | 27 | (D) | 3 | (Z) | 27 | (D) | 9 | 3 |
| Thurston | 40 | (D) | 6 | (D) | 37 | 34 | 25 | 79 |
| Wahkiakum | 1 | (D) | 1 | (D) | - | - | - | - |
| Walla Walla | 10 | 8,793 | 4 | (D) | 6 | (D) | 15 | 7,768 |
| Whatcom | 42 | 41 | 1 | (D) | 42 | (D) | 35 | 68 |
| Whitman | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Yakima | 78 | 1,061 | 3 | 66 | 76 | 995 | 30 | 3,589 |
| **SWEET POTATOES** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | - | - | - | - | - | - | 3 | (Z) |
| **Counties** | | | | | | | | |
| Kitsap | - | - | - | - | - | - | 1 | (D) |
| Snohomish | - | - | - | - | - | - | 2 | (D) |
| **TOMATOES IN THE OPEN** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 1,032 | 407 | 70 | 20 | 977 | 387 | 409 | 317 |
| **Counties** | | | | | | | | |
| Adams | 3 | (Z) | - | - | 3 | (Z) | 2 | (D) |
| Asotin | 3 | 2 | - | - | 3 | 2 | 4 | 1 |
| Benton | 24 | 12 | - | - | 24 | 12 | 10 | 4 |
| Chelan | 20 | 3 | 4 | (Z) | 16 | 2 | 10 | 2 |
| Clallam | 11 | 2 | - | - | 11 | 2 | 6 | 1 |
| Clark | 81 | 38 | 6 | 4 | 79 | 34 | 41 | 21 |
| Columbia | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Cowlitz | 7 | 7 | - | - | 7 | 7 | 6 | 2 |
| Douglas | 11 | 2 | - | - | 11 | 2 | 6 | 5 |
| Ferry | 2 | (D) | - | - | 2 | (D) | 7 | 1 |
| Franklin | 20 | 8 | - | - | 20 | 8 | 6 | 5 |
| Garfield | 1 | (D) | - | - | 1 | (D) | - | - |
| Grant | 6 | 5 | - | - | 6 | 5 | 15 | 9 |
| Grays Harbor | 4 | 1 | - | - | 4 | 1 | 3 | (D) |
| Island | 21 | 5 | 2 | (D) | 20 | (D) | 12 | 1 |
| Jefferson | 9 | 2 | 1 | (D) | 9 | (D) | 5 | 1 |
| King | 112 | 41 | 10 | 3 | 107 | 39 | 26 | 15 |
| Kitsap | 70 | 12 | 2 | (D) | 70 | (D) | 17 | 3 |
| Kittitas | 22 | 4 | 1 | (D) | 22 | (D) | 7 | 2 |
| Klickitat | 23 | 8 | - | - | 23 | 8 | 15 | 16 |
| Lewis | 16 | 4 | - | - | 16 | 4 | 6 | 1 |
| Mason | 14 | 1 | - | - | 14 | 1 | 12 | 2 |
| Okanogan | 46 | 10 | 1 | (D) | 46 | (D) | 19 | 17 |
| Pacific | 6 | 1 | 2 | (D) | 4 | (D) | - | - |
| Pend Oreille | 9 | 1 | 2 | (D) | 7 | (D) | - | - |
| Pierce | 88 | 15 | 4 | (Z) | 84 | 14 | 15 | 2 |
| San Juan | 17 | 3 | - | - | 17 | 3 | 12 | 1 |
| Skagit | 28 | 6 | - | - | 28 | 6 | 11 | 1 |
| Skamania | 12 | 2 | 8 | 1 | 4 | (Z) | - | - |
| Snohomish | 27 | 6 | - | - | 27 | 6 | 10 | 10 |
| Spokane | 76 | 31 | 12 | 5 | 64 | 26 | 30 | 9 |
| Stevens | 44 | 10 | 9 | 2 | 35 | 8 | 8 | 2 |
| Thurston | 51 | 13 | 3 | 2 | 48 | 12 | 26 | 13 |
| Wahkiakum | 4 | (Z) | 1 | (D) | 3 | (D) | 2 | (D) |
| Walla Walla | 14 | 7 | - | - | 14 | 7 | 11 | 2 |
| Whatcom | 22 | 3 | 2 | (D) | 20 | (D) | 11 | 2 |
| Whitman | 7 | 1 | - | - | 7 | 1 | 1 | (D) |
| Yakima | 99 | 140 | - | - | 99 | 140 | 36 | 169 |
| **TURNIP GREENS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 1 | (D) | - | - | 1 | (D) | - | - |

--continued

Table 29. **Vegetables, Potatoes, and Melons Harvested for Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | | 2007 harvested | |
|---|---|---|---|---|---|---|---|---|
| | Harvested | | Harvested for processing | | Harvested for fresh market | | | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **TURNIP GREENS** - Con. | | | | | | | | |
| **Counties** | | | | | | | | |
| Stevens | 1 | (D) | - | - | 1 | (D) | - | - |
| **TURNIPS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 17 | 37 | - | - | 17 | 37 | 3 | (D) |
| **Counties** | | | | | | | | |
| Clark | 4 | 3 | - | - | 4 | 3 | - | - |
| King | 2 | (D) | - | - | 2 | (D) | 1 | (D) |
| Kitsap | 1 | (D) | - | - | 1 | (D) | - | - |
| Skagit | 3 | (Z) | - | - | 3 | (Z) | - | - |
| Snohomish | 3 | (D) | - | - | 3 | (D) | - | - |
| Spokane | - | - | - | - | - | - | 1 | (D) |
| Thurston | 3 | (Z) | - | - | 3 | (Z) | - | - |
| Yakima | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| **WATERMELONS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 38 | 488 | - | - | 38 | 488 | 53 | 754 |
| **Counties** | | | | | | | | |
| Benton | - | - | - | - | - | - | 3 | (D) |
| Chelan | - | - | - | - | - | - | 2 | (D) |
| Clark | - | - | - | - | - | - | 5 | 2 |
| Douglas | 2 | (D) | - | - | 2 | (D) | - | - |
| Ferry | - | - | - | - | - | - | 2 | (D) |
| Franklin | 9 | 212 | - | - | 9 | 212 | 2 | (D) |
| Garfield | 1 | (D) | - | - | 1 | (D) | - | - |
| Grant | 2 | (D) | - | - | 2 | (D) | 7 | (D) |
| Kittitas | - | - | - | - | - | - | 3 | (Z) |
| Klickitat | 3 | 1 | - | - | 3 | 1 | 1 | (D) |
| Okanogan | 1 | (D) | - | - | 1 | (D) | 4 | 2 |
| Skagit | 2 | (D) | - | - | 2 | (D) | - | - |
| Thurston | - | - | - | - | - | - | 3 | 1 |
| Walla Walla | - | - | - | - | - | - | 1 | (D) |
| Whatcom | - | - | - | - | - | - | 4 | (Z) |
| Yakima | 18 | (D) | - | - | 18 | (D) | 16 | 94 |
| **OTHER VEGETABLES (SEE TEXT)** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 381 | 1,521 | 32 | 394 | 365 | 1,127 | 384 | 1,468 |
| **Counties** | | | | | | | | |
| Adams | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Asotin | - | - | - | - | - | - | 3 | (D) |
| Benton | 11 | 36 | - | - | 11 | 36 | 7 | 77 |
| Chelan | 6 | 5 | 4 | (D) | 2 | (D) | 2 | (D) |
| Clallam | 4 | (D) | - | - | 4 | (D) | 4 | (D) |
| Clark | 38 | 101 | 4 | (D) | 35 | (D) | 31 | 22 |
| Columbia | 1 | (D) | - | - | 1 | (D) | - | - |
| Cowlitz | 8 | 34 | - | - | 8 | 34 | 6 | (D) |
| Douglas | 4 | 1 | - | - | 4 | 1 | 2 | (D) |
| Ferry | 2 | (D) | - | - | 2 | (D) | 2 | (D) |
| Franklin | 4 | (D) | 1 | (D) | 3 | (D) | 8 | 87 |
| Grant | 1 | (D) | - | - | 1 | (D) | 3 | (D) |
| Grays Harbor | 5 | 1 | - | - | 5 | 1 | 8 | 33 |
| Island | 10 | 19 | 2 | (D) | 8 | (D) | 19 | 21 |
| Jefferson | 3 | 23 | - | - | 3 | 23 | 6 | 12 |
| King | 44 | 101 | 4 | 3 | 43 | 97 | 54 | 291 |
| Kitsap | 23 | (D) | 1 | (D) | 23 | (D) | 31 | 24 |
| Kittitas | - | - | - | - | - | - | 9 | 5 |
| Klickitat | 5 | 1 | - | - | 5 | 1 | 2 | (D) |
| Lewis | 11 | 234 | - | - | 11 | 234 | 8 | 35 |
| Lincoln | 1 | (D) | - | - | 1 | (D) | 1 | (D) |
| Mason | 6 | 4 | 4 | (D) | 6 | (D) | 9 | 5 |
| Okanogan | 2 | (D) | - | - | 2 | (D) | 22 | 30 |
| Pacific | 2 | (D) | - | - | 2 | (D) | - | - |
| Pierce | 29 | 75 | 1 | (D) | 28 | (D) | 19 | 39 |
| San Juan | 17 | 11 | 4 | 2 | 16 | 9 | 18 | 17 |
| Skagit | 17 | (D) | 1 | (D) | 17 | (D) | 23 | 122 |
| Snohomish | 26 | 92 | 5 | 3 | 24 | 89 | 20 | 154 |
| Spokane | 7 | 6 | - | - | 7 | 6 | 14 | 12 |
| Stevens | 11 | 4 | - | - | 11 | 4 | - | - |
| Thurston | 37 | 25 | - | - | 37 | 25 | 14 | 20 |
| Wahkiakum | - | - | - | - | - | - | 3 | 2 |
| Walla Walla | 5 | (D) | 1 | (D) | 4 | (D) | 2 | (D) |
| Whatcom | 15 | 30 | - | - | 15 | 30 | 13 | 25 |
| Whitman | 1 | (D) | - | - | 1 | (D) | 2 | (D) |
| Yakima | 23 | 51 | - | - | 23 | 51 | 17 | 51 |

## Table 30. **Land in Orchards: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | 2007 | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | | Irrigated | | Total | | Irrigated | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **State Total** | | | | | | | | |
| Washington | 4,846 | 315,456 | 4,827 | 315,398 | 5,470 | 299,174 | 5,281 | 298,379 |
| **Counties** | | | | | | | | |
| Adams | 38 | 5,850 | 38 | 5,850 | 40 | 4,754 | 40 | 4,754 |
| Asotin | 8 | 68 | 8 | 68 | 9 | 56 | 9 | 56 |
| Benton | 353 | 49,233 | 353 | 49,233 | 433 | 39,616 | 433 | 39,616 |
| Chelan | 631 | 20,599 | 631 | 20,599 | 778 | 22,681 | 778 | 22,681 |
| Clallam | 49 | 80 | 49 | 80 | 51 | 103 | 47 | 89 |
| Clark | 149 | 434 | 149 | 434 | 137 | 288 | 102 | 186 |
| Columbia | 4 | 185 | 4 | 185 | 4 | (D) | 4 | (D) |
| Cowlitz | 33 | 64 | 33 | 64 | 22 | 42 | 17 | 30 |
| Douglas | 327 | 13,930 | 327 | 13,930 | 397 | 14,877 | 397 | 14,877 |
| Ferry | 10 | 167 | 10 | 167 | 8 | (D) | 8 | (D) |
| Franklin | 202 | 19,472 | 202 | 19,472 | 191 | 15,977 | 191 | 15,977 |
| Garfield | 4 | 8 | 4 | 8 | 1 | (D) | 1 | (D) |
| Grant | 339 | 64,664 | 339 | 64,664 | 345 | 58,170 | 345 | 58,170 |
| Grays Harbor | 17 | 45 | 17 | 45 | 28 | 48 | 24 | 20 |
| Island | 26 | 34 | 21 | 24 | 54 | 76 | 38 | 37 |
| Jefferson | 23 | 64 | 19 | 49 | 23 | 35 | 19 | 33 |
| King | 94 | 295 | 94 | 295 | 86 | 136 | 72 | 96 |
| Kitsap | 76 | 72 | 76 | 72 | 73 | 91 | 65 | 73 |
| Kittitas | 47 | 455 | 47 | 455 | 54 | 867 | 54 | 867 |
| Klickitat | 77 | 7,432 | 77 | 7,432 | 86 | 6,390 | 86 | 6,390 |
| Lewis | 48 | 174 | 48 | 174 | 51 | 162 | 42 | 90 |
| Lincoln | 11 | 29 | 11 | 29 | 5 | 16 | 5 | 16 |
| Mason | 21 | 19 | 21 | 19 | 31 | 54 | 30 | 52 |
| Okanogan | 396 | 29,804 | 396 | 29,804 | 415 | 24,460 | 415 | 24,460 |
| Pacific | 3 | (D) | 3 | (D) | 5 | (D) | 5 | (D) |
| Pend Oreille | 5 | 2 | 5 | 2 | 5 | 7 | 5 | 7 |
| Pierce | 93 | 139 | 93 | 139 | 60 | 121 | 46 | 71 |
| San Juan | 58 | 101 | 48 | 69 | 58 | 158 | 49 | 139 |
| Skagit | 88 | 562 | 88 | 562 | 106 | 313 | 82 | 250 |
| Skamania | 19 | 274 | 19 | 274 | 16 | 291 | 9 | 212 |
| Snohomish | 68 | 184 | 68 | 184 | 70 | 168 | 58 | 127 |
| Spokane | 104 | 434 | 104 | 434 | 84 | 353 | 84 | 353 |
| Stevens | 47 | 164 | 47 | 164 | 45 | 181 | 44 | 154 |
| Thurston | 58 | 79 | 58 | 79 | 43 | 58 | 30 | 25 |
| Wahkiakum | 7 | (D) | 7 | (D) | 7 | 12 | 4 | 3 |
| Walla Walla | 106 | 12,200 | 106 | 12,200 | 80 | 12,517 | 80 | 12,517 |
| Whatcom | 98 | 479 | 98 | 479 | 80 | 358 | 74 | 214 |
| Whitman | 8 | 52 | 8 | 52 | 19 | 46 | 19 | 46 |
| Yakima | 1,101 | 87,607 | 1,101 | 87,607 | 1,470 | 95,351 | 1,470 | 95,351 |

## Table 31. **Fruits and Nuts: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Bearing age acres | | Nonbearing age acres | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **NONCITRUS, ALL** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | 4,769 | 314,899 | 4,350 | 286,142 | 1,911 | 28,757 |
| 2007 | 5,363 | 298,587 | 5,128 | 273,824 | 1,941 | 24,763 |
| **Counties, 2012** | | | | | | |
| Adams | 38 | 5,850 | 38 | 5,615 | 15 | 235 |
| Asotin | 8 | 68 | 6 | 62 | 3 | 6 |
| Benton | 351 | 49,211 | 342 | 43,287 | 112 | 5,925 |
| Chelan | 628 | (D) | 616 | 18,526 | 234 | (D) |
| Clallam | 49 | 79 | 42 | 61 | 21 | 18 |
| Clark | 141 | 341 | 90 | 207 | 92 | 134 |
| Columbia | 4 | 185 | 2 | (D) | 4 | (D) |
| Cowlitz | 33 | 64 | 25 | 24 | 15 | 40 |
| Douglas | 326 | (D) | 313 | 12,720 | 117 | (D) |
| Ferry | 10 | 167 | 8 | 161 | 3 | 6 |
| Franklin | 197 | 19,448 | 192 | 18,101 | 67 | 1,347 |
| Garfield | 4 | 8 | 2 | (D) | 2 | (D) |
| Grant | 336 | (D) | 312 | 57,700 | 145 | (D) |
| Grays Harbor | 16 | (D) | 8 | (D) | 12 | 20 |
| Island | 25 | (D) | 20 | 26 | 5 | (D) |
| Jefferson | 22 | (D) | 20 | 44 | 7 | (D) |
| King | 93 | 293 | 66 | 226 | 51 | 67 |
| Kitsap | 73 | 67 | 52 | 49 | 46 | 18 |
| Kittitas | 47 | (D) | 38 | 415 | 19 | (D) |
| Klickitat | 75 | (D) | 66 | 7,212 | 28 | (D) |
| Lewis | 40 | 81 | 28 | 53 | 21 | 29 |
| Lincoln | 11 | 29 | 5 | (D) | 7 | (D) |
| Mason | 21 | 19 | 19 | 15 | 10 | 4 |
| Okanogan | 393 | 29,767 | 385 | 26,201 | 175 | 3,566 |
| Pacific | 3 | (D) | 3 | 1 | 1 | (D) |
| Pend Oreille | 5 | 2 | 2 | (D) | 5 | (D) |
| Pierce | 92 | 135 | 65 | 108 | 45 | 27 |
| San Juan | 55 | 95 | 48 | 78 | 18 | 17 |
| Skagit | 87 | 555 | 76 | 481 | 33 | 74 |
| Skamania | 19 | 274 | 18 | 260 | 4 | 14 |
| Snohomish | 66 | (D) | 37 | 110 | 38 | (D) |
| Spokane | 98 | 416 | 80 | 314 | 35 | 103 |
| Stevens | 44 | (D) | 33 | 140 | 17 | (D) |
| Thurston | 57 | 73 | 51 | 57 | 16 | 16 |
| Wahkiakum | 7 | (D) | 5 | 1 | 5 | (D) |
| Walla Walla | 103 | 12,196 | 89 | 11,541 | 41 | 655 |
| Whatcom | 90 | 351 | 70 | 297 | 49 | 54 |
| Whitman | 8 | 52 | 6 | 41 | 6 | 12 |
| Yakima | 1,094 | 87,592 | 1,072 | 81,810 | 387 | 5,782 |
| **APPLES** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | 2,839 | 174,152 | 2,521 | 156,129 | 1,063 | 18,023 |
| 2007 | 3,052 | 165,215 | 2,912 | 152,334 | 979 | 12,880 |
| **Counties, 2012** | | | | | | |
| Adams | 34 | 5,522 | 34 | (D) | 15 | (D) |
| Asotin | 5 | 20 | 5 | 20 | - | - |
| Benton | 136 | 16,380 | 127 | 12,319 | 43 | 4,060 |
| Chelan | 279 | 6,996 | 271 | 6,444 | 87 | 552 |
| Clallam | 40 | 48 | 35 | 39 | 15 | 10 |
| Clark | 100 | 97 | 60 | 61 | 59 | 37 |
| Columbia | 4 | (D) | 2 | (D) | 4 | (D) |
| Cowlitz | 32 | 48 | 22 | 13 | 15 | 35 |
| Douglas | 198 | 9,546 | 190 | 8,796 | 65 | 749 |
| Ferry | 9 | 87 | 7 | 82 | 3 | 6 |
| Franklin | 128 | 11,151 | 127 | 10,431 | 40 | 720 |
| Garfield | 1 | (D) | 1 | (D) | - | - |
| Grant | 246 | 43,471 | 230 | 38,625 | 97 | 4,846 |
| Grays Harbor | 10 | 8 | 7 | 2 | 6 | 5 |
| Island | 16 | 7 | 11 | 4 | 5 | 3 |
| Jefferson | 19 | 35 | 18 | 26 | 5 | 9 |
| King | 73 | 137 | 50 | 106 | 34 | 32 |
| Kitsap | 61 | 32 | 40 | 24 | 40 | 8 |
| Kittitas | 31 | 301 | 25 | 289 | 10 | 12 |
| Klickitat | 22 | 338 | 14 | (D) | 9 | (D) |
| Lewis | 32 | 37 | 20 | 19 | 14 | 19 |
| Lincoln | 6 | 4 | 4 | 2 | 3 | 3 |
| Mason | 15 | 5 | 11 | 4 | 4 | 1 |
| Okanogan | 321 | 20,774 | 314 | 18,050 | 131 | 2,724 |
| Pacific | 3 | (D) | 3 | 1 | 1 | (D) |
| Pend Oreille | 3 | (Z) | - | - | 3 | (Z) |
| Pierce | 69 | 84 | 49 | 75 | 28 | 9 |
| San Juan | 44 | 44 | 38 | 33 | 12 | 11 |
| Skagit | 59 | 188 | 53 | 134 | 19 | 55 |
| Skamania | 7 | (D) | 7 | (D) | - | - |
| Snohomish | 44 | 69 | 21 | 32 | 28 | 37 |
| Spokane | 78 | 226 | 65 | 164 | 27 | 62 |
| Stevens | 27 | 46 | 20 | 43 | 9 | 3 |
| Thurston | 49 | 40 | 43 | 28 | 14 | 12 |
| Wahkiakum | 6 | (D) | 4 | (Z) | 5 | (D) |
| Walla Walla | 26 | 7,724 | 21 | 7,267 | 10 | 457 |
| Whatcom | 75 | 271 | 53 | 242 | 41 | 29 |

--continued

Table 31. **Fruits and Nuts: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Bearing age acres | | Nonbearing age acres | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **APPLES** - Con. | | | | | | |
| **Counties, 2012** - Con. | | | | | | |
| Whitman | 7 | 27 | 5 | 26 | 3 | 1 |
| Yakima | 524 | 50,270 | 514 | 47,045 | 159 | 3,225 |
| **APRICOTS** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 235 | 1,195 | 208 | 1,071 | 53 | 124 |
| 2007 | 316 | 1,287 | 248 | 1,181 | 98 | 106 |
| **Counties, 2012** | | | | | | |
| Asotin | 4 | 6 | 4 | 6 | - | - |
| Benton | 13 | 73 | 12 | (D) | 2 | (D) |
| Chelan | 31 | 84 | 28 | 68 | 11 | 17 |
| Clark | 2 | (D) | - | - | 2 | (D) |
| Douglas | 29 | 136 | 29 | 129 | 4 | 7 |
| Ferry | 4 | 10 | 4 | 10 | - | - |
| Franklin | 13 | 235 | 11 | (D) | 3 | (D) |
| Grant | 30 | 241 | 28 | (D) | 3 | (D) |
| Island | 2 | (D) | 2 | (D) | - | - |
| Kittitas | 2 | (D) | 2 | (D) | - | - |
| Klickitat | 2 | (D) | 2 | (D) | - | - |
| Okanogan | 20 | 10 | 19 | 9 | 5 | 1 |
| San Juan | 3 | (Z) | 2 | (D) | 1 | (D) |
| Snohomish | 5 | 1 | - | - | 5 | 1 |
| Spokane | 17 | 8 | 11 | 5 | 6 | 2 |
| Stevens | 13 | 7 | 11 | (D) | 2 | (D) |
| Walla Walla | 2 | (D) | 2 | (D) | - | - |
| Whitman | 1 | (D) | 1 | (D) | - | - |
| Yakima | 42 | 383 | 40 | 336 | 9 | 47 |
| **CHERRIES, SWEET** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 1,958 | 38,457 | 1,763 | 34,742 | 654 | 3,714 |
| 2007 | 2,160 | 38,811 | 1,992 | 33,632 | 742 | 5,179 |
| **Counties, 2012** | | | | | | |
| Adams | 5 | 259 | 5 | (D) | 1 | (D) |
| Asotin | 5 | 5 | 3 | (D) | 2 | (D) |
| Benton | 139 | 3,566 | 135 | 3,318 | 33 | 248 |
| Chelan | 309 | 5,632 | 303 | 4,997 | 113 | 635 |
| Clallam | 22 | 5 | 15 | 3 | 9 | 2 |
| Clark | 35 | 16 | 13 | 3 | 23 | 13 |
| Columbia | 2 | (D) | - | - | 2 | (D) |
| Cowlitz | 17 | 3 | 8 | 1 | 9 | 2 |
| Douglas | 240 | 3,397 | 231 | 3,052 | 64 | 345 |
| Ferry | 4 | 16 | 4 | 16 | - | - |
| Franklin | 94 | 2,893 | 94 | 2,671 | 29 | 222 |
| Grant | 168 | 7,277 | 161 | 6,505 | 47 | 772 |
| Island | 4 | (Z) | 4 | (Z) | - | - |
| Jefferson | 4 | 2 | 4 | 2 | - | - |
| King | 20 | 4 | 10 | 2 | 14 | 2 |
| Kitsap | 22 | 6 | 13 | 3 | 11 | 3 |
| Kittitas | 2 | (D) | 2 | (D) | - | - |
| Klickitat | 24 | 1,027 | 24 | 1,007 | 6 | 20 |
| Lewis | 10 | 3 | 3 | (Z) | 8 | 3 |
| Lincoln | 3 | (D) | 3 | (D) | - | - |
| Mason | 9 | 4 | 7 | (D) | 2 | (D) |
| Okanogan | 190 | 4,490 | 180 | 4,035 | 57 | 455 |
| Pend Oreille | 2 | (D) | 2 | (D) | 2 | (D) |
| Pierce | 29 | 5 | 9 | 1 | 20 | 3 |
| San Juan | 8 | 3 | 7 | (D) | 2 | (D) |
| Skagit | 12 | 3 | 8 | 3 | 4 | (Z) |
| Snohomish | 14 | 2 | 4 | 1 | 10 | 1 |
| Spokane | 56 | 66 | 44 | 59 | 14 | 7 |
| Stevens | 19 | 11 | 14 | 10 | 5 | 1 |
| Thurston | 15 | 5 | 11 | 3 | 4 | 2 |
| Wahkiakum | 1 | (D) | 1 | (D) | - | - |
| Walla Walla | 24 | 676 | 19 | 587 | 14 | 89 |
| Whatcom | 28 | 16 | 21 | 7 | 12 | 9 |
| Whitman | 3 | (D) | 1 | (D) | 2 | (D) |
| Yakima | 419 | 9,061 | 400 | 8,203 | 135 | 858 |
| **CHERRIES, TART** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 211 | 2,374 | 135 | 2,161 | 88 | 213 |
| 2007 | 130 | 1,444 | 103 | 1,241 | 39 | 203 |
| **Counties, 2012** | | | | | | |
| Asotin | 2 | (D) | - | - | 2 | (D) |
| Benton | 6 | (D) | 4 | (D) | 3 | 1 |
| Chelan | 8 | 2 | 6 | (D) | 2 | (D) |
| Clallam | 9 | 3 | 7 | 2 | 3 | (Z) |
| Clark | 14 | 3 | 10 | 2 | 4 | (Z) |
| Cowlitz | 3 | (D) | 2 | (D) | 1 | (D) |
| Douglas | 1 | (D) | 1 | (D) | - | - |
| Ferry | 3 | 2 | 3 | 2 | - | - |

--continued

Table 31. **Fruits and Nuts: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Bearing age acres | | Nonbearing age acres | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **CHERRIES, TART** - Con. | | | | | | |
| **Counties, 2012** - Con. | | | | | | |
| Franklin | 7 | 887 | 7 | (D) | 2 | (D) |
| Grant | 15 | 1,371 | 12 | (D) | 3 | (D) |
| Island | 1 | (D) | 1 | (D) | - | - |
| Jefferson | 4 | 2 | 3 | (D) | 1 | (D) |
| King | 13 | 2 | 5 | 1 | 11 | 1 |
| Kitsap | 8 | 1 | 4 | (Z) | 4 | 1 |
| Kittitas | 1 | (D) | - | - | 1 | (D) |
| Klickitat | 2 | (D) | 2 | (D) | - | - |
| Lewis | 5 | 1 | - | - | 5 | 1 |
| Mason | 3 | 1 | 1 | (D) | 2 | (D) |
| Okanogan | 10 | 6 | 10 | 6 | - | - |
| Pend Oreille | 2 | (D) | - | - | 2 | (D) |
| Pierce | 20 | 5 | 5 | 3 | 15 | 2 |
| San Juan | 3 | (Z) | 1 | (D) | 2 | (D) |
| Skagit | 5 | 1 | 5 | 1 | - | - |
| Snohomish | 5 | 1 | - | - | 5 | 1 |
| Spokane | 26 | 7 | 18 | 5 | 10 | 2 |
| Stevens | 5 | (D) | 4 | 1 | 1 | (D) |
| Thurston | 5 | 1 | 5 | 1 | - | - |
| Wahkiakum | 1 | (D) | 1 | (D) | - | - |
| Walla Walla | 4 | (D) | 4 | (D) | - | - |
| Whatcom | 11 | 5 | 8 | 4 | 5 | 1 |
| Whitman | 3 | (Z) | 1 | (D) | 2 | (D) |
| Yakima | 6 | 4 | 5 | (D) | 2 | (D) |
| **FIGS** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 29 | 4 | 19 | 3 | 10 | 1 |
| 2007 | 38 | 6 | 21 | 3 | 17 | 3 |
| **Counties, 2012** | | | | | | |
| Clallam | 2 | (D) | - | - | 2 | (D) |
| Clark | 6 | 1 | 2 | (D) | 4 | (D) |
| Cowlitz | 1 | (D) | 1 | (D) | - | - |
| Jefferson | 1 | (D) | 1 | (D) | - | - |
| Kitsap | 11 | 1 | 11 | 1 | - | - |
| Klickitat | 1 | (D) | 1 | (D) | - | - |
| Lewis | 1 | (D) | 1 | (D) | - | - |
| Pierce | 1 | (D) | - | - | 1 | (D) |
| San Juan | 4 | 1 | 2 | (D) | 2 | (D) |
| Thurston | 1 | (D) | - | - | 1 | (D) |
| **GRAPES** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 1,355 | 71,494 | 1,132 | 67,180 | 522 | 4,315 |
| 2007 | 1,219 | 61,055 | 1,086 | 57,025 | 393 | 4,030 |
| **Counties, 2012** | | | | | | |
| Adams | 2 | (D) | 2 | (D) | - | - |
| Asotin | 3 | (D) | 1 | (D) | 3 | 4 |
| Benton | 223 | 28,636 | 214 | 27,034 | 63 | 1,602 |
| Chelan | 53 | 326 | 49 | 276 | 20 | 50 |
| Clallam | 16 | 7 | 16 | (D) | 1 | (D) |
| Clark | 61 | 122 | 33 | 84 | 34 | 39 |
| Cowlitz | 12 | 6 | 12 | (D) | 1 | (D) |
| Douglas | 2 | (D) | 2 | (D) | - | - |
| Ferry | 1 | (D) | 1 | (D) | - | - |
| Franklin | 45 | 3,102 | 40 | 2,901 | 12 | 201 |
| Grant | 56 | 10,481 | 44 | 9,431 | 21 | 1,050 |
| Grays Harbor | 3 | (D) | 1 | (D) | 2 | (D) |
| Island | 8 | 17 | 8 | 17 | - | - |
| Jefferson | 8 | 6 | 6 | (D) | 2 | (D) |
| King | 34 | 109 | 18 | 84 | 21 | 25 |
| Kitsap | 26 | 8 | 19 | 7 | 11 | 2 |
| Kittitas | 11 | 45 | 6 | 19 | 9 | 26 |
| Klickitat | 41 | 4,879 | 39 | 4,828 | 13 | 51 |
| Lewis | 13 | 24 | 8 | 21 | 8 | 3 |
| Lincoln | 5 | 21 | 1 | (D) | 4 | (D) |
| Mason | 14 | 7 | 12 | 5 | 10 | 2 |
| Okanogan | 28 | 102 | 26 | 89 | 11 | 13 |
| Pend Oreille | 5 | 1 | - | - | 5 | 1 |
| Pierce | 40 | 23 | 25 | 18 | 21 | 5 |
| San Juan | 10 | 29 | 8 | 27 | 4 | 1 |
| Skagit | 39 | (D) | 28 | (D) | 18 | (D) |
| Skamania | 11 | 161 | 10 | (D) | 4 | (D) |
| Snohomish | 19 | 15 | 2 | (D) | 17 | (D) |
| Spokane | 20 | 16 | 15 | 13 | 5 | 3 |
| Stevens | 15 | 15 | 6 | 11 | 10 | 4 |
| Thurston | 14 | 3 | 11 | 2 | 4 | 1 |
| Wahkiakum | 2 | (D) | 1 | (D) | 1 | (D) |
| Walla Walla | 71 | 3,721 | 57 | 3,614 | 28 | 107 |
| Whatcom | 40 | 28 | 23 | 19 | 22 | 8 |
| Whitman | 3 | (D) | 1 | (D) | 3 | 1 |
| Yakima | 401 | 19,421 | 387 | 18,368 | 134 | 1,053 |

--continued

Table 31. **Fruits and Nuts: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Bearing age acres | | Nonbearing age acres | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **KIWIFRUIT** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 29 | 12 | 19 | 9 | 15 | 4 |
| 2007 | 47 | 30 | 37 | 24 | 12 | 6 |
| **Counties, 2012** | | | | | | |
| Benton | 1 | (D) | - | - | 1 | (D) |
| Chelan | 1 | (D) | 1 | (D) | - | - |
| Clallam | 2 | (D) | - | - | 2 | (D) |
| Clark | 4 | 1 | 2 | (D) | 2 | (D) |
| Grant | 1 | (D) | 1 | (D) | - | - |
| Island | 2 | (D) | 2 | (D) | - | - |
| Jefferson | 2 | (D) | 2 | (D) | - | - |
| Kitsap | 3 | 1 | 3 | (Z) | 3 | (Z) |
| Lewis | 3 | (D) | 3 | (D) | 1 | (D) |
| Pierce | 1 | (D) | - | - | 1 | (D) |
| San Juan | 2 | (D) | 2 | (D) | - | - |
| Snohomish | 4 | (D) | - | - | 4 | (D) |
| Thurston | 2 | (D) | 2 | (D) | - | - |
| Whatcom | 1 | (D) | 1 | (D) | 1 | (D) |
| **NECTARINES** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 145 | 1,748 | 129 | 1,589 | 35 | 159 |
| 2007 | 226 | 1,511 | 187 | 1,302 | 68 | 209 |
| **Counties, 2012** | | | | | | |
| Adams | 1 | (D) | 1 | (D) | - | - |
| Asotin | 3 | 4 | 3 | 4 | - | - |
| Benton | 15 | 57 | 15 | 57 | - | - |
| Chelan | 10 | 15 | 9 | (D) | 1 | (D) |
| Clark | 1 | (D) | - | - | 1 | (D) |
| Douglas | 13 | 41 | 13 | (D) | 3 | (D) |
| Ferry | 3 | 2 | 3 | 2 | - | - |
| Franklin | 15 | 427 | 15 | (D) | 1 | (D) |
| Grant | 10 | 146 | 10 | (D) | 2 | (D) |
| Kittitas | 1 | (D) | - | - | 1 | (D) |
| Klickitat | 1 | (D) | 1 | (D) | 1 | (D) |
| Okanogan | 17 | 21 | 16 | 18 | 4 | 3 |
| Pierce | 1 | (D) | 1 | (D) | - | - |
| Spokane | 6 | 5 | 2 | (D) | 4 | (D) |
| Stevens | 8 | 6 | 8 | (D) | 1 | (D) |
| Wahkiakum | 1 | (D) | - | - | 1 | (D) |
| Yakima | 39 | 974 | 32 | 830 | 15 | 144 |
| **PEACHES, ALL** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 322 | 2,714 | 265 | 2,402 | 107 | 312 |
| 2007 | 482 | 2,698 | 390 | 2,302 | 170 | 396 |
| **Counties, 2012** | | | | | | |
| Adams | 1 | (D) | 1 | (D) | - | - |
| Asotin | 3 | 16 | 3 | 16 | - | - |
| Benton | 20 | 91 | 20 | 90 | 4 | 1 |
| Chelan | 21 | 42 | 20 | 41 | 3 | 1 |
| Clark | 11 | 17 | 5 | (D) | 7 | (D) |
| Douglas | 35 | 197 | 31 | 162 | 14 | 35 |
| Ferry | 3 | 12 | 3 | 12 | - | - |
| Franklin | 18 | 614 | 18 | 593 | 5 | 21 |
| Garfield | 3 | (D) | 1 | (D) | 2 | (D) |
| Grant | 13 | 122 | 13 | (D) | 5 | (D) |
| Island | 1 | (D) | 1 | (D) | - | - |
| Jefferson | 2 | (D) | 2 | (D) | - | - |
| King | 10 | (D) | 5 | 2 | 5 | (D) |
| Kitsap | 5 | 3 | 4 | (D) | 1 | (D) |
| Kittitas | 1 | (D) | 1 | (D) | - | - |
| Klickitat | 3 | (D) | 3 | (D) | 1 | (D) |
| Okanogan | 32 | 72 | 30 | 63 | 11 | 9 |
| Pierce | 7 | 2 | 3 | 1 | 4 | (Z) |
| San Juan | 4 | (Z) | 3 | (D) | 1 | (D) |
| Skagit | 2 | (D) | 2 | (D) | 1 | (D) |
| Snohomish | 4 | (Z) | - | - | 4 | (Z) |
| Spokane | 30 | 51 | 17 | 40 | 13 | 12 |
| Stevens | 17 | 48 | 17 | 48 | - | - |
| Thurston | 1 | (D) | 1 | (D) | - | - |
| Wahkiakum | 1 | (D) | - | - | 1 | (D) |
| Walla Walla | 2 | (D) | 2 | (D) | - | - |
| Whatcom | 6 | (D) | 3 | (D) | 4 | (Z) |
| Whitman | 1 | (D) | 1 | (D) | - | - |
| Yakima | 65 | 1,349 | 55 | 1,155 | 21 | 194 |
| **PEARS, ALL** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 1,386 | 22,229 | 1,208 | 20,411 | 439 | 1,818 |
| 2007 | 1,530 | 25,514 | 1,430 | 23,924 | 364 | 1,590 |

--continued

Table 31. **Fruits and Nuts: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Bearing age acres | | Nonbearing age acres | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **PEARS, ALL** - Con. | | | | | | |
| **Counties, 2012** | | | | | | |
| Adams | 5 | 24 | 5 | 24 | - | - |
| Asotin | 3 | (D) | 3 | (D) | - | - |
| Benton | 28 | 322 | 21 | 314 | 9 | 8 |
| Chelan | 250 | 7,465 | 246 | 6,675 | 77 | 790 |
| Clallam | 29 | 11 | 24 | 8 | 10 | 3 |
| Clark | 48 | 55 | 31 | 31 | 23 | 24 |
| Columbia | 2 | (D) | 2 | (D) | 2 | (D) |
| Cowlitz | 19 | 7 | 13 | 4 | 8 | 3 |
| Douglas | 56 | 603 | 51 | 532 | 13 | 71 |
| Ferry | 6 | 36 | 6 | (D) | 1 | (D) |
| Franklin | 6 | 113 | 6 | (D) | 1 | (D) |
| Grant | 47 | 1,521 | 46 | 1,316 | 13 | 204 |
| Grays Harbor | 4 | (D) | 4 | (D) | - | - |
| Island | 8 | 4 | 6 | (D) | 2 | (D) |
| Jefferson | 8 | 7 | 6 | (D) | 3 | (D) |
| King | 28 | 30 | 18 | 27 | 10 | 4 |
| Kitsap | 36 | 12 | 20 | 8 | 22 | 4 |
| Kittitas | 16 | 105 | 15 | (D) | 1 | (D) |
| Klickitat | 7 | 1,086 | 7 | 1,024 | 4 | 61 |
| Lewis | 15 | 14 | 9 | 11 | 11 | 3 |
| Lincoln | 1 | (D) | - | - | 1 | (D) |
| Mason | 7 | 2 | 5 | (D) | 2 | (D) |
| Okanogan | 208 | 4,268 | 197 | 3,918 | 68 | 350 |
| Pierce | 39 | 13 | 21 | 7 | 18 | 6 |
| San Juan | 25 | 10 | 22 | 8 | 6 | 2 |
| Skagit | 25 | (D) | 22 | (D) | 8 | 1 |
| Skamania | 6 | (D) | 6 | (D) | 1 | (D) |
| Snohomish | 26 | 77 | 15 | 73 | 13 | 4 |
| Spokane | 37 | 28 | 23 | 21 | 16 | 7 |
| Stevens | 16 | 14 | 11 | 12 | 5 | 1 |
| Thurston | 20 | 22 | 18 | (D) | 2 | (D) |
| Walla Walla | 6 | 2 | 3 | (D) | 3 | (D) |
| Whatcom | 44 | 23 | 31 | 18 | 20 | 5 |
| Whitman | 5 | 4 | 3 | (D) | 2 | (D) |
| Yakima | 300 | 5,923 | 292 | 5,676 | 64 | 248 |
| **PEARS, BARTLETT** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 1,027 | 9,225 | 910 | 8,542 | 278 | 683 |
| 2007 | 1,190 | 12,288 | 1,130 | 11,466 | 233 | 822 |
| **Counties, 2012** | | | | | | |
| Adams | 4 | 23 | 4 | 23 | - | - |
| Asotin | 3 | 7 | 3 | 7 | - | - |
| Benton | 23 | 218 | 18 | 213 | 7 | 5 |
| Chelan | 213 | 2,207 | 209 | 1,996 | 54 | 211 |
| Clallam | 19 | 6 | 16 | 5 | 7 | 1 |
| Clark | 31 | 36 | 18 | 24 | 16 | 12 |
| Columbia | 2 | (D) | 2 | (D) | 2 | (D) |
| Cowlitz | 16 | 3 | 9 | 1 | 7 | 2 |
| Douglas | 48 | 273 | 43 | 226 | 8 | 47 |
| Ferry | 6 | (D) | 6 | (D) | 1 | (D) |
| Franklin | 4 | (D) | 3 | (D) | 1 | (D) |
| Grant | 40 | 565 | 39 | 512 | 7 | 54 |
| Island | 4 | (Z) | 4 | (Z) | - | - |
| Jefferson | 4 | 2 | 3 | (D) | 1 | (D) |
| King | 15 | 3 | 7 | 2 | 8 | 1 |
| Kitsap | 14 | 2 | 6 | 1 | 9 | 1 |
| Kittitas | 11 | 34 | 10 | (D) | 1 | (D) |
| Klickitat | 7 | 385 | 7 | (D) | 1 | (D) |
| Lewis | 10 | 8 | 5 | (D) | 7 | (D) |
| Lincoln | 1 | (D) | - | - | 1 | (D) |
| Mason | 4 | (D) | 4 | (D) | - | - |
| Okanogan | 160 | 1,125 | 152 | 982 | 46 | 143 |
| Pierce | 13 | 6 | 6 | 2 | 7 | 4 |
| San Juan | 12 | 3 | 11 | 2 | 3 | 1 |
| Skagit | 9 | (D) | 5 | (D) | 4 | (Z) |
| Skamania | 6 | (D) | 6 | (D) | - | - |
| Snohomish | 11 | 3 | 4 | 2 | 9 | 1 |
| Spokane | 28 | 23 | 16 | 20 | 12 | 3 |
| Stevens | 9 | 3 | 5 | 3 | 4 | 1 |
| Thurston | 10 | (D) | 10 | (D) | - | - |
| Walla Walla | 3 | 1 | 2 | (D) | 1 | (D) |
| Whatcom | 12 | 3 | 12 | 2 | 3 | 1 |
| Whitman | 3 | 1 | 1 | (D) | 2 | (D) |
| Yakima | 272 | 4,139 | 264 | 3,966 | 49 | 173 |
| **PEARS, OTHER THAN BARTLETT** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 1,099 | 13,004 | 953 | 11,869 | 334 | 1,136 |
| 2007 | 1,123 | 13,226 | 1,041 | 12,458 | 243 | 768 |
| **Counties, 2012** | | | | | | |
| Adams | 3 | 1 | 3 | 1 | - | - |
| Asotin | 3 | (D) | 3 | (D) | - | - |
| Benton | 19 | 104 | 13 | 101 | 7 | 3 |

--continued

Table 31. **Fruits and Nuts: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Bearing age acres | | Nonbearing age acres | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **PEARS, OTHER THAN BARTLETT** - Con. | | | | | | |
| **Counties, 2012** - Con. | | | | | | |
| Chelan | 231 | 5,257 | 229 | 4,678 | 62 | 579 |
| Clallam | 25 | 5 | 21 | 4 | 7 | 1 |
| Clark | 37 | 19 | 20 | 7 | 17 | 12 |
| Columbia | 2 | (D) | 2 | (D) | 2 | (D) |
| Cowlitz | 18 | 4 | 12 | 3 | 6 | 1 |
| Douglas | 42 | 331 | 42 | 306 | 7 | 25 |
| Ferry | 4 | (D) | 4 | (D) | - | - |
| Franklin | 6 | (D) | 6 | 70 | 1 | (D) |
| Grant | 37 | 955 | 34 | 805 | 12 | 151 |
| Grays Harbor | 4 | (D) | 4 | (D) | - | - |
| Island | 6 | 4 | 4 | (D) | 2 | (D) |
| Jefferson | 6 | 5 | 5 | (D) | 2 | (D) |
| King | 28 | 28 | 17 | 25 | 11 | 2 |
| Kitsap | 31 | 9 | 18 | 7 | 17 | 2 |
| Kittitas | 14 | 71 | 13 | (D) | 1 | (D) |
| Klickitat | 5 | 701 | 5 | (D) | 4 | (D) |
| Lewis | 10 | 6 | 6 | (D) | 7 | (D) |
| Lincoln | 1 | (D) | - | - | 1 | (D) |
| Mason | 5 | (D) | 3 | (D) | 2 | (D) |
| Okanogan | 178 | 3,143 | 174 | 2,936 | 51 | 207 |
| Pierce | 32 | 8 | 15 | 5 | 17 | 3 |
| San Juan | 18 | 7 | 15 | 6 | 5 | 1 |
| Skagit | 19 | (D) | 18 | (D) | 4 | 1 |
| Skamania | 6 | (D) | 6 | (D) | 1 | (D) |
| Snohomish | 23 | 74 | 12 | 71 | 11 | 3 |
| Spokane | 22 | 5 | 12 | 2 | 12 | 4 |
| Stevens | 14 | 10 | 9 | 10 | 5 | 1 |
| Thurston | 16 | (D) | 14 | (D) | 2 | (D) |
| Walla Walla | 3 | 1 | 1 | (D) | 2 | (D) |
| Whatcom | 40 | 20 | 27 | 16 | 19 | 4 |
| Whitman | 5 | 3 | 3 | (D) | 2 | (D) |
| Yakima | 186 | 1,784 | 183 | 1,709 | 35 | 75 |
| **PERSIMMONS** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 8 | 1 | 5 | 1 | 3 | (Z) |
| 2007 | 6 | 1 | 1 | (D) | 5 | (D) |
| **Counties, 2012** | | | | | | |
| Clark | 2 | (D) | - | - | 2 | (D) |
| Kitsap | 2 | (D) | 2 | (D) | - | - |
| Lewis | 1 | (D) | 1 | (D) | - | - |
| San Juan | 1 | (D) | 1 | (D) | - | - |
| Skagit | 1 | (D) | 1 | (D) | - | - |
| Thurston | 1 | (D) | - | - | 1 | (D) |
| **PLUMS AND PRUNES** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 281 | 398 | 210 | 346 | 100 | 52 |
| 2007 | 418 | 699 | 329 | 588 | 118 | 111 |
| **Counties, 2012** | | | | | | |
| Benton | 15 | 72 | 12 | 70 | 5 | 2 |
| Chelan | 10 | (D) | 9 | 2 | 1 | (D) |
| Clallam | 5 | 3 | 2 | (D) | 3 | (D) |
| Clark | 30 | 27 | 21 | (D) | 10 | (D) |
| Douglas | 1 | (D) | 1 | (D) | - | - |
| Ferry | 3 | (D) | 1 | (D) | 2 | (D) |
| Franklin | 1 | (D) | 1 | (D) | - | - |
| Grant | 8 | 3 | 8 | 3 | - | - |
| Island | 3 | (Z) | 3 | (Z) | - | - |
| Jefferson | 2 | (D) | 2 | (D) | - | - |
| King | 15 | 5 | 10 | 3 | 7 | 2 |
| Kitsap | 18 | 2 | 10 | 1 | 11 | 1 |
| Kittitas | 3 | (D) | 3 | 1 | 1 | (D) |
| Klickitat | 1 | (D) | 1 | (D) | - | - |
| Lewis | 4 | 1 | 2 | (D) | 3 | (D) |
| Lincoln | 1 | (D) | - | - | 1 | (D) |
| Mason | 4 | 1 | 4 | 1 | - | - |
| Okanogan | 8 | (D) | 8 | 3 | 1 | (D) |
| Pierce | 12 | 2 | 9 | 2 | 3 | (Z) |
| San Juan | 13 | 4 | 8 | 3 | 6 | 1 |
| Skagit | 14 | 3 | 11 | 2 | 5 | 1 |
| Snohomish | 18 | 4 | 10 | 1 | 10 | 3 |
| Spokane | 17 | 7 | 11 | 6 | 7 | 1 |
| Stevens | 6 | 5 | 6 | (D) | 2 | (D) |
| Thurston | 3 | 1 | 1 | (D) | 2 | (D) |
| Wahkiakum | 2 | (D) | 1 | (D) | 1 | (D) |
| Walla Walla | 2 | (D) | 1 | (D) | 1 | (D) |
| Whatcom | 23 | 6 | 17 | (D) | 9 | (D) |
| Whitman | 3 | 10 | 3 | (D) | 2 | (D) |
| Yakima | 36 | 199 | 34 | 187 | 7 | 12 |

--continued

Table 31. **Fruits and Nuts: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Bearing age acres | | Nonbearing age acres | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **PLUMCOTS, PLUOTS, AND OTHER PLUM-APRICOT HYBRIDS (SEE TEXT)** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | 33 | 65 | 30 | 60 | 5 | 5 |
| 2007 | 45 | 179 | 38 | 130 | 12 | 50 |
| **Counties, 2012** | | | | | | |
| Adams | 1 | (D) | 1 | (D) | - | - |
| Benton | 2 | (D) | 2 | (D) | - | - |
| Chelan | 2 | (D) | 2 | (D) | 1 | (D) |
| Clark | 2 | (D) | 2 | (D) | - | - |
| Douglas | 2 | (D) | 2 | (D) | - | - |
| Franklin | 4 | (D) | 4 | (D) | - | - |
| Grant | 2 | (D) | 2 | (D) | - | - |
| King | 1 | (D) | 1 | (D) | - | - |
| Kitsap | 3 | 1 | 3 | 1 | - | - |
| Lewis | 1 | (D) | - | - | 1 | (D) |
| Okanogan | 4 | (D) | 4 | 5 | 1 | (D) |
| Spokane | 1 | (D) | 1 | (D) | - | - |
| Yakima | 8 | 9 | 6 | (D) | 2 | (D) |
| **POMEGRANATES** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | - | - | - | - | - | - |
| 2007 | 3 | (Z) | - | - | 3 | (Z) |
| **OTHER NONCITRUS FRUIT** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | 56 | 56 | 32 | 39 | 29 | 18 |
| 2007 | 173 | 137 | 166 | (D) | 7 | (D) |
| **Counties, 2012** | | | | | | |
| Clallam | 3 | (D) | 2 | (D) | 1 | (D) |
| Clark | 8 | 1 | 4 | 1 | 4 | (Z) |
| Grant | 2 | (D) | 2 | (D) | - | - |
| Grays Harbor | 4 | (D) | - | - | 4 | (D) |
| Island | 2 | (D) | 2 | (D) | - | - |
| King | 4 | 2 | 2 | (D) | 3 | (D) |
| Kitsap | 1 | (D) | - | - | 1 | (D) |
| Kittitas | 2 | (D) | 2 | (D) | - | - |
| Lewis | 1 | (D) | - | - | 1 | (D) |
| Okanogan | 4 | 16 | 4 | 6 | 3 | 11 |
| Pierce | 2 | (D) | 1 | (D) | 1 | (D) |
| San Juan | 5 | 2 | 5 | (D) | 1 | (D) |
| Skagit | 2 | (D) | 1 | (D) | 1 | (D) |
| Snohomish | 4 | (D) | 4 | (D) | - | - |
| Spokane | 4 | (D) | - | - | 4 | (D) |
| Stevens | 4 | 2 | 2 | (D) | 2 | (D) |
| Thurston | 1 | (D) | - | - | 1 | (D) |
| Wahkiakum | 1 | (D) | 1 | (D) | - | - |
| Whitman | 2 | (D) | - | - | 2 | (D) |
| **CITRUS FRUIT, ALL** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | 8 | 1 | 7 | (D) | 1 | (D) |
| 2007 | - | - | - | - | - | - |
| **Counties, 2012** | | | | | | |
| Clallam | 2 | (D) | 2 | (D) | - | - |
| Clark | 1 | (D) | - | - | 1 | (D) |
| San Juan | 3 | 1 | 3 | 1 | - | - |
| Spokane | 1 | (D) | 1 | (D) | - | - |
| Thurston | 1 | (D) | 1 | (D) | - | - |
| **OTHER CITRUS FRUIT** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | 8 | 1 | 7 | (D) | 1 | (D) |
| 2007 | - | - | - | - | - | - |
| **Counties, 2012** | | | | | | |
| Clallam | 2 | (D) | 2 | (D) | - | - |
| Clark | 1 | (D) | - | - | 1 | (D) |
| San Juan | 3 | 1 | 3 | 1 | - | - |
| Spokane | 1 | (D) | 1 | (D) | - | - |
| Thurston | 1 | (D) | 1 | (D) | - | - |
| **NUTS, ALL** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | 231 | 558 | 150 | 401 | 113 | 157 |
| 2007 | 308 | 590 | 230 | 400 | 122 | 190 |
| **Counties, 2012** | | | | | | |
| Benton | 8 | 21 | 6 | (D) | 3 | (D) |

--continued

Table 31. **Fruits and Nuts: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Bearing age acres | | Nonbearing age acres | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **NUTS, ALL** - Con. | | | | | | |
| **Counties, 2012** - Con. | | | | | | |
| Chelan | 6 | (D) | 4 | (D) | 4 | 2 |
| Clallam | 4 | (D) | 4 | 1 | 1 | (D) |
| Clark | 23 | (D) | 15 | 81 | 9 | (D) |
| Douglas | 1 | (D) | 1 | (D) | - | - |
| Franklin | 5 | 24 | 5 | 24 | - | - |
| Grant | 3 | (D) | 2 | (D) | 1 | (D) |
| Grays Harbor | 1 | (D) | 1 | (D) | 1 | (D) |
| Island | 3 | (D) | 3 | (D) | - | - |
| Jefferson | 4 | (D) | 3 | (D) | 1 | (D) |
| King | 14 | 3 | 7 | 1 | 7 | 2 |
| Kitsap | 13 | 5 | 7 | 2 | 9 | 3 |
| Kittitas | 1 | (D) | - | - | 1 | (D) |
| Klickitat | 4 | (D) | - | - | 4 | (D) |
| Lewis | 19 | 93 | 10 | 44 | 16 | 49 |
| Okanogan | 13 | 37 | 11 | 36 | 4 | 1 |
| Pierce | 5 | 4 | 2 | (D) | 5 | (D) |
| San Juan | 7 | 6 | 5 | (D) | 2 | (D) |
| Skagit | 16 | 8 | 11 | 3 | 7 | 5 |
| Snohomish | 8 | (D) | 5 | (D) | 5 | (D) |
| Spokane | 10 | (D) | 5 | (D) | 5 | 13 |
| Stevens | 8 | (D) | 4 | (D) | 4 | 1 |
| Thurston | 12 | (D) | 6 | 5 | 9 | (D) |
| Wahkiakum | 1 | (D) | - | - | 1 | (D) |
| Walla Walla | 6 | 3 | 6 | (D) | 2 | (D) |
| Whatcom | 22 | 128 | 16 | 106 | 8 | 22 |
| Yakima | 14 | 15 | 11 | 14 | 4 | 1 |
| **ALMONDS** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 6 | 5 | 2 | (D) | 6 | (D) |
| 2007 | 10 | 1 | 5 | 1 | 5 | 1 |
| **Counties, 2012** | | | | | | |
| Chelan | 3 | (D) | 2 | (D) | 3 | (D) |
| Okanogan | 2 | (D) | - | - | 2 | (D) |
| Yakima | 1 | (D) | - | - | 1 | (D) |
| **CHESTNUTS** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 18 | 57 | 13 | (D) | 12 | (D) |
| 2007 | 43 | 66 | 31 | 43 | 16 | 23 |
| **Counties, 2012** | | | | | | |
| Clallam | 1 | (D) | 1 | (D) | - | - |
| Clark | 2 | (D) | 2 | (D) | - | - |
| Grays Harbor | 1 | (D) | 1 | (D) | 1 | (D) |
| King | 1 | (D) | 1 | (D) | - | - |
| Klickitat | 2 | (D) | - | - | 2 | (D) |
| Lewis | 5 | 12 | 5 | (D) | 4 | (D) |
| Snohomish | 1 | (D) | - | - | 1 | (D) |
| Spokane | 1 | (D) | 1 | (D) | - | - |
| Thurston | 1 | (D) | - | - | 1 | (D) |
| Walla Walla | 1 | (D) | 1 | (D) | 1 | (D) |
| Whatcom | 2 | (D) | 1 | (D) | 2 | (D) |
| **HAZELNUTS (FILBERTS)** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 115 | 228 | 69 | 157 | 62 | 71 |
| 2007 | 160 | 298 | 118 | 216 | 59 | 82 |
| **Counties, 2012** | | | | | | |
| Benton | 1 | (D) | 1 | (D) | - | - |
| Clallam | 2 | (D) | 2 | (D) | - | - |
| Clark | 8 | (D) | 4 | (D) | 5 | (D) |
| Franklin | 1 | (D) | 1 | (D) | - | - |
| Grant | 2 | (D) | 2 | (D) | - | - |
| Island | 3 | (D) | 3 | (D) | - | - |
| Jefferson | 2 | (D) | 1 | (D) | 1 | (D) |
| King | 10 | 2 | 6 | (D) | 4 | (D) |
| Kitsap | 9 | 4 | 4 | 1 | 8 | 3 |
| Kittitas | 1 | (D) | - | - | 1 | (D) |
| Lewis | 13 | 63 | 4 | (D) | 12 | (D) |
| Okanogan | 1 | (D) | 1 | (D) | - | - |
| Pierce | 3 | (D) | - | - | 3 | (D) |
| San Juan | 6 | 3 | 4 | (D) | 2 | (D) |
| Skagit | 12 | 7 | 10 | (D) | 4 | (D) |
| Snohomish | 7 | 13 | 4 | (D) | 5 | (D) |
| Spokane | 5 | 4 | 4 | (D) | 1 | (D) |
| Thurston | 10 | 6 | 6 | 5 | 7 | 1 |
| Wahkiakum | 1 | (D) | - | - | 1 | (D) |
| Whatcom | 17 | 102 | 11 | (D) | 7 | (D) |
| Yakima | 1 | (D) | 1 | (D) | 1 | (D) |

--continued

Table 31. **Fruits and Nuts: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | | Total | | Bearing age acres | | Nonbearing age acres | |
|---|---|---|---|---|---|---|---|
| | | Farms | Acres | Farms | Acres | Farms | Acres |
| **PECANS, ALL** | | | | | | | |
| **State Total** | | | | | | | |
| Washington | 2012 | 3 | (Z) | - | - | 3 | (Z) |
| | 2007 | - | - | - | - | - | - |
| **Counties, 2012** | | | | | | | |
| Lewis | | 1 | (D) | - | - | 1 | (D) |
| Spokane | | 2 | (D) | - | - | 2 | (D) |
| **PECANS, NATIVE AND SEEDLING** | | | | | | | |
| **State Total** | | | | | | | |
| Washington | 2012 | 3 | (Z) | - | - | 3 | (Z) |
| | 2007 | - | - | - | - | - | - |
| **Counties, 2012** | | | | | | | |
| Lewis | | 1 | (D) | - | - | 1 | (D) |
| Spokane | | 2 | (D) | - | - | 2 | (D) |
| **WALNUTS, ENGLISH** | | | | | | | |
| **State Total** | | | | | | | |
| Washington | 2012 | 119 | 221 | 77 | 180 | 50 | 41 |
| | 2007 | 173 | 173 | 130 | 108 | 54 | 65 |
| **Counties, 2012** | | | | | | | |
| Benton | | 7 | (D) | 5 | (D) | 3 | (D) |
| Chelan | | 3 | (D) | 2 | (D) | 1 | (D) |
| Clallam | | 2 | (D) | 2 | (D) | 1 | (D) |
| Clark | | 14 | 66 | 7 | 64 | 7 | 2 |
| Douglas | | 1 | (D) | 1 | (D) | - | - |
| Franklin | | 5 | (D) | 5 | (D) | - | - |
| Jefferson | | 2 | (D) | 2 | (D) | - | - |
| King | | 3 | (D) | - | - | 3 | (D) |
| Kitsap | | 6 | 1 | 3 | (Z) | 3 | (Z) |
| Klickitat | | 2 | (D) | - | - | 2 | (D) |
| Lewis | | 10 | 14 | 4 | 3 | 8 | 11 |
| Okanogan | | 11 | (D) | 10 | (D) | 1 | (D) |
| Pierce | | 2 | (D) | 2 | (D) | 2 | (D) |
| San Juan | | 5 | 3 | 5 | 3 | - | - |
| Skagit | | 7 | 1 | 4 | (D) | 4 | (D) |
| Snohomish | | 5 | (D) | 3 | (Z) | 2 | (D) |
| Spokane | | 6 | 13 | 1 | (D) | 5 | (D) |
| Stevens | | 4 | (D) | 2 | (D) | 2 | (D) |
| Thurston | | 1 | (D) | - | - | 1 | (D) |
| Walla Walla | | 4 | 2 | 4 | (D) | 1 | (D) |
| Whatcom | | 7 | (D) | 5 | 5 | 2 | (D) |
| Yakima | | 12 | 14 | 10 | (D) | 2 | (D) |
| **OTHER NUTS** | | | | | | | |
| **State Total** | | | | | | | |
| Washington | 2012 | 17 | 47 | 10 | 35 | 7 | 12 |
| | 2007 | 20 | 53 | 15 | 34 | 6 | 19 |
| **Counties, 2012** | | | | | | | |
| Clallam | | 1 | (D) | 1 | (D) | - | - |
| Clark | | 3 | 4 | 3 | 4 | - | - |
| Grant | | 1 | (D) | - | - | 1 | (D) |
| Island | | 1 | (D) | 1 | (D) | - | - |
| Lewis | | 1 | (D) | - | - | 1 | (D) |
| Okanogan | | 2 | (D) | 1 | (D) | 1 | (D) |
| Stevens | | 4 | 1 | 2 | (D) | 2 | (D) |
| Thurston | | 2 | (D) | - | - | 2 | (D) |
| Walla Walla | | 1 | (D) | 1 | (D) | - | - |
| Whatcom | | 1 | (D) | 1 | (D) | - | - |

## Table 32. **Land in Berries: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | 2007 | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | | Irrigated | | Total | | Irrigated | |
| | Farms | Acres | Farms | Acres | Farms | Acres | Farms | Acres |
| **State Total** | | | | | | | | |
| Washington | 1,828 | 24,076 | 1,801 | 24,010 | 1,282 | 20,324 | 891 | 19,176 |
| **Counties** | | | | | | | | |
| Adams | 2 | (D) | 2 | (D) | 2 | (D) | 2 | (D) |
| Asotin | 3 | 2 | 3 | 2 | 6 | 3 | 6 | 3 |
| Benton | 34 | 2,544 | 34 | 2,544 | 22 | (D) | 22 | (D) |
| Chelan | 37 | 58 | 37 | 58 | 14 | (D) | 14 | (D) |
| Clallam | 41 | (D) | 40 | (D) | 35 | 67 | 32 | 64 |
| Clark | 177 | 1,086 | 177 | 1,086 | 141 | 1,335 | 75 | 1,099 |
| Columbia | 9 | 4 | 9 | 4 | - | - | - | - |
| Cowlitz | 27 | 629 | 27 | 629 | 20 | 666 | 11 | 659 |
| Douglas | 8 | 5 | 8 | 5 | 4 | 5 | 4 | 5 |
| Ferry | 9 | 3 | 9 | 3 | - | - | - | - |
| Franklin | 12 | 51 | 12 | 51 | 6 | 10 | 6 | 10 |
| Garfield | 2 | (D) | 2 | (D) | - | - | - | - |
| Grant | 19 | 765 | 19 | 765 | 13 | 195 | 13 | 195 |
| Grays Harbor | 42 | 329 | 42 | 329 | 48 | 353 | 38 | 323 |
| Island | 41 | 60 | 34 | 57 | 31 | 17 | 14 | 13 |
| Jefferson | 24 | 42 | 23 | (D) | 22 | 12 | 8 | 6 |
| King | 139 | 231 | 139 | 231 | 69 | 115 | 25 | 23 |
| Kitsap | 111 | 60 | 106 | 49 | 71 | 83 | 44 | 64 |
| Kittitas | 12 | 9 | 12 | 9 | 18 | 8 | 18 | 8 |
| Klickitat | 10 | 15 | 10 | 15 | 12 | 7 | 12 | 7 |
| Lewis | 45 | 238 | 45 | 238 | 23 | 129 | 14 | 115 |
| Lincoln | 2 | (D) | 2 | (D) | 3 | 1 | 3 | 1 |
| Mason | 25 | 12 | 25 | 12 | 23 | 9 | 11 | 7 |
| Okanogan | 40 | 24 | 40 | 24 | 29 | 10 | 29 | 10 |
| Pacific | 91 | 1,481 | 91 | 1,481 | 88 | 1,514 | 84 | 1,471 |
| Pend Oreille | 8 | 4 | 8 | 4 | 5 | 11 | 5 | 11 |
| Pierce | 99 | 224 | 99 | 224 | 64 | 243 | 29 | 146 |
| San Juan | 33 | 13 | 29 | 12 | 37 | 33 | 25 | 27 |
| Skagit | 84 | 2,284 | 84 | 2,284 | 81 | 2,355 | 47 | 2,123 |
| Skamania | 16 | 4 | 16 | 4 | 2 | (D) | - | - |
| Snohomish | 92 | 127 | 92 | 127 | 70 | 186 | 24 | 49 |
| Spokane | 70 | 152 | 70 | 152 | 41 | 93 | 41 | 93 |
| Stevens | 40 | 29 | 40 | 29 | 12 | 7 | 12 | 7 |
| Thurston | 108 | 195 | 101 | 193 | 47 | 242 | 23 | 198 |
| Wahkiakum | 4 | (Z) | 4 | (Z) | 3 | 1 | 3 | 1 |
| Walla Walla | 23 | (D) | 23 | (D) | 9 | 82 | 9 | 82 |
| Whatcom | 232 | 12,703 | 232 | 12,693 | 179 | 11,379 | 156 | 11,205 |
| Whitman | 12 | 22 | 10 | (D) | 2 | (D) | 2 | (D) |
| Yakima | 45 | 422 | 45 | 422 | 30 | 68 | 30 | 68 |

## Table 33. **Berries: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Harvested | | Not harvested | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **BLACKBERRIES AND DEWBERRIES (INCLUDING MARIONBERRIES)** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | 407 | 920 | 295 | 683 | 175 | 236 |
| 2007 | 223 | 549 | 187 | 341 | 63 | 208 |
| **Counties, 2012** | | | | | | |
| Adams | 1 | (D) | 1 | (D) | - | - |
| Benton | 5 | (D) | 5 | (D) | 1 | (D) |
| Chelan | 3 | (D) | 2 | (D) | 1 | (D) |
| Clallam | 13 | 13 | 11 | 10 | 5 | 3 |
| Clark | 45 | 133 | 40 | 73 | 12 | 60 |
| Columbia | 8 | 2 | - | - | 8 | 2 |
| Cowlitz | 9 | (D) | 8 | (D) | 4 | (D) |
| Douglas | 1 | (D) | - | - | 1 | (D) |
| Ferry | 2 | (D) | 2 | (D) | - | - |
| Franklin | 4 | 2 | 4 | (D) | 1 | (D) |
| Grant | 7 | 4 | 4 | 1 | 4 | 3 |
| Grays Harbor | 4 | 5 | 1 | (D) | 4 | (D) |
| Island | 8 | 3 | 5 | 2 | 3 | 2 |
| Jefferson | 3 | (D) | 3 | (Z) | 1 | (D) |
| King | 37 | 18 | 28 | 11 | 14 | 7 |
| Kitsap | 29 | 12 | 24 | 7 | 9 | 5 |
| Kittitas | 3 | 1 | 2 | (D) | 1 | (D) |
| Klickitat | 1 | (D) | 1 | (D) | - | - |
| Lewis | 9 | 5 | 1 | (D) | 9 | (D) |
| Mason | 8 | 2 | 6 | 1 | 3 | 1 |
| Okanogan | 7 | (D) | 3 | (D) | 5 | 1 |
| Pacific | 4 | 1 | 3 | (D) | 1 | (D) |
| Pend Oreille | 2 | (D) | 2 | (D) | - | - |
| Pierce | 42 | 32 | 30 | 20 | 23 | 12 |
| San Juan | 9 | 2 | 9 | (D) | 1 | (D) |
| Skagit | 28 | 250 | 27 | 213 | 5 | 37 |
| Skamania | 2 | (D) | 2 | (D) | - | - |
| Snohomish | 22 | 22 | 16 | 19 | 11 | 3 |
| Spokane | 8 | 7 | 6 | 7 | 3 | 1 |
| Stevens | 14 | 9 | 10 | 7 | 4 | 2 |
| Thurston | 27 | 18 | 13 | 13 | 18 | 5 |
| Walla Walla | 5 | 4 | 5 | 4 | - | - |
| Whatcom | 27 | 44 | 11 | 10 | 20 | 35 |
| Whitman | 2 | (D) | 2 | (D) | 2 | (D) |
| Yakima | 8 | (D) | 8 | 3 | 1 | (D) |
| **BLUEBERRIES, TAME** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | 823 | 8,911 | 639 | 7,758 | 295 | 1,152 |
| 2007 | 564 | 5,490 | 475 | 3,926 | 163 | 1,563 |
| **Counties, 2012** | | | | | | |
| Adams | 1 | (D) | 1 | (D) | - | - |
| Benton | 12 | 1,914 | 12 | 1,914 | - | - |
| Chelan | 23 | 49 | 19 | 48 | 5 | 1 |
| Clallam | 18 | 9 | 16 | 7 | 5 | 2 |
| Clark | 108 | 253 | 92 | 199 | 35 | 55 |
| Columbia | 2 | (D) | - | - | 2 | (D) |
| Cowlitz | 18 | (D) | 15 | (D) | 4 | 7 |
| Douglas | 6 | 5 | 2 | (D) | 4 | (D) |
| Ferry | 4 | (D) | 4 | (D) | - | - |
| Franklin | 3 | 36 | 3 | 36 | - | - |
| Grant | 6 | 758 | 5 | (D) | 4 | (D) |
| Grays Harbor | 17 | 12 | 8 | 4 | 9 | 9 |
| Island | 13 | 32 | 11 | 9 | 3 | 23 |
| Jefferson | 11 | 11 | 11 | 11 | - | - |
| King | 61 | 124 | 49 | 117 | 16 | 8 |
| Kitsap | 57 | 26 | 42 | 11 | 20 | 15 |
| Kittitas | 8 | 5 | 6 | (D) | 2 | (D) |
| Klickitat | 1 | (D) | - | - | 1 | (D) |
| Lewis | 31 | 220 | 16 | 213 | 16 | 7 |
| Lincoln | 1 | (D) | 1 | (D) | 1 | (D) |
| Mason | 15 | 6 | 12 | 6 | 3 | (Z) |
| Okanogan | 8 | 6 | 7 | (D) | 2 | (D) |
| Pacific | 6 | 15 | 4 | (D) | 2 | (D) |
| Pend Oreille | 4 | 2 | 4 | 2 | - | - |
| Pierce | 39 | 31 | 27 | 23 | 15 | 8 |
| San Juan | 11 | 3 | 9 | 2 | 4 | 1 |
| Skagit | 46 | 1,087 | 39 | 1,050 | 11 | 38 |
| Skamania | 6 | 2 | 6 | 2 | - | - |
| Snohomish | 47 | 57 | 42 | 52 | 11 | 4 |
| Spokane | 20 | 15 | 8 | (D) | 14 | (D) |
| Stevens | 9 | 8 | 7 | 7 | 4 | (Z) |
| Thurston | 52 | 59 | 30 | 38 | 31 | 22 |
| Walla Walla | 5 | (D) | 3 | (D) | 3 | (Z) |
| Whatcom | 137 | 3,611 | 111 | 3,104 | 61 | 506 |
| Yakima | 17 | 298 | 17 | (D) | 7 | (D) |

--continued

Table 33. **Berries: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Harvested | | Not harvested | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **BLUEBERRIES, WILD** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 4 | 11 | 2 | (D) | 2 | (D) |
| 2007 | - | - | - | - | - | - |
| **Counties, 2012** | | | | | | |
| Columbia | 1 | (D) | - | - | 1 | (D) |
| Lewis | 1 | (D) | 1 | (D) | - | - |
| Skagit | 1 | (D) | - | - | 1 | (D) |
| Whatcom | 1 | (D) | 1 | (D) | - | - |
| **BOYSENBERRIES** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 48 | 14 | 34 | (D) | 16 | (D) |
| 2007 | 34 | 40 | 26 | (D) | 9 | (D) |
| **Counties, 2012** | | | | | | |
| Asotin | 1 | (D) | 1 | (D) | - | - |
| Clark | 4 | 3 | 3 | (D) | 2 | (D) |
| Cowlitz | 2 | (D) | 1 | (D) | 1 | (D) |
| Grant | 2 | (D) | - | - | 2 | (D) |
| Jefferson | 1 | (D) | 1 | (D) | - | - |
| King | 1 | (D) | 1 | (D) | - | - |
| Kitsap | 3 | 1 | 1 | (D) | 2 | (D) |
| Kittitas | 1 | (D) | - | - | 1 | (D) |
| Lewis | 1 | (D) | 1 | (D) | - | - |
| Pacific | 3 | (Z) | 2 | (D) | 1 | (D) |
| Pierce | 4 | 2 | 4 | 2 | - | - |
| Skagit | 5 | 3 | 4 | (D) | 1 | (D) |
| Skamania | 2 | (D) | 2 | (D) | - | - |
| Snohomish | 2 | (D) | 2 | (D) | - | - |
| Spokane | 4 | (D) | 1 | (D) | 3 | (Z) |
| Thurston | 10 | (D) | 8 | 1 | 2 | (D) |
| Whatcom | 2 | (D) | 2 | (D) | 1 | (D) |
| **CRANBERRIES** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 111 | 1,799 | 106 | 1,671 | 40 | 128 |
| 2007 | 130 | 1,899 | 123 | 1,752 | 48 | 147 |
| **Counties, 2012** | | | | | | |
| Clallam | 1 | (D) | - | - | 1 | (D) |
| Grays Harbor | 23 | 305 | 22 | (D) | 11 | (D) |
| Pacific | 79 | 1,459 | 79 | 1,349 | 23 | 110 |
| Pend Oreille | 1 | (D) | - | - | 1 | (D) |
| Spokane | 2 | (D) | - | - | 2 | (D) |
| Thurston | 3 | 2 | 3 | (D) | 2 | (D) |
| Whatcom | 2 | (D) | 2 | (D) | - | - |
| **CURRANTS** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 67 | 85 | 52 | 61 | 26 | 24 |
| 2007 | 35 | 103 | 25 | 83 | 14 | 20 |
| **Counties, 2012** | | | | | | |
| Adams | 1 | (D) | 1 | (D) | - | - |
| Benton | 4 | 1 | 4 | 1 | - | - |
| Chelan | 3 | 2 | 3 | (D) | 2 | (D) |
| Clallam | 1 | (D) | 1 | (D) | - | - |
| Clark | 8 | 3 | 4 | 1 | 6 | 2 |
| Cowlitz | 2 | (D) | 2 | (D) | 2 | (D) |
| Grays Harbor | 2 | (D) | 2 | (D) | - | - |
| Island | 1 | (D) | 1 | (D) | - | - |
| Jefferson | 1 | (D) | - | - | 1 | (D) |
| King | 6 | (D) | 4 | (Z) | 2 | (D) |
| Kitsap | 6 | 2 | 6 | (D) | 2 | (D) |
| Mason | 1 | (D) | - | - | 1 | (D) |
| Okanogan | 1 | (D) | 1 | (D) | - | - |
| Pacific | 1 | (D) | 1 | (D) | - | - |
| Pend Oreille | 4 | (Z) | 3 | (D) | 1 | (D) |
| Pierce | 5 | 1 | 3 | (D) | 2 | (D) |
| San Juan | 1 | (D) | 1 | (D) | - | - |
| Skagit | 3 | 1 | 1 | (D) | 2 | (D) |
| Snohomish | 3 | (D) | 3 | (D) | - | - |
| Spokane | 7 | 3 | 5 | 2 | 4 | 1 |
| Whatcom | 6 | (D) | 6 | (D) | 1 | (D) |
| **LOGANBERRIES** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 28 | 8 | 16 | (D) | 12 | (D) |
| 2007 | 30 | 10 | 28 | (D) | 2 | (D) |
| **Counties, 2012** | | | | | | |
| Clallam | 1 | (D) | 1 | (D) | - | - |
| Clark | 4 | 1 | 1 | (D) | 3 | (D) |

--continued

Table 33. **Berries: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Harvested | | Not harvested | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **LOGANBERRIES** - Con. | | | | | | |
| **Counties, 2012** - Con. | | | | | | |
| Grays Harbor | 1 | (D) | - | - | 1 | (D) |
| King | 3 | 1 | 2 | (D) | 1 | (D) |
| Kitsap | 7 | 1 | 4 | (Z) | 3 | 1 |
| Kittitas | 1 | (D) | - | - | 1 | (D) |
| Lewis | 1 | (D) | 1 | (D) | - | - |
| Pacific | 3 | (Z) | - | - | 3 | (Z) |
| Pierce | 4 | 1 | 4 | 1 | - | - |
| Skagit | 1 | (D) | 1 | (D) | - | - |
| Thurston | 1 | (D) | 1 | (D) | - | - |
| Whatcom | 1 | (D) | 1 | (D) | - | - |
| **RASPBERRIES, ALL** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 777 | 10,698 | 657 | 9,885 | 217 | 813 |
| 2007 | 657 | 10,431 | 578 | 9,607 | 136 | 825 |
| **Counties, 2012** | | | | | | |
| Adams | 2 | (D) | 2 | (D) | 1 | (D) |
| Asotin | 2 | (D) | 2 | (D) | - | - |
| Benton | 17 | (D) | 17 | (D) | - | - |
| Chelan | 14 | 3 | 12 | (D) | 2 | (D) |
| Clallam | 19 | 15 | 14 | 14 | 6 | 1 |
| Clark | 62 | 404 | 54 | 372 | 17 | 31 |
| Columbia | 2 | (D) | - | - | 2 | (D) |
| Cowlitz | 17 | (D) | 14 | (D) | 5 | 13 |
| Douglas | 1 | (D) | - | - | 1 | (D) |
| Ferry | 3 | 1 | 3 | (D) | 1 | (D) |
| Franklin | 2 | (D) | 2 | (D) | 1 | (D) |
| Garfield | 2 | (D) | 2 | (D) | - | - |
| Grant | 6 | 2 | 3 | 1 | 4 | 1 |
| Grays Harbor | 11 | 6 | 6 | 2 | 5 | 4 |
| Island | 16 | 11 | 16 | (D) | 2 | (D) |
| Jefferson | 15 | 4 | 15 | (D) | 1 | (D) |
| King | 66 | 39 | 55 | 37 | 13 | 2 |
| Kitsap | 43 | 9 | 37 | 8 | 8 | 2 |
| Kittitas | 7 | 1 | 6 | (D) | 1 | (D) |
| Klickitat | 6 | 11 | 3 | 1 | 3 | 10 |
| Lewis | 14 | 2 | 5 | 1 | 9 | 1 |
| Mason | 8 | 2 | 5 | 2 | 3 | 1 |
| Okanogan | 26 | 10 | 23 | 8 | 5 | 2 |
| Pacific | 3 | (D) | 2 | (D) | 1 | (D) |
| Pend Oreille | 3 | (Z) | 3 | (Z) | - | - |
| Pierce | 48 | 75 | 39 | 65 | 13 | 10 |
| San Juan | 12 | 3 | 11 | (D) | 1 | (D) |
| Skagit | 40 | 493 | 35 | 458 | 11 | 35 |
| Skamania | 11 | 1 | 11 | 1 | - | - |
| Snohomish | 35 | 26 | 30 | 20 | 7 | 6 |
| Spokane | 38 | 23 | 28 | 20 | 20 | 3 |
| Stevens | 24 | 9 | 18 | 6 | 8 | 3 |
| Thurston | 31 | 38 | 24 | 33 | 9 | 6 |
| Walla Walla | 15 | 5 | 9 | 3 | 6 | 1 |
| Whatcom | 126 | (D) | 121 | 7,994 | 43 | (D) |
| Whitman | 12 | 4 | 12 | 2 | 4 | 2 |
| Yakima | 18 | 114 | 18 | 113 | 4 | (Z) |
| **RASPBERRIES, BLACK** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 67 | 155 | 44 | 140 | 30 | 14 |
| 2007 | 49 | 25 | 37 | 17 | 16 | 8 |
| **Counties, 2012** | | | | | | |
| Adams | 1 | (D) | 1 | (D) | - | - |
| Benton | 3 | (D) | 3 | (D) | - | - |
| Chelan | 4 | (Z) | 4 | (Z) | - | - |
| Clallam | 1 | (D) | 1 | (D) | 1 | (D) |
| Clark | 7 | 6 | 5 | 2 | 6 | 4 |
| Cowlitz | 1 | (D) | 1 | (D) | - | - |
| Franklin | 1 | (D) | 1 | (D) | - | - |
| Grant | 2 | (D) | 1 | (D) | 1 | (D) |
| Grays Harbor | 3 | 4 | - | - | 3 | 4 |
| Jefferson | 1 | (D) | 1 | (D) | - | - |
| King | 2 | (D) | 2 | (D) | 2 | (D) |
| Kitsap | 2 | (D) | 2 | (D) | - | - |
| Klickitat | 2 | (D) | - | - | 2 | (D) |
| Lewis | 1 | (D) | - | - | 1 | (D) |
| Okanogan | 2 | (D) | 2 | (D) | - | - |
| Pierce | 6 | 30 | 3 | 30 | 3 | (Z) |
| San Juan | 2 | (D) | 2 | (D) | - | - |
| Skagit | 3 | (D) | 2 | (D) | 1 | (D) |
| Skamania | 2 | (D) | 2 | (D) | - | - |
| Snohomish | 1 | (D) | 1 | (D) | - | - |
| Spokane | 7 | 1 | 1 | (D) | 6 | (D) |
| Stevens | 3 | (Z) | 1 | (D) | 2 | (D) |
| Thurston | 3 | (Z) | 3 | (Z) | - | - |
| Walla Walla | 2 | (D) | - | - | 2 | (D) |
| Whatcom | 5 | 2 | 5 | 2 | - | - |

--continued

Table 33. **Berries: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Harvested | | Not harvested | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **RASPBERRIES, RED** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 748 | 10,544 | 633 | 9,745 | 207 | 799 |
| 2007 | 635 | 10,406 | 566 | 9,590 | 122 | 816 |
| **Counties, 2012** | | | | | | |
| Adams | 2 | (D) | 2 | (D) | 1 | (D) |
| Asotin | 2 | (D) | 2 | (D) | - | - |
| Benton | 15 | (D) | 15 | (D) | - | - |
| Chelan | 14 | 2 | 12 | (D) | 2 | (D) |
| Clallam | 19 | (D) | 14 | (D) | 5 | (D) |
| Clark | 59 | 397 | 49 | 370 | 15 | 27 |
| Columbia | 2 | (D) | - | - | 2 | (D) |
| Cowlitz | 16 | (D) | 13 | (D) | 5 | 13 |
| Douglas | 1 | (D) | - | - | 1 | (D) |
| Ferry | 3 | 1 | 3 | (D) | 1 | (D) |
| Franklin | 1 | (D) | 1 | (D) | 1 | (D) |
| Garfield | 2 | (D) | 2 | (D) | - | - |
| Grant | 6 | (D) | 3 | (D) | 4 | (D) |
| Grays Harbor | 9 | 2 | 6 | 2 | 3 | (Z) |
| Island | 16 | 11 | 16 | (D) | 2 | (D) |
| Jefferson | 14 | (D) | 14 | 3 | 1 | (D) |
| King | 64 | (D) | 53 | (D) | 11 | (D) |
| Kitsap | 42 | (D) | 36 | (D) | 8 | 2 |
| Kittitas | 7 | 1 | 6 | (D) | 1 | (D) |
| Klickitat | 6 | (D) | 3 | 1 | 3 | (D) |
| Lewis | 14 | (D) | 5 | 1 | 9 | (D) |
| Mason | 8 | 2 | 5 | 2 | 3 | 1 |
| Okanogan | 26 | (D) | 23 | (D) | 5 | 2 |
| Pacific | 3 | (D) | 2 | (D) | 1 | (D) |
| Pend Oreille | 3 | (Z) | 3 | (Z) | - | - |
| Pierce | 45 | 45 | 36 | 35 | 13 | 10 |
| San Juan | 10 | (D) | 9 | 2 | 1 | (D) |
| Skagit | 39 | (D) | 35 | (D) | 10 | (D) |
| Skamania | 9 | (D) | 9 | (D) | - | - |
| Snohomish | 35 | (D) | 30 | (D) | 7 | 6 |
| Spokane | 36 | 22 | 28 | (D) | 18 | (D) |
| Stevens | 23 | 9 | 19 | (D) | 8 | (D) |
| Thurston | 31 | 38 | 24 | 32 | 9 | 6 |
| Walla Walla | 15 | (D) | 9 | 3 | 6 | (D) |
| Whatcom | 121 | (D) | 116 | 7,992 | 43 | (D) |
| Whitman | 12 | 4 | 12 | 2 | 4 | 2 |
| Yakima | 18 | 114 | 18 | 113 | 4 | (Z) |
| **STRAWBERRIES** | | | | | | |
| **State Total** | | | | | | |
| Washington 2012 | 614 | 1,514 | 477 | 1,313 | 198 | 201 |
| 2007 | 326 | 1,715 | 304 | 1,408 | 54 | 307 |
| **Counties, 2012** | | | | | | |
| Adams | 1 | (D) | 1 | (D) | 1 | (D) |
| Asotin | 2 | (D) | 2 | (D) | - | - |
| Benton | 8 | 1 | 6 | (D) | 2 | (D) |
| Chelan | 9 | (D) | 7 | (D) | 2 | (D) |
| Clallam | 18 | 12 | 14 | 11 | 4 | 1 |
| Clark | 54 | 288 | 44 | 254 | 21 | 34 |
| Columbia | 2 | (D) | - | - | 2 | (D) |
| Cowlitz | 12 | 83 | 10 | 77 | 3 | 7 |
| Douglas | 1 | (D) | 1 | (D) | - | - |
| Ferry | 7 | 1 | 7 | (D) | 1 | (D) |
| Franklin | 7 | (D) | 7 | 6 | 2 | (D) |
| Garfield | 2 | (D) | 2 | (D) | - | - |
| Grant | 7 | 2 | 3 | 1 | 4 | (Z) |
| Grays Harbor | 5 | 1 | 3 | (D) | 2 | (D) |
| Island | 17 | 12 | 13 | 12 | 4 | (Z) |
| Jefferson | 12 | 7 | 12 | (D) | 1 | (D) |
| King | 34 | 47 | 19 | 38 | 19 | 9 |
| Kitsap | 50 | 8 | 45 | 6 | 10 | 2 |
| Kittitas | 7 | 2 | 6 | (D) | 1 | (D) |
| Klickitat | 6 | 2 | 3 | 2 | 3 | (Z) |
| Lewis | 17 | 11 | 9 | 10 | 8 | 1 |
| Lincoln | 1 | (D) | 1 | (D) | - | - |
| Mason | 5 | 1 | 1 | (D) | 4 | (D) |
| Okanogan | 25 | 4 | 18 | 2 | 7 | 1 |
| Pacific | 4 | (Z) | 3 | (D) | 1 | (D) |
| Pend Oreille | 1 | (D) | 1 | (D) | - | - |
| Pierce | 52 | 64 | 39 | 50 | 17 | 14 |
| San Juan | 20 | 5 | 20 | 5 | - | - |
| Skagit | 27 | 443 | 24 | 414 | 6 | 28 |
| Skamania | 9 | 1 | 9 | 1 | - | - |
| Snohomish | 32 | 19 | 31 | 17 | 5 | 2 |
| Spokane | 39 | 104 | 20 | 68 | 28 | 36 |
| Stevens | 19 | 3 | 17 | 2 | 5 | 1 |
| Thurston | 56 | 72 | 41 | 66 | 19 | 7 |
| Wahkiakum | 3 | (D) | 3 | (D) | - | - |
| Walla Walla | 1 | (D) | 1 | (D) | 1 | (D) |
| Whatcom | 32 | 261 | 25 | 225 | 13 | 36 |
| Yakima | 10 | 6 | 9 | (D) | 2 | (D) |

--continued

Table 33. **Berries: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total | | Harvested | | Not harvested | |
|---|---|---|---|---|---|---|
| | Farms | Acres | Farms | Acres | Farms | Acres |
| **OTHER BERRIES** | | | | | | |
| **State Total** | | | | | | |
| Washington ..... 2012 | 71 | 118 | 46 | 101 | 31 | 17 |
| 2007 | 78 | 88 | 63 | 38 | 26 | 51 |
| **Counties, 2012** | | | | | | |
| Adams | 1 | (D) | 1 | (D) | - | - |
| Benton | 5 | (D) | 3 | (D) | 2 | (D) |
| Clallam | 1 | (D) | - | - | 1 | (D) |
| Clark | 6 | 1 | 6 | 1 | - | - |
| Grant | 1 | (D) | 1 | (D) | - | - |
| Grays Harbor | 1 | (D) | 1 | (D) | - | - |
| Island | 2 | (D) | 2 | (D) | - | - |
| Jefferson | 2 | (D) | 1 | (D) | 1 | (D) |
| King | 3 | 1 | - | - | 3 | 1 |
| Kitsap | 7 | 1 | 4 | 1 | 3 | (Z) |
| Lewis | 1 | (D) | 1 | (D) | - | - |
| Mason | 2 | (D) | - | - | 2 | (D) |
| Okanogan | 2 | (D) | 2 | (D) | - | - |
| Pend Oreille | 1 | (D) | - | - | 1 | (D) |
| Pierce | 6 | 18 | 6 | (D) | 1 | (D) |
| San Juan | 1 | (D) | 1 | (D) | - | - |
| Skagit | 6 | 6 | 4 | (D) | 2 | (D) |
| Snohomish | 5 | 2 | 2 | (D) | 3 | (D) |
| Spokane | 4 | 1 | - | - | 4 | 1 |
| Thurston | 4 | 3 | 4 | 2 | 3 | 2 |
| Wahkiakum | 1 | (D) | 1 | (D) | - | - |
| Whatcom | 6 | (D) | 3 | (D) | 3 | (Z) |
| Whitman | 2 | (D) | 2 | (D) | 2 | (D) |
| Yakima | 1 | (D) | 1 | (D) | - | - |

Table 34. **Nursery, Greenhouse, Floriculture, Sod, Mushrooms, Vegetable Seeds, and Propagative Materials Grown For Sale: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | |
|---|---|---|---|---|---|---|---|---|
| | Farms | Sq. ft. under glass or other protection | Acres in the open | Value of sales | | Farms | Sq. ft. under glass or other protection | Acres in the open |
| | | | | Farms | Dollars | | | |
| **AQUATIC PLANTS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 11 | 32,180 | 1 | 11 | 136,915 | 26 | 60,939 | 17 |
| **Counties** | | | | | | | | |
| Clark | - | - | - | - | - | 1 | (D) | (D) |
| Cowlitz | 1 | (D) | - | 1 | (D) | 1 | - | (D) |
| Grays Harbor | 2 | (D) | - | 2 | (D) | 1 | (D) | - |
| King | - | - | - | - | - | 4 | 1,284 | (D) |
| Kitsap | 1 | - | (D) | 1 | (D) | 2 | (D) | (D) |
| Lewis | 2 | (D) | - | 2 | (D) | 5 | (D) | (D) |
| Mason | - | - | - | - | - | 2 | (D) | (D) |
| Pierce | 2 | (D) | - | 2 | (D) | 4 | 5,325 | (D) |
| Skagit | 1 | (D) | (D) | 1 | (D) | 1 | (D) | - |
| Snohomish | 1 | (D) | - | 1 | (D) | 2 | - | (D) |
| Thurston | 1 | - | (D) | 1 | (D) | 1 | (D) | - |
| Whitman | - | - | - | - | - | 2 | - | (D) |
| **BULBS, CORMS, RHIZOMES, AND TUBERS - DRY** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 40 | (D) | 1,339 | 40 | (D) | 76 | 3,823 | 1,755 |
| **Counties** | | | | | | | | |
| Benton | 1 | - | (D) | 1 | (D) | - | - | - |
| Clallam | - | - | - | - | - | 3 | - | (D) |
| Clark | 2 | (D) | (D) | 2 | (D) | 8 | (D) | 14 |
| Cowlitz | 1 | - | (D) | 1 | (D) | 1 | - | (D) |
| Douglas | - | - | - | - | - | 1 | - | (D) |
| Grant | 2 | (D) | (D) | 2 | (D) | 2 | - | (D) |
| Grays Harbor | 4 | (D) | 18 | 4 | 40,900 | 5 | (D) | 9 |
| Island | - | - | - | - | - | 2 | - | (D) |
| Jefferson | 1 | - | (D) | 1 | (D) | 2 | - | (D) |
| King | 4 | (D) | 5 | 4 | 25,800 | 5 | (D) | 5 |
| Kitsap | 1 | - | (D) | 1 | (D) | 6 | - | 4 |
| Kittitas | - | - | - | - | - | 3 | - | (D) |
| Lewis | 2 | - | (D) | 2 | (D) | 2 | - | (D) |
| Lincoln | 1 | - | (D) | 1 | (D) | - | - | - |
| Mason | 2 | - | (D) | 2 | (D) | 2 | - | (D) |
| Pend Oreille | 1 | - | (D) | 1 | (D) | 1 | - | (D) |
| Pierce | 5 | (D) | (D) | 5 | (D) | 9 | - | (D) |
| Skagit | 3 | (D) | (D) | 3 | (D) | 5 | - | (D) |
| Skamania | 1 | - | (D) | 1 | (D) | 2 | - | (D) |
| Snohomish | 2 | - | (D) | 2 | (D) | 3 | (D) | (D) |
| Spokane | - | - | - | - | - | 6 | - | 3 |
| Stevens | 1 | - | (D) | 1 | (D) | - | - | - |
| Thurston | 1 | (D) | - | 1 | (D) | 1 | - | (D) |
| Wahkiakum | - | - | - | - | - | 1 | (D) | (D) |
| Whatcom | 3 | - | (D) | 3 | (D) | 2 | - | (D) |
| Yakima | 2 | - | (D) | 2 | (D) | 4 | - | 16 |
| **CUTTINGS, SEEDLINGS, LINERS, AND PLUGS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 56 | 1,526,935 | 341 | 56 | 40,709,550 | 50 | 1,891,834 | 548 |
| **Counties** | | | | | | | | |
| Benton | 2 | (D) | (D) | 2 | (D) | 2 | - | (D) |
| Clallam | 2 | (D) | (D) | 2 | (D) | 2 | (D) | - |
| Clark | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) |
| Cowlitz | 1 | (D) | (D) | 1 | (D) | - | - | - |
| Ferry | - | - | - | - | - | 1 | - | (D) |
| Grant | - | - | - | - | - | 1 | - | (D) |
| Island | 2 | - | (D) | 2 | (D) | 3 | (D) | (D) |
| Jefferson | 1 | (D) | - | 1 | (D) | 2 | (D) | - |
| King | 4 | (D) | (D) | 4 | (D) | 5 | (D) | 3 |
| Kitsap | 1 | (D) | - | 1 | (D) | - | - | - |
| Klickitat | 2 | - | (D) | 2 | (D) | 3 | (D) | (D) |
| Lewis | 2 | (D) | (D) | 2 | (D) | 1 | - | (D) |
| Mason | - | - | - | - | - | 1 | (D) | - |
| Okanogan | - | - | - | - | - | 1 | - | (D) |
| Pierce | 7 | (D) | (D) | 7 | (D) | 3 | (D) | (D) |
| San Juan | 3 | (D) | (D) | 3 | (D) | 1 | (D) | - |
| Skagit | 7 | (D) | (D) | 7 | (D) | 2 | (D) | (D) |
| Snohomish | 8 | 40,361 | (D) | 8 | (D) | 6 | (D) | 9 |
| Spokane | 2 | (D) | - | 2 | (D) | 1 | (D) | - |
| Stevens | 1 | (D) | - | 1 | (D) | - | - | - |
| Thurston | 5 | (D) | (D) | 5 | (D) | 5 | (D) | (D) |
| Whatcom | 2 | (D) | (D) | 2 | (D) | 3 | (D) | (D) |
| Yakima | 2 | (D) | (D) | 2 | (D) | 5 | (D) | (D) |

--continued

Table 34. **Nursery, Greenhouse, Floriculture, Sod, Mushrooms, Vegetable Seeds, and Propagative Materials Grown For Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | |
|---|---|---|---|---|---|---|---|---|
| | Farms | Sq. ft. under glass or other protection | Acres in the open | Value of sales | | Farms | Sq. ft. under glass or other protection | Acres in the open |
| | | | | Farms | Dollars | | | |
| **FLORICULTURE AND BEDDING CROPS: BEDDING/GARDEN PLANTS - ANNUALS, HERBACEOUS PERENNIALS, VEGETABLE PLANTS (INCLUDING HANGING BASKETS), CUT FLOWERS AND CUT FLORIST GREENS, FOLIAGE PLANTS - INDOOR (INCLUDING HANGING BASKETS), POTTED FLOWERING PLANTS, AND OTHER FLORICULTURE AND BEDDING CROPS, TOTAL** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 875 | 9,350,033 | 2,175 | 873 | 132,917,261 | 820 | 10,561,649 | 2,522 |
| **Counties** | | | | | | | | |
| Asotin | 4 | (D) | - | 4 | (D) | 2 | (D) | - |
| Benton | 6 | 20,890 | 2 | 6 | 183,390 | 17 | 54,544 | 9 |
| Chelan | 14 | 9,450 | (D) | 13 | (D) | 12 | 4,780 | 8 |
| Clallam | 30 | 23,361 | 46 | 30 | 372,503 | 29 | 25,224 | 56 |
| Clark | 38 | 99,768 | 47 | 38 | 825,046 | 47 | 210,770 | 35 |
| Cowlitz | 19 | 274,584 | 35 | 19 | 3,455,230 | 24 | 269,103 | 38 |
| Douglas | 5 | (D) | 3 | 5 | (D) | 3 | (D) | (D) |
| Ferry | 1 | - | (D) | 1 | (D) | 1 | (D) | - |
| Franklin | 8 | 101,570 | (D) | 8 | 1,167,382 | 6 | 47,840 | (D) |
| Grant | 7 | (D) | 103 | 7 | (D) | 4 | (D) | (D) |
| Grays Harbor | 15 | 12,298 | 37 | 15 | 478,653 | 11 | 45,960 | 32 |
| Island | 25 | 16,895 | 22 | 25 | 193,173 | 31 | 10,242 | 98 |
| Jefferson | 14 | 4,460 | 4 | 14 | 51,350 | 9 | 3,400 | 6 |
| King | 157 | 1,017,060 | 295 | 157 | 11,119,511 | 148 | 1,288,761 | 390 |
| Kitsap | 50 | 102,227 | 28 | 50 | 751,755 | 48 | 78,182 | 160 |
| Kittitas | 5 | 2,500 | (D) | 5 | 15,050 | 9 | 6,000 | 1 |
| Klickitat | 15 | (D) | 12 | 15 | 376,382 | 9 | (D) | 10 |
| Lewis | 40 | 254,828 | 233 | 40 | 5,034,772 | 25 | 333,740 | 16 |
| Lincoln | 3 | 8,000 | (D) | 3 | (D) | 2 | (D) | - |
| Mason | 16 | 33,140 | 179 | 16 | 262,970 | 18 | (D) | 116 |
| Okanogan | 16 | 16,322 | 3 | 16 | 78,687 | 15 | 19,516 | (D) |
| Pacific | 4 | (D) | (D) | 4 | (D) | 3 | (D) | (D) |
| Pend Oreille | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) |
| Pierce | 60 | 896,821 | 225 | 60 | 8,466,848 | 48 | 1,132,164 | 302 |
| San Juan | 11 | 20,088 | 9 | 11 | 158,197 | 15 | 1,900 | 14 |
| Skagit | 43 | 2,139,358 | 355 | 43 | 36,318,365 | 46 | 2,665,826 | 430 |
| Skamania | 5 | (D) | (D) | 5 | (D) | 1 | (D) | - |
| Snohomish | 81 | 1,924,259 | 188 | 81 | 37,207,522 | 72 | 1,463,103 | 161 |
| Spokane | 47 | 719,722 | 56 | 47 | 9,388,389 | 38 | 877,354 | 29 |
| Stevens | 10 | 2,030 | 4 | 10 | 21,243 | 7 | 3,094 | 2 |
| Thurston | 43 | 311,730 | 89 | 43 | 4,608,237 | 36 | 260,837 | 56 |
| Wahkiakum | 7 | 13,000 | 1 | 6 | 102,202 | 5 | (D) | (D) |
| Walla Walla | 10 | (D) | 12 | 10 | 270,337 | 12 | 104,400 | 13 |
| Whatcom | 40 | 1,024,100 | 34 | 40 | 9,594,817 | 35 | 970,445 | 22 |
| Whitman | 7 | 5,596 | (D) | 7 | 104,606 | 9 | (D) | 51 |
| Yakima | 17 | (D) | 25 | 17 | 501,125 | 21 | 256,590 | 116 |
| **BEDDING/GARDEN PLANTS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 501 | 7,143,025 | 609 | 500 | 97,531,412 | 514 | 7,938,980 | 613 |
| **Counties** | | | | | | | | |
| Asotin | 4 | (D) | - | 4 | (D) | 2 | (D) | - |
| Benton | 6 | (D) | 1 | 6 | (D) | 12 | (D) | 5 |
| Chelan | 12 | (D) | (D) | 11 | 28,882 | 7 | (D) | (D) |
| Clallam | 17 | 18,761 | 8 | 17 | 105,066 | 21 | (D) | 30 |
| Clark | 25 | 74,753 | 34 | 25 | 535,614 | 26 | 203,014 | 22 |
| Cowlitz | 16 | (D) | (D) | 16 | (D) | 21 | (D) | (D) |
| Douglas | 3 | (D) | (D) | 3 | (D) | 1 | (D) | - |
| Ferry | 1 | - | (D) | 1 | (D) | - | - | - |
| Franklin | 4 | 85,320 | (D) | 4 | 615,639 | 4 | (D) | (D) |
| Grant | 1 | (D) | - | 1 | (D) | 3 | (D) | - |
| Grays Harbor | 6 | 5,388 | - | 6 | 55,128 | 6 | (D) | (D) |
| Island | 9 | (D) | (D) | 9 | 11,868 | 9 | (D) | 6 |
| Jefferson | 8 | 4,460 | (D) | 8 | 31,150 | 5 | (D) | 2 |
| King | 58 | 831,624 | 80 | 58 | 8,495,711 | 59 | 1,158,858 | 59 |
| Kitsap | 27 | 69,057 | 5 | 27 | 452,053 | 32 | 69,032 | (D) |
| Kittitas | 5 | 2,500 | (D) | 5 | 15,050 | 8 | (D) | (D) |
| Klickitat | 9 | (D) | 7 | 9 | (D) | 7 | (D) | (D) |
| Lewis | 30 | (D) | (D) | 30 | (D) | 18 | (D) | (D) |
| Lincoln | 3 | (D) | (D) | 3 | (D) | 2 | (D) | - |
| Mason | 7 | 8,040 | (D) | 7 | (D) | 8 | (D) | 1 |
| Okanogan | 12 | 14,994 | (D) | 12 | 60,934 | 11 | 15,908 | (D) |
| Pacific | 4 | (D) | (D) | 4 | (D) | 2 | (D) | (D) |
| Pend Oreille | 2 | (D) | (D) | 2 | (D) | 2 | (D) | (D) |
| Pierce | 43 | 778,531 | (D) | 43 | 5,187,453 | 39 | 682,214 | (D) |
| San Juan | 6 | (D) | (D) | 6 | 101,828 | 12 | 1,900 | 12 |
| Skagit | 19 | 1,239,693 | (D) | 19 | (D) | 27 | (D) | (D) |
| Skamania | 4 | (D) | (D) | 4 | (D) | 1 | (D) | - |
| Snohomish | 48 | 1,748,473 | 96 | 48 | 35,800,509 | 50 | 1,395,103 | 72 |
| Spokane | 33 | 629,862 | 49 | 33 | 8,449,510 | 34 | 782,974 | (D) |
| Stevens | 7 | 1,610 | (D) | 7 | 13,419 | 7 | 3,094 | (D) |
| Thurston | 26 | 298,868 | (D) | 26 | 4,056,022 | 26 | 240,077 | 39 |

--continued

Table 34. **Nursery, Greenhouse, Floriculture, Sod, Mushrooms, Vegetable Seeds, and Propagative Materials Grown For Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | |
|---|---|---|---|---|---|---|---|---|
| | Farms | Sq. ft. under glass or other protection | Acres in the open | Value of sales | | Farms | Sq. ft. under glass or other protection | Acres in the open |
| | | | | Farms | Dollars | | | |
| **BEDDING/GARDEN PLANTS** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Wahkiakum | 4 | 8,300 | (D) | 4 | 92,202 | 2 | (D) | (D) |
| Walla Walla | 3 | (D) | (D) | 3 | (D) | 6 | (D) | 5 |
| Whatcom | 29 | 716,380 | 14 | 29 | 8,128,878 | 25 | (D) | 11 |
| Whitman | 3 | (D) | - | 3 | (D) | 6 | (D) | (D) |
| Yakima | 7 | (D) | 4 | 7 | 377,425 | 13 | 140,290 | (D) |
| **CUT FLOWERS AND CUT FLORIST GREENS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 343 | 993,236 | 1,348 | 341 | 22,511,838 | 325 | 991,292 | 1,785 |
| **Counties** | | | | | | | | |
| Benton | 1 | - | (D) | 1 | (D) | 4 | - | 3 |
| Chelan | 2 | - | (D) | 1 | (D) | 3 | (D) | (D) |
| Clallam | 18 | (D) | 35 | 18 | 229,787 | 9 | 788 | (D) |
| Clark | 9 | 634 | (D) | 9 | 19,590 | 21 | - | 14 |
| Cowlitz | 2 | (D) | (D) | 2 | (D) | 3 | (D) | (D) |
| Douglas | 1 | - | (D) | 1 | (D) | 1 | - | (D) |
| Franklin | 2 | - | (D) | 2 | (D) | 2 | (D) | (D) |
| Grant | 1 | - | (D) | 1 | (D) | 1 | - | (D) |
| Grays Harbor | 7 | 4,970 | 35 | 7 | (D) | 5 | (D) | (D) |
| Island | 13 | 1,065 | 21 | 13 | 144,955 | 24 | (D) | 91 |
| Jefferson | 6 | - | 3 | 6 | (D) | 6 | (D) | 4 |
| King | 86 | (D) | 196 | 86 | 1,225,287 | 90 | (D) | 324 |
| Kitsap | 24 | (D) | 22 | 24 | (D) | 15 | (D) | 68 |
| Kittitas | - | - | - | - | - | 1 | - | (D) |
| Klickitat | 4 | - | (D) | 4 | (D) | 2 | - | (D) |
| Lewis | 12 | (D) | (D) | 12 | 127,124 | 5 | - | 4 |
| Mason | 10 | (D) | 176 | 10 | 75,080 | 16 | (D) | 115 |
| Okanogan | 3 | - | 1 | 3 | 8,805 | 7 | (D) | (D) |
| Pacific | - | - | - | - | - | 1 | - | (D) |
| Pierce | 22 | (D) | (D) | 22 | (D) | 12 | (D) | (D) |
| San Juan | 7 | (D) | (D) | 7 | 56,369 | 5 | - | 3 |
| Skagit | 22 | (D) | 156 | 22 | (D) | 19 | (D) | 238 |
| Skamania | 1 | - | (D) | 1 | (D) | - | - | - |
| Snohomish | 32 | (D) | 65 | 32 | 1,136,792 | 24 | - | 85 |
| Spokane | 9 | - | (D) | 9 | (D) | 2 | (D) | (D) |
| Stevens | 1 | - | (D) | 1 | (D) | 3 | - | (D) |
| Thurston | 17 | 12,600 | 77 | 17 | 550,080 | 12 | (D) | (D) |
| Wahkiakum | 5 | 1,900 | 1 | 4 | 4,000 | 4 | 1,100 | (D) |
| Walla Walla | 3 | (D) | 4 | 3 | 41,251 | 4 | (D) | (D) |
| Whatcom | 11 | (D) | 12 | 11 | 124,199 | 13 | (D) | (D) |
| Whitman | 2 | - | (D) | 2 | (D) | 3 | - | (D) |
| Yakima | 10 | - | 22 | 10 | 123,700 | 8 | (D) | (D) |
| **FOLIAGE PLANTS, INDOOR (INCLUDING HANGING BASKETS) (SEE TEXT)** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 30 | 329,662 | 4 | 30 | 2,929,252 | 19 | 98,400 | 8 |
| **Counties** | | | | | | | | |
| Clallam | - | - | - | - | - | 1 | (D) | - |
| Clark | 1 | (D) | - | 1 | (D) | - | - | - |
| Cowlitz | - | - | - | - | - | 2 | (D) | - |
| Franklin | 1 | (D) | - | 1 | (D) | - | - | - |
| King | 3 | (D) | (D) | 3 | (D) | 4 | (D) | (D) |
| Kitsap | 2 | (D) | - | 2 | (D) | - | - | - |
| Lewis | 1 | (D) | (D) | 1 | (D) | 2 | (D) | (D) |
| Lincoln | 2 | (D) | - | 2 | (D) | - | - | - |
| Mason | 2 | (D) | - | 2 | (D) | 1 | (D) | - |
| Pierce | 2 | (D) | - | 2 | (D) | - | - | - |
| Skagit | 2 | (D) | (D) | 2 | (D) | - | - | - |
| Snohomish | 6 | (D) | 1 | 6 | (D) | 4 | 4,500 | (D) |
| Spokane | 5 | (D) | - | 5 | 351,164 | 4 | (D) | - |
| Stevens | 2 | (D) | - | 2 | (D) | - | - | - |
| Thurston | 1 | (D) | - | 1 | (D) | 1 | (D) | - |
| **POTTED FLOWERING PLANTS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 97 | 729,039 | 35 | 97 | 7,958,412 | 108 | 1,478,459 | 23 |
| **Counties** | | | | | | | | |
| Asotin | 1 | (D) | - | 1 | (D) | 1 | (D) | - |
| Benton | 2 | (D) | (D) | 2 | (D) | 4 | (D) | 1 |
| Chelan | - | - | - | - | - | 2 | - | (D) |
| Clallam | 3 | (D) | (D) | 3 | (D) | 4 | 4,970 | (D) |
| Clark | 6 | (D) | (D) | 6 | 38,898 | 5 | 7,756 | - |
| Cowlitz | 1 | (D) | - | 1 | (D) | 4 | 4,550 | (D) |
| Douglas | 3 | (D) | 2 | 3 | (D) | 3 | (D) | - |
| Ferry | - | - | - | - | - | 1 | (D) | - |
| Franklin | 3 | (D) | (D) | 3 | (D) | - | - | - |

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Table 34. **Nursery, Greenhouse, Floriculture, Sod, Mushrooms, Vegetable Seeds, and Propagative Materials Grown For Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | |
|---|---|---|---|---|---|---|---|---|
| | Farms | Sq. ft. under glass or other protection | Acres in the open | Value of sales | | Farms | Sq. ft. under glass or other protection | Acres in the open |
| | | | | Farms | Dollars | | | |
| **POTTED FLOWERING PLANTS** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Grant | 2 | (D) | - | 2 | (D) | - | - | - |
| Grays Harbor | 4 | (D) | (D) | 4 | 9,100 | - | - | - |
| Island | 4 | (D) | 1 | 4 | (D) | 3 | - | 1 |
| Jefferson | 1 | - | (D) | 1 | (D) | - | - | - |
| King | 8 | 104,616 | (D) | 8 | 746,195 | 9 | 102,003 | (D) |
| Kitsap | 4 | (D) | (D) | 4 | (D) | 6 | 750 | 4 |
| Kittitas | - | - | - | - | - | 5 | (D) | 1 |
| Klickitat | - | - | - | - | - | 4 | (D) | (D) |
| Lewis | 5 | (D) | (D) | 5 | (D) | 5 | (D) | (D) |
| Mason | 4 | (D) | (D) | 4 | 58,300 | 1 | (D) | - |
| Okanogan | 3 | (D) | - | 3 | (D) | 2 | (D) | - |
| Pierce | 8 | 25,003 | (D) | 8 | (D) | 10 | (D) | (D) |
| Skagit | 8 | (D) | (D) | 8 | (D) | 5 | 18,386 | (D) |
| Snohomish | 10 | 23,212 | 1 | 10 | (D) | 10 | 63,500 | (D) |
| Spokane | 4 | (D) | (D) | 4 | (D) | 5 | (D) | (D) |
| Stevens | 2 | (D) | - | 2 | (D) | - | - | - |
| Thurston | 1 | (D) | - | 1 | (D) | 7 | (D) | (D) |
| Wahkiakum | 2 | (D) | (D) | 2 | (D) | 1 | (D) | (D) |
| Walla Walla | 2 | (D) | (D) | 2 | (D) | 5 | 23,200 | (D) |
| Whatcom | 5 | (D) | - | 5 | 1,310,500 | 5 | (D) | (D) |
| Whitman | 1 | (D) | - | 1 | (D) | - | - | - |
| Yakima | - | - | - | - | - | 1 | (D) | - |
| **OTHER FLORICULTURE AND BEDDING CROPS (SEE TEXT)** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 75 | 155,071 | 180 | 75 | 1,986,347 | 10 | 54,518 | 93 |
| **Counties** | | | | | | | | |
| Asotin | - | - | - | - | - | 1 | (D) | - |
| Chelan | 1 | (D) | (D) | 1 | (D) | - | - | - |
| Clallam | 1 | - | (D) | 1 | (D) | 1 | - | (D) |
| Clark | 3 | - | 10 | 3 | (D) | - | - | - |
| Grant | 3 | - | (D) | 3 | (D) | - | - | - |
| Grays Harbor | 2 | (D) | (D) | 2 | (D) | - | - | - |
| Island | 1 | (D) | (D) | 1 | (D) | - | - | - |
| King | 18 | 61,052 | 15 | 18 | (D) | - | - | - |
| Kitsap | 6 | 21,420 | (D) | 6 | 129,712 | 3 | (D) | (D) |
| Klickitat | 2 | - | (D) | 2 | (D) | - | - | - |
| Lewis | 2 | (D) | (D) | 2 | (D) | 1 | (D) | (D) |
| Okanogan | 2 | (D) | (D) | 2 | (D) | - | - | - |
| Pierce | 4 | (D) | 3 | 4 | (D) | 1 | (D) | - |
| Skagit | 2 | (D) | - | 2 | (D) | - | - | - |
| Snohomish | 5 | (D) | 25 | 5 | 135,532 | - | - | - |
| Spokane | 7 | 43,754 | 3 | 7 | (D) | 1 | (D) | - |
| Stevens | 3 | - | 3 | 3 | 3,068 | - | - | - |
| Thurston | 3 | (D) | (D) | 3 | (D) | 1 | - | (D) |
| Wahkiakum | 2 | (D) | (D) | 2 | (D) | - | - | - |
| Walla Walla | 2 | - | (D) | 2 | (D) | - | - | - |
| Whatcom | 4 | (D) | 8 | 4 | 31,240 | 1 | (D) | - |
| Whitman | 2 | - | (D) | 2 | (D) | - | - | - |
| **FLOWER SEEDS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 10 | (D) | 140 | 10 | (D) | 22 | 139 | (D) |
| **Counties** | | | | | | | | |
| Adams | 2 | - | (D) | 2 | (D) | - | - | - |
| Clark | - | - | - | - | - | 3 | (D) | (D) |
| Cowlitz | - | - | - | - | - | 3 | 3 | - |
| Ferry | - | - | - | - | - | 1 | - | (D) |
| Franklin | 2 | - | (D) | 2 | (D) | 3 | - | (D) |
| Grays Harbor | - | - | - | - | - | 1 | - | (D) |
| Island | - | - | - | - | - | 1 | - | (D) |
| King | - | - | - | - | - | 1 | - | (D) |
| Klickitat | 1 | - | (D) | 1 | (D) | - | - | - |
| Mason | - | - | - | - | - | 1 | (D) | - |
| Okanogan | - | - | - | - | - | 3 | (D) | (D) |
| Pierce | 2 | (D) | (D) | 2 | (D) | 2 | - | (D) |
| Snohomish | 1 | (D) | (D) | 1 | (D) | 1 | - | (D) |
| Thurston | 1 | (D) | - | 1 | (D) | - | - | - |
| Walla Walla | 1 | - | (D) | 1 | (D) | - | - | - |
| Whatcom | - | - | - | - | - | 2 | - | (D) |
| **GREENHOUSE FRUITS AND BERRIES** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 33 | 27,795 | (X) | 30 | 83,786 | 14 | 4,966 | (X) |

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Table 34. **Nursery, Greenhouse, Floriculture, Sod, Mushrooms, Vegetable Seeds, and Propagative Materials Grown For Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | |
|---|---|---|---|---|---|---|---|---|
| | Farms | Sq. ft. under glass or other protection | Acres in the open | Value of sales | | Farms | Sq. ft. under glass or other protection | Acres in the open |
| | | | | Farms | Dollars | | | |
| **GREENHOUSE FRUITS AND BERRIES** - Con. | | | | | | | | |
| **Counties** | | | | | | | | |
| Asotin | 3 | 210 | (X) | - | - | - | - | (X) |
| Clark | 2 | (D) | (X) | 2 | (D) | - | - | (X) |
| Cowlitz | 1 | (D) | (X) | 1 | (D) | 3 | 90 | (X) |
| Grays Harbor | 2 | (D) | (X) | 2 | (D) | - | - | (X) |
| Jefferson | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| King | 3 | 3,167 | (X) | 3 | 10,768 | 4 | 3,476 | (X) |
| Kitsap | 5 | 2,024 | (X) | 5 | 2,081 | - | - | (X) |
| Klickitat | 2 | (D) | (X) | 2 | (D) | 1 | (D) | (X) |
| Lewis | 3 | (D) | (X) | 3 | (D) | - | - | (X) |
| Pacific | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| Pierce | 3 | (D) | (X) | 3 | (D) | 1 | (D) | (X) |
| San Juan | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| Skagit | 4 | (D) | (X) | 4 | 15,120 | 3 | 600 | (X) |
| Spokane | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| Stevens | - | - | (X) | - | - | 2 | (D) | (X) |
| Whatcom | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| **TOTAL GREENHOUSE VEGETABLES AND FRESH CUT HERBS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 339 | 752,478 | (X) | 337 | 3,635,652 | 163 | 495,725 | (X) |
| **Counties** | | | | | | | | |
| Asotin | 4 | 12,838 | (X) | 4 | 13,571 | - | - | (X) |
| Benton | 2 | (D) | (X) | 2 | (D) | - | - | (X) |
| Chelan | 1 | (D) | (X) | 1 | (D) | 1 | (D) | (X) |
| Clallam | 9 | 27,053 | (X) | 9 | 56,244 | 6 | 17,710 | (X) |
| Clark | 17 | 25,060 | (X) | 17 | 112,618 | 10 | 27,182 | (X) |
| Cowlitz | 5 | 23,700 | (X) | 5 | 66,326 | 10 | 7,143 | (X) |
| Ferry | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| Grays Harbor | 6 | 3,850 | (X) | 6 | 26,080 | 4 | 2,160 | (X) |
| Island | 6 | 19,018 | (X) | 6 | 240,924 | 6 | 15,862 | (X) |
| Jefferson | 8 | 29,730 | (X) | 8 | 69,390 | 9 | 21,400 | (X) |
| King | 44 | 147,273 | (X) | 44 | (D) | 15 | 55,581 | (X) |
| Kitsap | 26 | 55,752 | (X) | 25 | 136,599 | 16 | 52,102 | (X) |
| Kittitas | 5 | (D) | (X) | 5 | (D) | 4 | 22,120 | (X) |
| Klickitat | 5 | 20,364 | (X) | 5 | (D) | 3 | (D) | (X) |
| Lewis | 20 | 28,877 | (X) | 20 | 93,233 | 1 | (D) | (X) |
| Lincoln | 2 | (D) | (X) | 2 | (D) | 1 | (D) | (X) |
| Mason | 3 | (D) | (X) | 3 | 28,400 | 1 | (D) | (X) |
| Okanogan | 8 | 15,433 | (X) | 8 | 68,850 | 2 | (D) | (X) |
| Pacific | 2 | (D) | (X) | 2 | (D) | 3 | 33,000 | (X) |
| Pend Oreille | 1 | (D) | (X) | 1 | (D) | 1 | (D) | (X) |
| Pierce | 22 | 20,609 | (X) | 22 | 103,126 | 10 | 15,714 | (X) |
| San Juan | 18 | 36,590 | (X) | 18 | 140,418 | 6 | 11,101 | (X) |
| Skagit | 28 | 44,362 | (X) | 28 | 244,338 | 10 | 31,914 | (X) |
| Snohomish | 19 | 43,872 | (X) | 19 | 137,675 | 8 | 22,662 | (X) |
| Spokane | 23 | 40,432 | (X) | 23 | 201,136 | 6 | 8,300 | (X) |
| Stevens | 5 | 15,529 | (X) | 5 | (D) | 5 | 10,800 | (X) |
| Thurston | 16 | 32,180 | (X) | 16 | 127,874 | 10 | 20,662 | (X) |
| Wahkiakum | 4 | 3,100 | (X) | 3 | (D) | 4 | 1,900 | (X) |
| Walla Walla | 3 | (D) | (X) | 3 | 7,197 | 1 | (D) | (X) |
| Whatcom | 17 | 59,988 | (X) | 17 | 330,254 | 10 | 28,758 | (X) |
| Whitman | 5 | 7,345 | (X) | 5 | (D) | - | - | (X) |
| Yakima | 4 | (D) | (X) | 4 | 4,366 | - | - | (X) |
| **GREENHOUSE TOMATOES** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 247 | 335,320 | (X) | 245 | 2,446,356 | 122 | 309,555 | (X) |
| **Counties** | | | | | | | | |
| Asotin | 3 | 1,404 | (X) | 3 | 9,918 | - | - | (X) |
| Benton | 2 | (D) | (X) | 2 | (D) | - | - | (X) |
| Chelan | - | - | (X) | - | - | 1 | (D) | (X) |
| Clallam | 5 | 4,303 | (X) | 5 | (D) | 3 | 1,360 | (X) |
| Clark | 14 | 13,816 | (X) | 14 | 92,048 | 8 | (D) | (X) |
| Cowlitz | 2 | (D) | (X) | 2 | (D) | 4 | 6,790 | (X) |
| Ferry | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| Grays Harbor | 6 | (D) | (X) | 6 | (D) | 3 | 960 | (X) |
| Island | 5 | 3,778 | (X) | 5 | (D) | 5 | (D) | (X) |
| Jefferson | 7 | 21,915 | (X) | 7 | 56,100 | 7 | 13,800 | (X) |
| King | 34 | 72,783 | (X) | 34 | 559,250 | 13 | 39,572 | (X) |
| Kitsap | 21 | 36,271 | (X) | 20 | 93,285 | 13 | 36,400 | (X) |
| Kittitas | 3 | (D) | (X) | 3 | (D) | 4 | 22,120 | (X) |
| Klickitat | 2 | (D) | (X) | 2 | (D) | 2 | (D) | (X) |
| Lewis | 9 | 9,280 | (X) | 9 | 52,560 | 1 | (D) | (X) |
| Lincoln | 1 | (D) | (X) | 1 | (D) | 1 | (D) | (X) |
| Mason | 2 | (D) | (X) | 2 | (D) | 1 | (D) | (X) |
| Okanogan | 6 | 8,984 | (X) | 6 | 58,272 | 2 | (D) | (X) |
| Pacific | 1 | (D) | (X) | 1 | (D) | 2 | (D) | (X) |
| Pend Oreille | 1 | (D) | (X) | 1 | (D) | 1 | (D) | (X) |
| Pierce | 16 | 11,357 | (X) | 16 | 74,400 | 5 | 2,600 | (X) |

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Table 34. **Nursery, Greenhouse, Floriculture, Sod, Mushrooms, Vegetable Seeds, and Propagative Materials Grown For Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | |
|---|---|---|---|---|---|---|---|---|
| | Farms | Sq. ft. under glass or other protection | Acres in the open | Value of sales | | Farms | Sq. ft. under glass or other protection | Acres in the open |
| | | | | Farms | Dollars | | | |
| **GREENHOUSE TOMATOES** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| San Juan | 15 | 21,331 | (X) | 15 | 109,418 | 5 | (D) | (X) |
| Skagit | 24 | 23,176 | (X) | 24 | 184,278 | 6 | 6,300 | (X) |
| Snohomish | 10 | 8,212 | (X) | 10 | 63,266 | 6 | (D) | (X) |
| Spokane | 21 | 18,632 | (X) | 21 | 156,860 | 3 | (D) | (X) |
| Stevens | 5 | 13,120 | (X) | 5 | (D) | 5 | 10,800 | (X) |
| Thurston | 11 | 7,220 | (X) | 11 | 57,760 | 10 | 11,450 | (X) |
| Wahkiakum | 1 | (D) | (X) | - | - | 2 | (D) | (X) |
| Walla Walla | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| Whatcom | 14 | 26,452 | (X) | 14 | 276,816 | 9 | 17,127 | (X) |
| Whitman | 2 | (D) | (X) | 2 | (D) | - | - | (X) |
| Yakima | 2 | (D) | (X) | 2 | (D) | - | - | (X) |
| **OTHER GREENHOUSE VEGETABLES AND FRESH CUT HERBS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 234 | 417,158 | (X) | 234 | 1,189,296 | 88 | 186,170 | (X) |
| **Counties** | | | | | | | | |
| Asotin | 4 | 11,434 | (X) | 4 | 3,653 | - | - | (X) |
| Benton | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| Chelan | 1 | (D) | (X) | 1 | (D) | 1 | (D) | (X) |
| Clallam | 5 | 22,750 | (X) | 5 | (D) | 4 | 16,350 | (X) |
| Clark | 10 | 11,244 | (X) | 10 | 20,570 | 3 | (D) | (X) |
| Cowlitz | 4 | (D) | (X) | 4 | (D) | 7 | 353 | (X) |
| Ferry | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| Grays Harbor | 2 | (D) | (X) | 2 | (D) | 4 | 1,200 | (X) |
| Island | 5 | 15,240 | (X) | 5 | (D) | 1 | (D) | (X) |
| Jefferson | 6 | 7,815 | (X) | 6 | 13,290 | 4 | 7,600 | (X) |
| King | 32 | 74,490 | (X) | 32 | (D) | 10 | 16,009 | (X) |
| Kitsap | 17 | 19,481 | (X) | 17 | 43,314 | 12 | 15,702 | (X) |
| Kittitas | 3 | 2,500 | (X) | 3 | 5,064 | - | - | (X) |
| Klickitat | 4 | (D) | (X) | 4 | (D) | 1 | (D) | (X) |
| Lewis | 18 | 19,597 | (X) | 18 | 40,673 | 1 | (D) | (X) |
| Lincoln | 2 | (D) | (X) | 2 | (D) | 1 | (D) | (X) |
| Mason | 2 | (D) | (X) | 2 | (D) | 1 | (D) | (X) |
| Okanogan | 6 | 6,449 | (X) | 6 | 10,578 | 1 | (D) | (X) |
| Pacific | 1 | (D) | (X) | 1 | (D) | 1 | (D) | (X) |
| Pend Oreille | 1 | (D) | (X) | 1 | (D) | - | - | (X) |
| Pierce | 9 | 9,252 | (X) | 9 | 28,726 | 6 | 13,114 | (X) |
| San Juan | 16 | 15,259 | (X) | 16 | 31,000 | 2 | (D) | (X) |
| Skagit | 18 | 21,186 | (X) | 18 | 60,060 | 6 | 25,614 | (X) |
| Snohomish | 14 | 35,660 | (X) | 14 | 74,409 | 4 | (D) | (X) |
| Spokane | 10 | 21,800 | (X) | 10 | 44,276 | 3 | (D) | (X) |
| Stevens | 4 | 2,409 | (X) | 4 | 5,439 | - | - | (X) |
| Thurston | 15 | 24,960 | (X) | 15 | 70,114 | 5 | 9,212 | (X) |
| Wahkiakum | 3 | (D) | (X) | 3 | (D) | 2 | (D) | (X) |
| Walla Walla | 3 | (D) | (X) | 3 | (D) | 1 | (D) | (X) |
| Whatcom | 8 | 33,536 | (X) | 8 | 53,438 | 7 | 11,631 | (X) |
| Whitman | 5 | (D) | (X) | 5 | (D) | - | - | (X) |
| Yakima | 4 | (D) | (X) | 4 | (D) | - | - | (X) |
| **MUSHROOMS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 17 | 414,982 | (X) | 17 | (D) | 15 | (D) | (X) |
| **Counties** | | | | | | | | |
| Clallam | - | - | (X) | - | - | 2 | (D) | (X) |
| Clark | - | - | (X) | - | - | 1 | (D) | (X) |
| Douglas | - | - | (X) | - | - | 1 | (D) | (X) |
| Jefferson | 1 | (D) | (X) | 1 | (D) | 1 | (D) | (X) |
| Kitsap | 2 | (D) | (X) | 2 | (D) | 2 | (D) | (X) |
| Mason | - | - | (X) | - | - | 1 | (D) | (X) |
| Pierce | 2 | (D) | (X) | 2 | (D) | 1 | (D) | (X) |
| San Juan | 3 | 400 | (X) | 3 | 15,200 | - | - | (X) |
| Snohomish | 1 | (D) | (X) | 1 | (D) | 3 | 7,350 | (X) |
| Stevens | 2 | (D) | (X) | 2 | (D) | - | - | (X) |
| Thurston | 4 | (D) | (X) | 4 | (D) | 2 | (D) | (X) |
| Whatcom | 2 | (D) | (X) | 2 | (D) | 1 | (D) | (X) |
| **NURSERY STOCK CROPS (SEE TEXT)** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 621 | 4,569,639 | 5,702 | 621 | 117,859,727 | 585 | 6,289,714 | 7,086 |
| **Counties** | | | | | | | | |
| Adams | 2 | - | (D) | 2 | (D) | 2 | - | (D) |
| Asotin | 1 | - | (D) | 1 | (D) | 1 | - | (D) |
| Benton | 14 | (D) | 57 | 14 | 1,071,666 | 16 | 14,000 | 78 |
| Chelan | 2 | - | (D) | 2 | (D) | 7 | (D) | 18 |
| Clallam | 12 | (D) | 19 | 12 | (D) | 5 | (D) | 9 |
| Clark | 65 | 149,383 | 286 | 65 | (D) | 56 | 142,692 | 189 |

--continued

Table 34. **Nursery, Greenhouse, Floriculture, Sod, Mushrooms, Vegetable Seeds, and Propagative Materials Grown For Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | |
|---|---|---|---|---|---|---|---|---|
| | Farms | Sq. ft. under glass or other protection | Acres in the open | Value of sales | | Farms | Sq. ft. under glass or other protection | Acres in the open |
| | | | | Farms | Dollars | | | |
| **NURSERY STOCK CROPS (SEE TEXT)** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Columbia | - | - | - | - | - | 2 | - | (D) |
| Cowlitz | 7 | - | 20 | 7 | 280,800 | 14 | (D) | 46 |
| Douglas | 4 | - | (D) | 4 | (D) | 6 | - | 211 |
| Ferry | 3 | - | 3 | 3 | (D) | 2 | - | (D) |
| Franklin | 8 | (D) | 206 | 8 | (D) | 7 | - | 17 |
| Garfield | 2 | - | (D) | 2 | (D) | - | - | - |
| Grant | 8 | - | 1,075 | 8 | 21,870,500 | 12 | - | 1,164 |
| Grays Harbor | 8 | (D) | 22 | 8 | (D) | 7 | (D) | 36 |
| Island | 10 | 1,400 | 20 | 10 | (D) | 13 | 7,120 | 14 |
| Jefferson | 6 | 44,442 | 13 | 6 | 556,526 | 9 | 56,240 | 28 |
| King | 81 | 1,364,240 | 236 | 81 | 14,052,163 | 56 | 169,875 | 254 |
| Kitsap | 33 | 89,820 | 37 | 33 | 848,421 | 23 | 153,324 | 90 |
| Kittitas | 4 | - | 3 | 4 | 32,000 | 2 | - | (D) |
| Klickitat | 5 | (D) | 2 | 5 | 109,900 | 6 | (D) | 8 |
| Lewis | 28 | 21,316 | 194 | 28 | 3,502,244 | 23 | 94,640 | 314 |
| Lincoln | 1 | - | (D) | 1 | (D) | 1 | - | (D) |
| Mason | 10 | (D) | 10 | 10 | (D) | 19 | - | 31 |
| Okanogan | 11 | (D) | 24 | 11 | (D) | 9 | (D) | 8 |
| Pacific | 3 | (D) | (D) | 3 | (D) | 1 | - | (D) |
| Pierce | 50 | 63,297 | 143 | 50 | 1,828,514 | 42 | 471,346 | 879 |
| San Juan | 9 | (D) | 20 | 9 | 221,099 | 5 | (D) | 5 |
| Skagit | 29 | (D) | 487 | 29 | 17,353,642 | 42 | 82,877 | 618 |
| Skamania | - | - | - | - | - | 4 | - | 28 |
| Snohomish | 55 | 904,203 | 595 | 55 | 10,875,671 | 75 | (D) | 883 |
| Spokane | 35 | (D) | 121 | 35 | (D) | 26 | 11,184 | 224 |
| Stevens | 10 | 600 | (D) | 10 | (D) | 5 | (D) | (D) |
| Thurston | 53 | 679,251 | 499 | 53 | 13,961,278 | 31 | (D) | 413 |
| Wahkiakum | 1 | (D) | (D) | 1 | (D) | - | - | - |
| Walla Walla | 2 | - | (D) | 2 | (D) | 3 | - | (D) |
| Whatcom | 29 | 23,420 | 436 | 29 | 4,419,944 | 31 | 38,430 | 482 |
| Whitman | 1 | - | (D) | 1 | (D) | 4 | - | 2 |
| Yakima | 19 | 45,805 | 417 | 19 | (D) | 18 | (D) | 482 |
| **SOD HARVESTED** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 20 | (X) | 2,010 | 20 | 9,135,298 | 19 | (X) | 2,384 |
| **Counties** | | | | | | | | |
| Asotin | 3 | (X) | 3 | 3 | 11,223 | 1 | (X) | (D) |
| Clark | 1 | (X) | (D) | 1 | (D) | 1 | (X) | (D) |
| Franklin | 1 | (X) | (D) | 1 | (D) | 1 | (X) | (D) |
| Grant | 3 | (X) | (D) | 3 | (D) | 3 | (X) | (D) |
| King | 2 | (X) | (D) | 2 | (D) | 1 | (X) | (D) |
| Pierce | - | (X) | - | - | - | 1 | (X) | (D) |
| Skagit | 1 | (X) | (D) | 1 | (D) | 1 | (X) | (D) |
| Snohomish | 1 | (X) | (D) | 1 | (D) | 2 | (X) | (D) |
| Spokane | 3 | (X) | 394 | 3 | 985,000 | 1 | (X) | (D) |
| Stevens | - | (X) | - | - | - | 2 | (X) | (D) |
| Thurston | 1 | (X) | (D) | 1 | (D) | 2 | (X) | (D) |
| Walla Walla | 2 | (X) | (D) | 2 | (D) | 2 | (X) | (D) |
| Whatcom | 1 | (X) | (D) | 1 | (D) | 1 | (X) | (D) |
| Yakima | 1 | (X) | (D) | 1 | (D) | - | (X) | - |
| **VEGETABLE SEEDS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 139 | 8,275 | 11,259 | 139 | 21,104,036 | 136 | 8,062 | 10,596 |
| **Counties** | | | | | | | | |
| Adams | 9 | - | 483 | 9 | 1,089,330 | 4 | - | 745 |
| Benton | 2 | - | (D) | 2 | (D) | 5 | - | 1,402 |
| Clallam | 3 | - | 136 | 3 | 630,000 | 1 | - | (D) |
| Clark | 3 | (D) | - | 3 | (D) | - | - | - |
| Columbia | 1 | - | (D) | 1 | (D) | 2 | - | (D) |
| Cowlitz | - | - | - | - | - | 3 | 3 | - |
| Franklin | 5 | - | (D) | 5 | 156,545 | 6 | - | 374 |
| Grant | 42 | - | 4,921 | 42 | 8,475,292 | 50 | (D) | 4,710 |
| Grays Harbor | 4 | 460 | - | 4 | 920 | - | - | - |
| Island | 7 | - | 39 | 7 | 71,200 | 4 | - | 23 |
| Jefferson | 6 | (D) | 4 | 6 | 11,720 | - | - | - |
| King | - | - | - | - | - | 1 | (D) | (D) |
| Kittitas | - | - | - | - | - | 6 | 560 | 4 |
| Klickitat | - | - | - | - | - | 2 | - | (D) |
| Lewis | 6 | - | 558 | 6 | 829,680 | 1 | - | (D) |
| Lincoln | 2 | - | (D) | 2 | (D) | 1 | - | (D) |
| Mason | - | - | - | - | - | 1 | (D) | - |
| Okanogan | - | - | - | - | - | 2 | - | (D) |
| Pierce | 3 | (D) | (D) | 3 | (D) | 4 | (D) | (D) |
| San Juan | 1 | - | (D) | 1 | (D) | - | - | - |
| Skagit | 28 | - | 2,620 | 28 | 5,114,998 | 24 | - | 1,929 |
| Snohomish | 4 | - | 448 | 4 | 1,295,000 | 6 | - | 434 |
| Stevens | 1 | - | (D) | 1 | (D) | - | - | - |

--continued

Table 34. **Nursery, Greenhouse, Floriculture, Sod, Mushrooms, Vegetable Seeds, and Propagative Materials Grown For Sale: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | |
|---|---|---|---|---|---|---|---|---|
| | Farms | Sq. ft. under glass or other protection | Acres in the open | Value of sales | | Farms | Sq. ft. under glass or other protection | Acres in the open |
| | | | | Farms | Dollars | | | |
| **VEGETABLE SEEDS** - Con. | | | | | | | | |
| **Counties** - Con. | | | | | | | | |
| Thurston | 1 | - | (D) | 1 | (D) | 2 | (D) | (D) |
| Walla Walla | 7 | - | 708 | 7 | 1,364,975 | 7 | - | (D) |
| Whatcom | - | - | - | - | - | 2 | - | (D) |
| Yakima | 4 | - | 18 | 4 | 30,520 | 2 | - | (D) |
| **VEGETABLE TRANSPLANTS** | | | | | | | | |
| **State Total** | | | | | | | | |
| Washington | 87 | 151,084 | 54 | 86 | 621,712 | 45 | 75,322 | 33 |
| **Counties** | | | | | | | | |
| Chelan | 2 | (D) | - | 2 | (D) | - | - | - |
| Clallam | - | - | - | - | - | 2 | (D) | (D) |
| Clark | 4 | 7,508 | (D) | 4 | 18,694 | 5 | 1,622 | - |
| Cowlitz | 1 | (D) | - | 1 | (D) | - | - | - |
| Douglas | - | - | - | - | - | 4 | - | 4 |
| Franklin | 2 | (D) | - | 2 | (D) | 1 | (D) | - |
| Grays Harbor | 3 | (D) | (D) | 3 | 8,000 | - | - | - |
| Island | 6 | 9,022 | (Z) | 6 | 1,560 | 5 | 1,140 | (D) |
| Jefferson | 3 | (D) | (D) | 3 | (D) | 1 | (D) | (D) |
| King | 3 | 1,556 | - | 3 | 12,214 | 5 | 2,400 | (D) |
| Kitsap | 2 | (D) | - | 2 | (D) | 3 | (D) | (D) |
| Kittitas | 1 | (D) | - | 1 | (D) | - | - | - |
| Klickitat | 1 | (D) | (D) | 1 | (D) | - | - | - |
| Lewis | 4 | 1,840 | - | 4 | 4,416 | - | - | - |
| Mason | 1 | (D) | - | 1 | (D) | 1 | (D) | - |
| Okanogan | 6 | 1,638 | - | 6 | 6,600 | 1 | (D) | - |
| Pierce | 7 | 5,201 | (D) | 7 | 62,336 | 1 | (D) | - |
| San Juan | 4 | 1,115 | (D) | 4 | 18,320 | - | - | - |
| Skagit | 12 | 20,218 | (D) | 12 | 181,202 | 7 | (D) | 7 |
| Snohomish | 7 | 896 | 7 | 7 | 42,428 | - | - | - |
| Spokane | 2 | (D) | - | 2 | (D) | - | - | - |
| Thurston | 6 | 5,912 | (D) | 6 | 23,936 | 3 | 1,100 | (D) |
| Wahkiakum | 1 | (D) | - | - | - | 2 | (D) | - |
| Walla Walla | - | - | - | - | - | 1 | (D) | - |
| Whatcom | 3 | (D) | - | 3 | (D) | 1 | (D) | - |
| Whitman | 1 | (D) | - | 1 | (D) | 2 | - | (D) |
| Yakima | 5 | (D) | 2 | 5 | 174,560 | - | - | - |

## Table 35. **Cut Christmas Trees: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Acres in production | | | Trees cut | | Acres in production | | Trees cut | |
| | Farms | Acres | Acres irrigated | Farms | Number | Farms | Acres | Farms | Number |
| **State Total** | | | | | | | | | |
| Washington | 637 | 8,327 | 682 | 481 | 587,047 | 791 | 11,095 | 498 | 785,304 |
| **Counties** | | | | | | | | | |
| Adams | - | - | - | - | - | 1 | (D) | 1 | (D) |
| Benton | 4 | 4 | 4 | 3 | (D) | 2 | (D) | 2 | (D) |
| Chelan | 8 | 27 | 16 | 4 | (D) | 6 | 35 | 5 | 851 |
| Clallam | 15 | 94 | 65 | 5 | 3,634 | 7 | 113 | 7 | 2,968 |
| Clark | 67 | 696 | (D) | 56 | 46,916 | 114 | 1,176 | 67 | 121,927 |
| Cowlitz | 17 | 227 | - | 9 | 7,584 | 15 | 96 | 7 | 3,675 |
| Douglas | 1 | (D) | (D) | 1 | (D) | 3 | 13 | - | - |
| Ferry | 4 | 4 | 4 | - | - | 1 | (D) | - | - |
| Franklin | 4 | 6 | 6 | 2 | (D) | 3 | 7 | 1 | (D) |
| Grant | 4 | 7 | 5 | 2 | (D) | 6 | 12 | 4 | 224 |
| Grays Harbor | 20 | 95 | - | 14 | 1,508 | 17 | 115 | 7 | 1,240 |
| Island | 5 | 26 | - | 3 | (D) | 17 | 85 | 6 | 4,738 |
| Jefferson | 3 | 10 | (D) | 3 | 237 | 6 | 16 | 6 | 364 |
| King | 61 | 599 | 22 | 48 | 21,128 | 63 | 367 | 47 | 18,950 |
| Kitsap | 21 | 553 | (D) | 20 | 22,105 | 33 | 481 | 31 | 14,855 |
| Kittitas | 3 | 3 | 3 | 2 | (D) | 5 | 15 | 3 | 599 |
| Klickitat | 2 | (D) | - | 2 | (D) | 6 | 31 | 2 | (D) |
| Lewis | 99 | 2,818 | 7 | 84 | 266,542 | 138 | 4,466 | 90 | 398,210 |
| Mason | 40 | 1,026 | 7 | 29 | 87,057 | 50 | 934 | 26 | 35,020 |
| Okanogan | 4 | 4 | 4 | 2 | (D) | 11 | 49 | 5 | 900 |
| Pacific | 22 | 146 | - | 16 | 3,577 | 26 | 162 | 13 | 8,546 |
| Pend Oreille | 3 | 23 | - | 2 | (D) | 4 | 97 | 1 | (D) |
| Pierce | 33 | 507 | (D) | 23 | 46,735 | 54 | 741 | 37 | 60,617 |
| San Juan | 4 | 21 | (D) | 3 | 27 | 4 | 52 | 2 | (D) |
| Skagit | 14 | 89 | 3 | 11 | 4,603 | 20 | 114 | 11 | 9,012 |
| Skamania | 10 | 28 | 4 | 6 | 515 | 3 | 14 | 3 | 373 |
| Snohomish | 47 | 325 | (D) | 43 | 11,751 | 50 | 298 | 45 | 16,626 |
| Spokane | 34 | 212 | 88 | 20 | 4,313 | 36 | 169 | 16 | 4,562 |
| Stevens | 8 | 31 | (D) | 3 | (D) | 3 | 3 | - | - |
| Thurston | 35 | 447 | 60 | 30 | 26,580 | 47 | 720 | 25 | 18,246 |
| Wahkiakum | - | - | - | - | - | 2 | (D) | 1 | (D) |
| Walla Walla | 5 | 45 | 45 | 5 | (D) | 3 | 17 | 1 | (D) |
| Whatcom | 34 | 220 | 11 | 27 | 26,187 | 28 | 426 | 21 | 55,704 |
| Whitman | 4 | 20 | - | 2 | (D) | 2 | (D) | 2 | (D) |
| Yakima | 2 | (D) | (D) | 1 | (D) | 5 | (D) | 3 | (D) |

## Table 36. **Short Rotation Woody Crops: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | | | 2007 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Acres in production | | | Acres harvested | | Acres in production | | | Acres harvested | |
| | Farms | Acres | Acres irrigated | Farms | Acres | Farms | Acres | Acres irrigated | Farms | Acres |
| **State Total** | | | | | | | | | | |
| Washington | 85 | (D) | (D) | 48 | 1,333 | 153 | 12,638 | (D) | 71 | 1,714 |
| **Counties** | | | | | | | | | | |
| Asotin | 1 | (D) | - | 1 | (D) | - | - | - | - | - |
| Benton | - | - | - | - | - | 2 | (D) | (D) | - | - |
| Chelan | 2 | (D) | - | 2 | (D) | 1 | (D) | - | 1 | (D) |
| Clallam | - | - | - | - | - | 7 | 122 | (D) | 4 | 7 |
| Clark | 4 | 111 | (D) | 2 | (D) | 21 | 218 | (D) | 4 | 13 |
| Cowlitz | 1 | (D) | - | 1 | (D) | 3 | 173 | - | 1 | (D) |
| Ferry | - | - | - | - | - | 1 | (D) | (D) | - | - |
| Garfield | - | - | - | - | - | 1 | (D) | - | 1 | (D) |
| Grant | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Grays Harbor | 4 | 71 | - | 3 | 3 | 4 | (D) | - | 2 | (D) |
| Island | - | - | - | - | - | 4 | 21 | - | 1 | (D) |
| King | 11 | 34 | (D) | 8 | 9 | 15 | 31 | 5 | 14 | 17 |
| Kitsap | 6 | 46 | (D) | 4 | (D) | 6 | 54 | (D) | 5 | 14 |
| Kittitas | 2 | (D) | (D) | - | - | 2 | (D) | (D) | - | - |
| Klickitat | 1 | (D) | - | 1 | (D) | 1 | (D) | - | - | - |
| Lewis | 7 | 75 | (D) | 4 | 18 | 11 | 65 | (D) | 7 | 10 |
| Mason | 6 | 23 | (D) | 3 | (D) | 5 | 62 | - | 1 | (D) |
| Pacific | 7 | 86 | - | - | - | 13 | 123 | - | 2 | (D) |
| Pierce | 2 | (D) | (D) | - | - | 4 | (D) | - | 3 | (D) |
| San Juan | 1 | (D) | (D) | 1 | (D) | - | - | - | - | - |
| Skagit | 8 | 52 | (D) | 4 | 6 | 8 | 26 | - | 4 | 8 |
| Skamania | - | - | - | - | - | 1 | (D) | - | 1 | (D) |
| Snohomish | 6 | 24 | (D) | 3 | (D) | 13 | 139 | (D) | 11 | 59 |
| Spokane | 3 | 32 | - | 1 | (D) | 11 | 196 | 28 | 2 | (D) |
| Stevens | - | - | - | - | - | 4 | 140 | - | - | - |
| Thurston | 8 | 73 | (D) | 6 | 20 | 9 | 375 | (D) | 4 | 62 |
| Walla Walla | 1 | (D) | (D) | 1 | (D) | 1 | (D) | (D) | 1 | (D) |
| Whatcom | 3 | 7 | - | 2 | (D) | 5 | (D) | - | 2 | (D) |

## Table 37. **Maple Syrup: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | 2012 | | | 2007 | | |
|---|---|---|---|---|---|---|
| | Farms | Number of taps | Syrup produced (gallons) | Farms | Number of taps | Syrup produced (gallons) |
| **State Total** | | | | | | |
| Washington | 4 | 36 | 4 | - | - | - |
| **Counties** | | | | | | |
| Skagit | 4 | 36 | 4 | - | - | - |

## Table 38. **Grain Storage Capacity: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | | Grain storage capacity (see text) | | | Farms with capacity by North American Industry Classification System | |
|---|---|---|---|---|---|---|
| | | Farms | Bushels | Average bushels per farm | Crop production (111) | Animal production and aquaculture (112) |
| **State Total** | | | | | | |
| Washington | 2012 | 1,549 | 61,803,046 | 39,899 | 1,226 | 323 |
| | 2007 | 1,662 | 69,147,864 | 41,605 | 1,323 | 339 |
| **Counties, 2012** | | | | | | |
| Adams | | 97 | 5,081,648 | 52,388 | 92 | 5 |
| Asotin | | 39 | 1,897,660 | 48,658 | 31 | 8 |
| Benton | | 40 | 4,350,395 | 108,760 | 33 | 7 |
| Chelan | | 1 | (D) | (D) | 1 | - |
| Clallam | | 7 | 72,306 | 10,329 | 4 | 3 |
| Clark | | 15 | 143,807 | 9,587 | 9 | 6 |
| Columbia | | 15 | 872,333 | 58,156 | 15 | - |
| Cowlitz | | 4 | 4,045 | 1,011 | - | 4 |
| Douglas | | 98 | 2,731,800 | 27,876 | 88 | 10 |
| Ferry | | 8 | 22,180 | 2,773 | 4 | 4 |
| Franklin | | 91 | 3,347,640 | 36,787 | 80 | 11 |
| Garfield | | 62 | 2,392,630 | 38,591 | 58 | 4 |
| Grant | | 144 | 7,982,281 | 55,433 | 118 | 26 |
| Grays Harbor | | 9 | 156,850 | 17,428 | 6 | 3 |
| Island | | 3 | (D) | (D) | 2 | 1 |
| Jefferson | | 1 | (D) | (D) | - | 1 |
| King | | 15 | 91,376 | 6,092 | 1 | 14 |
| Kitsap | | 4 | 6,280 | 1,570 | 2 | 2 |
| Kittitas | | 36 | 593,617 | 16,489 | 30 | 6 |
| Klickitat | | 41 | 1,194,390 | 29,131 | 23 | 18 |
| Lewis | | 25 | 248,190 | 9,928 | 11 | 14 |
| Lincoln | | 98 | 4,864,241 | 49,635 | 86 | 12 |
| Mason | | 2 | (D) | (D) | - | 2 |
| Okanogan | | 37 | 285,636 | 7,720 | 14 | 23 |
| Pacific | | 3 | 817 | 272 | - | 3 |
| Pend Oreille | | 8 | 14,306 | 1,788 | 5 | 3 |
| Pierce | | 9 | (D) | (D) | - | 9 |
| San Juan | | 9 | (D) | (D) | 4 | 5 |
| Skagit | | 23 | 669,613 | 29,114 | 19 | 4 |
| Snohomish | | 20 | 110,950 | 5,548 | 10 | 10 |
| Spokane | | 141 | 4,378,550 | 31,054 | 109 | 32 |
| Stevens | | 97 | 715,907 | 7,380 | 66 | 31 |
| Thurston | | 11 | 22,107 | 2,010 | 3 | 8 |
| Walla Walla | | 49 | 2,279,003 | 46,510 | 47 | 2 |
| Whatcom | | 18 | 590,269 | 32,793 | 4 | 14 |
| Whitman | | 224 | 14,345,320 | 64,042 | 216 | 8 |
| Yakima | | 45 | 2,000,364 | 44,453 | 35 | 10 |

[1] 2007 data may not include storage capacity for pulse crops.

## Table 39. **Commodities Raised and Delivered Under Production Contracts: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Farms | Number |
|---|---|---|
| **BROILERS AND OTHER MEAT-TYPE CHICKENS** | | |
| **State Total** | | |
| Washington | 35 | 25,285,024 |
| **Counties** | | |
| Clark | 7 | 2,541,134 |
| Cowlitz | 5 | (D) |
| Lewis | 21 | 20,161,000 |
| Whatcom | 2 | (D) |
| **EGGS, CHICKEN (DOZENS)** | | |
| **State Total** | | |
| Washington | 3 | 32,750,830 |
| **Counties** | | |
| Pierce | 1 | (D) |
| Skagit | 1 | (D) |
| Snohomish | 1 | (D) |
| **LAYERS** | | |
| **State Total** | | |
| Washington | 1 | (D) |
| **Counties** | | |
| Skagit | 1 | (D) |
| **CUSTOM FED CATTLE SHIPPED DIRECTLY FOR SLAUGHTER (SEE TEXT)** | | |
| **State Total** | | |
| Washington | 7 | 229,349 |
| **Counties** | | |
| Benton | 1 | (D) |
| Franklin | 1 | (D) |
| Grant | 3 | (D) |
| Walla Walla | 1 | (D) |
| Whitman | 1 | (D) |
| **REPLACEMENT DAIRY HEIFERS** | | |
| **State Total** | | |
| Washington | 39 | 19,458 |
| **Counties** | | |
| Adams | 1 | (D) |
| Franklin | 1 | (D) |
| Grant | 1 | (D) |
| Island | 1 | (D) |
| King | 7 | 1,085 |
| Lewis | 2 | (D) |
| Pierce | 2 | (D) |
| Skagit | 2 | (D) |
| Snohomish | 3 | 170 |
| Walla Walla | 2 | (D) |
| **REPLACEMENT DAIRY HEIFERS** - Con. | | |
| **Counties** - Con. | | |
| Whatcom | 15 | 2,854 |
| Yakima | 2 | (D) |
| **OTHER CATTLE, SHEEP, LIVESTOCK, OR POULTRY (SEE TEXT)** | | |
| **State Total** | | |
| Washington | 12 | (X) |
| **Counties** | | |
| Adams | 1 | (X) |
| Grant | 1 | (X) |
| Kittitas | 1 | (X) |
| Lewis | 2 | (X) |
| Lincoln | 1 | (X) |
| Okanogan | 3 | (X) |
| Pierce | 1 | (X) |
| Walla Walla | 1 | (X) |
| Yakima | 1 | (X) |
| **GRAINS AND OILSEEDS** | | |
| **State Total** | | |
| Washington | 9 | (X) |
| **Counties** | | |
| Adams | 4 | (X) |
| Grant | 1 | (X) |
| King | 1 | (X) |
| Kittitas | 1 | (X) |
| Spokane | 1 | (X) |
| Walla Walla | 1 | (X) |
| **VEGETABLES, MELONS, POTATOES, AND SWEET POTATOES** | | |
| **State Total** | | |
| Washington | 36 | (X) |
| **Counties** | | |
| Adams | 3 | (X) |
| Benton | 4 | (X) |
| Franklin | 9 | (X) |
| Grant | 14 | (X) |
| Kittitas | 1 | (X) |
| Lewis | 2 | (X) |
| Skagit | 3 | (X) |
| **OTHER CROPS (SEE TEXT)** | | |
| **State Total** | | |
| Washington | 2 | (X) |
| **Counties** | | |
| Benton | 1 | (X) |
| Walla Walla | 1 | (X) |

## Table 40. **Machinery and Equipment on Operation: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **VALUE OF MACHINERY AND EQUIPMENT** | | | | | | | | |
| Estimated market value of all machinery and equipment ..... farms, 2012 | 37,249 | 713 | 185 | 1,509 | 890 | 536 | 1,929 | 308 |
| 2007 | 39,283 | 782 | 192 | 1,630 | 979 | 512 | 2,101 | 283 |
| $1,000, 2012 | 3,672,289 | 180,195 | 19,121 | 193,101 | 57,357 | 19,313 | 74,842 | 54,792 |
| 2007 | 3,278,858 | 149,513 | 19,040 | 170,221 | 61,730 | 23,365 | 76,643 | 33,679 |
| Average per farm ..... dollars, 2012 | 98,588 | 252,727 | 103,356 | 127,966 | 64,446 | 36,032 | 38,798 | 177,896 |
| 2007 | 83,468 | 191,192 | 99,164 | 104,430 | 63,054 | 45,634 | 36,479 | 119,009 |
| Farms by value group: | | | | | | | | |
| $1 to $9,999 ..... 2012 | 9,294 | 144 | 33 | 434 | 140 | 168 | 533 | 83 |
| 2007 | 8,794 | 128 | 28 | 435 | 169 | 99 | 689 | 54 |
| $10,000 to $19,999 ..... 2012 | 6,399 | 62 | 19 | 260 | 136 | 90 | 380 | 29 |
| 2007 | 6,735 | 84 | 24 | 338 | 116 | 58 | 362 | 31 |
| $20,000 to $29,999 ..... 2012 | 4,949 | 58 | 24 | 190 | 128 | 81 | 303 | 27 |
| 2007 | 5,112 | 75 | 25 | 230 | 164 | 117 | 321 | 37 |
| $30,000 to $49,999 ..... 2012 | 5,008 | 56 | 18 | 193 | 132 | 78 | 342 | 34 |
| 2007 | 5,732 | 93 | 31 | 189 | 155 | 84 | 318 | 43 |
| $50,000 to $69,999 ..... 2012 | 2,910 | 60 | 17 | 110 | 101 | 48 | 124 | 24 |
| 2007 | 3,625 | 71 | 16 | 127 | 106 | 76 | 154 | 19 |
| $70,000 to $99,999 ..... 2012 | 2,116 | 41 | 18 | 83 | 76 | 28 | 106 | 34 |
| 2007 | 2,328 | 45 | 14 | 70 | 97 | 36 | 101 | 20 |
| $100,000 to $199,999 ..... 2012 | 2,774 | 85 | 28 | 116 | 112 | 26 | 86 | 30 |
| 2007 | 3,212 | 108 | 28 | 121 | 106 | 27 | 105 | 33 |
| $200,000 to $499,999 ..... 2012 | 2,303 | 88 | 20 | 72 | 60 | 17 | 48 | 23 |
| 2007 | 2,643 | 101 | 16 | 83 | 59 | 12 | 45 | 31 |
| $500,000 or more ..... 2012 | 1,496 | 119 | 8 | 51 | 5 | - | 7 | 24 |
| 2007 | 1,102 | 77 | 10 | 37 | 7 | 3 | 6 | 15 |
| **SELECTED MACHINERY AND EQUIPMENT** | | | | | | | | |
| Trucks, including pickups (see text) ..... farms, 2012 | 26,834 | 475 | 140 | 1,101 | 700 | 379 | 1,264 | 202 |
| 2007 | 32,299 | 625 | 160 | 1,349 | 840 | 401 | 1,641 | 252 |
| number, 2012 | 64,943 | 2,242 | 418 | 2,858 | 1,505 | 622 | 1,867 | 638 |
| 2007 | 72,330 | 2,641 | 447 | 3,143 | 1,670 | 634 | 2,441 | 734 |
| Tractors ..... farms, 2012 | 26,845 | 466 | 128 | 1,031 | 772 | 386 | 1,383 | 196 |
| 2007 | 31,130 | 616 | 151 | 1,186 | 860 | 399 | 1,651 | 203 |
| number, 2012 | 63,140 | 1,539 | 293 | 2,551 | 2,226 | 710 | 2,375 | 467 |
| 2007 | 68,686 | 1,856 | 303 | 2,898 | 2,296 | 717 | 2,668 | 458 |
| Less than 40 horsepower (PTO) ..... farms, 2012 | 15,482 | 143 | 54 | 627 | 427 | 284 | 1,008 | 98 |
| 2007 | 18,543 | 211 | 87 | 722 | 518 | 269 | 1,244 | 110 |
| number, 2012 | 21,007 | 193 | 70 | 823 | 680 | 385 | 1,306 | 132 |
| 2007 | 25,319 | 313 | 112 | 1,011 | 907 | 396 | 1,604 | 136 |
| 40 to 99 horsepower (PTO) ..... farms, 2012 | 14,944 | 263 | 79 | 559 | 560 | 167 | 592 | 114 |
| 2007 | 16,669 | 333 | 76 | 575 | 563 | 167 | 694 | 106 |
| number, 2012 | 29,105 | 516 | 108 | 1,300 | 1,450 | 262 | 921 | 158 |
| 2007 | 29,679 | 571 | 96 | 1,373 | 1,272 | 242 | 944 | 137 |
| 100 horsepower (PTO) or more ..... farms, 2012 | 5,556 | 309 | 55 | 142 | 61 | 31 | 94 | 88 |
| 2007 | 6,431 | 439 | 52 | 181 | 55 | 53 | 91 | 89 |
| number, 2012 | 13,028 | 830 | 115 | 428 | 96 | 63 | 148 | 177 |
| 2007 | 13,688 | 972 | 95 | 514 | 117 | 79 | 120 | 185 |
| Grain and bean combines, self-propelled ..... farms, 2012 | 2,567 | 205 | 28 | 51 | 3 | 4 | 15 | 64 |
| 2007 | 2,522 | 219 | 34 | 50 | 1 | 5 | 10 | 64 |
| number, 2012 | 3,834 | 325 | 41 | 75 | 6 | 6 | 17 | 95 |
| 2007 | 3,839 | 350 | 48 | 77 | (D) | 7 | 12 | 99 |
| Cotton pickers and strippers, self-propelled ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Forage harvesters, self-propelled ..... farms, 2012 | 1,614 | 32 | 5 | 71 | 19 | 4 | 22 | 5 |
| 2007 | 1,556 | 42 | 11 | 53 | 14 | - | 21 | 4 |
| number, 2012 | 1,867 | 42 | 7 | 78 | 20 | 5 | 22 | 5 |
| 2007 | 1,711 | 47 | 11 | 54 | 14 | - | 21 | 4 |
| Hay balers ..... farms, 2012 | 6,891 | 83 | 33 | 182 | 53 | 123 | 325 | 48 |
| 2007 | 7,281 | 110 | 29 | 214 | 43 | 101 | 354 | 56 |
| number, 2012 | 8,468 | 114 | 39 | 206 | 55 | 148 | 395 | 58 |
| 2007 | 8,503 | 137 | 33 | 234 | 49 | 121 | 398 | 66 |
| **2012 INVENTORY** | | | | | | | | |
| Manufactured 2008 to 2012: | | | | | | | | |
| Trucks, including pickups ..... farms | 4,945 | 170 | 37 | 216 | 156 | 36 | 157 | 56 |
| number | 7,562 | 379 | 48 | 502 | 197 | 41 | 180 | 83 |
| Tractors ..... farms | 5,113 | 100 | 23 | 226 | 211 | 49 | 199 | 38 |
| number | 8,634 | 229 | 26 | 519 | 327 | 59 | 235 | 61 |
| Less than 40 horsepower (PTO) ..... farms | 2,038 | 13 | 7 | 105 | 57 | 33 | 119 | 6 |
| number | 2,343 | 13 | 7 | 128 | 61 | (D) | 125 | 6 |
| 40 to 99 horsepower (PTO) ..... farms | 2,569 | 43 | 11 | 123 | 148 | 19 | 82 | 16 |
| number | 4,357 | 80 | 11 | 282 | 237 | 20 | 92 | 16 |
| 100 horsepower (PTO) or more ..... farms | 1,069 | 59 | 8 | 30 | 20 | 1 | 16 | 27 |
| number | 1,934 | 136 | 8 | 109 | 29 | (D) | 18 | 39 |
| Grain and bean combines ..... farms | 360 | 38 | 2 | 10 | - | - | - | 22 |
| number | 436 | 49 | (D) | 16 | - | - | - | 29 |
| Cotton pickers and strippers ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Forage harvesters self-propelled ..... farms | 169 | 5 | - | 11 | 3 | - | 3 | 3 |
| number | 210 | 5 | - | 11 | 3 | - | 3 | (D) |
| Hay balers ..... farms | 766 | 15 | 6 | 17 | 1 | 9 | 38 | 3 |
| number | 884 | 19 | 6 | 21 | (D) | 12 | 40 | 3 |

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Table 40. **Machinery and Equipment on Operation: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **VALUE OF MACHINERY AND EQUIPMENT** | | | | | | | | |
| Estimated market value of all machinery and equipment ....farms, 2012 | 492 | 849 | 255 | 883 | 211 | 1,552 | 557 | 377 |
| 2007 | 481 | 955 | 232 | 891 | 239 | 1,858 | 628 | 458 |
| $1,000, 2012 | 33,227 | 110,864 | 14,147 | 266,947 | 32,299 | 451,764 | 37,082 | 15,499 |
| 2007 | 24,862 | 95,715 | 9,929 | 180,306 | 26,575 | 380,473 | 26,701 | 16,451 |
| Average per farm .... dollars, 2012 | 67,534 | 130,582 | 55,478 | 302,318 | 153,078 | 291,085 | 66,574 | 41,111 |
| 2007 | 51,689 | 100,225 | 42,795 | 202,364 | 111,192 | 204,775 | 42,517 | 35,920 |
| Farms by value group: | | | | | | | | |
| $1 to $9,999 ....2012 | 142 | 123 | 51 | 133 | 31 | 243 | 157 | 126 |
| 2007 | 99 | 161 | 59 | 91 | 44 | 278 | 169 | 170 |
| $10,000 to $19,999 ....2012 | 87 | 143 | 56 | 77 | 16 | 125 | 98 | 56 |
| 2007 | 128 | 167 | 38 | 84 | 28 | 231 | 124 | 81 |
| $20,000 to $29,999 ....2012 | 69 | 125 | 52 | 79 | 24 | 155 | 73 | 51 |
| 2007 | 57 | 110 | 34 | 68 | 25 | 153 | 88 | 49 |
| $30,000 to $49,999 ....2012 | 82 | 78 | 29 | 93 | 24 | 138 | 81 | 42 |
| 2007 | 80 | 135 | 40 | 110 | 25 | 192 | 122 | 58 |
| $50,000 to $69,999 ....2012 | 39 | 80 | 15 | 37 | 18 | 98 | 37 | 34 |
| 2007 | 47 | 94 | 19 | 74 | 29 | 141 | 36 | 37 |
| $70,000 to $99,999 ....2012 | 22 | 51 | 17 | 75 | 23 | 79 | 35 | 17 |
| 2007 | 12 | 72 | 18 | 63 | 10 | 107 | 36 | 26 |
| $100,000 to $199,999 ....2012 | 25 | 103 | 19 | 112 | 22 | 194 | 38 | 42 |
| 2007 | 32 | 84 | 13 | 120 | 37 | 245 | 34 | 24 |
| $200,000 to $499,999 ....2012 | 14 | 93 | 15 | 145 | 37 | 247 | 26 | 8 |
| 2007 | 20 | 100 | 11 | 191 | 30 | 315 | 17 | 11 |
| $500,000 or more ....2012 | 12 | 53 | 1 | 132 | 16 | 273 | 12 | 1 |
| 2007 | 6 | 32 | - | 90 | 11 | 196 | 2 | 2 |
| **SELECTED MACHINERY AND EQUIPMENT** | | | | | | | | |
| Trucks, including pickups (see text) ....farms, 2012 | 353 | 620 | 211 | 667 | 146 | 1,169 | 408 | 259 |
| 2007 | 395 | 749 | 183 | 766 | 209 | 1,591 | 520 | 372 |
| number, 2012 | 647 | 2,070 | 451 | 2,876 | 516 | 5,403 | 772 | 365 |
| 2007 | 686 | 2,182 | 336 | 3,084 | 637 | 6,009 | 849 | 537 |
| Tractors ....farms, 2012 | 346 | 610 | 190 | 678 | 145 | 1,202 | 392 | 265 |
| 2007 | 350 | 779 | 191 | 730 | 162 | 1,541 | 504 | 350 |
| number, 2012 | 663 | 1,885 | 314 | 2,527 | 362 | 4,931 | 814 | 480 |
| 2007 | 586 | 1,933 | 306 | 2,728 | 391 | 5,356 | 851 | 598 |
| Less than 40 horsepower (PTO) ....farms, 2012 | 241 | 280 | 84 | 291 | 57 | 421 | 246 | 187 |
| 2007 | 248 | 357 | 105 | 283 | 94 | 563 | 338 | 241 |
| number, 2012 | 309 | 413 | 106 | 405 | 76 | 697 | 351 | 234 |
| 2007 | 307 | 501 | 128 | 489 | 118 | 833 | 444 | 307 |
| 40 to 99 horsepower (PTO) ....farms, 2012 | 169 | 414 | 121 | 411 | 75 | 809 | 217 | 130 |
| 2007 | 163 | 473 | 103 | 497 | 86 | 1,060 | 214 | 173 |
| number, 2012 | 282 | 1,058 | 176 | 1,057 | 111 | 2,372 | 358 | 203 |
| 2007 | 245 | 996 | 145 | 1,078 | 102 | 2,492 | 327 | 253 |
| 100 horsepower (PTO) or more ....farms, 2012 | 33 | 211 | 22 | 333 | 87 | 608 | 43 | 24 |
| 2007 | 18 | 238 | 25 | 411 | 87 | 717 | 56 | 23 |
| number, 2012 | 72 | 414 | 32 | 1,065 | 175 | 1,862 | 105 | 43 |
| 2007 | 34 | 436 | 33 | 1,161 | 171 | 2,031 | 80 | 38 |
| Grain and bean combines, self-propelled ....farms, 2012 | 12 | 142 | 15 | 130 | 79 | 217 | 2 | 10 |
| 2007 | 3 | 122 | 7 | 91 | 74 | 246 | 4 | 14 |
| number, 2012 | 23 | 222 | 15 | 185 | 118 | 323 | (D) | 14 |
| 2007 | (D) | 204 | 8 | 137 | 117 | 338 | 4 | 18 |
| Cotton pickers and strippers, self-propelled ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Forage harvesters, self-propelled ....farms, 2012 | 5 | 15 | 15 | 64 | 6 | 156 | 15 | 4 |
| 2007 | 3 | 23 | 11 | 84 | 12 | 221 | 12 | 7 |
| number, 2012 | 5 | 16 | 18 | 93 | 6 | 203 | 17 | 4 |
| 2007 | 5 | 23 | 11 | 114 | 12 | 271 | 12 | (D) |
| Hay balers ....farms, 2012 | 84 | 70 | 98 | 161 | 39 | 407 | 145 | 82 |
| 2007 | 89 | 68 | 70 | 196 | 44 | 473 | 177 | 105 |
| number, 2012 | 105 | 81 | 129 | 240 | 46 | 579 | 174 | 94 |
| 2007 | 111 | 81 | 83 | 258 | 52 | 612 | 199 | 121 |
| **2012 INVENTORY** | | | | | | | | |
| Manufactured 2008 to 2012: | | | | | | | | |
| Trucks, including pickups ....farms | 28 | 181 | 33 | 260 | 40 | 447 | 38 | 28 |
| number | 30 | 258 | 35 | 521 | 49 | 1,051 | 52 | 30 |
| Tractors ....farms | 60 | 144 | 25 | 192 | 28 | 396 | 78 | 60 |
| number | 77 | 319 | 31 | 524 | 32 | 1,164 | 83 | 76 |
| Less than 40 horsepower (PTO) ....farms | 33 | 28 | 2 | 50 | 7 | 76 | 31 | 36 |
| number | 36 | 30 | (D) | 65 | 9 | 117 | 31 | 38 |
| 40 to 99 horsepower (PTO) ....farms | 23 | 83 | 19 | 108 | 11 | 223 | 40 | 25 |
| number | 25 | 226 | 24 | 262 | 11 | 619 | 43 | 35 |
| 100 horsepower (PTO) or more ....farms | 10 | 50 | 4 | 85 | 11 | 177 | 9 | 3 |
| number | 16 | 63 | (D) | 197 | 12 | 428 | 9 | 3 |
| Grain and bean combines ....farms | - | 27 | - | 14 | 4 | 48 | - | - |
| number | - | 29 | - | 20 | 6 | 59 | - | - |
| Cotton pickers and strippers ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Forage harvesters self-propelled ....farms | - | - | - | 25 | 1 | 43 | 1 | - |
| number | - | - | - | 44 | (D) | 59 | (D) | - |
| Hay balers ....farms | 10 | 6 | 14 | 44 | 3 | 110 | 5 | 15 |
| number | 10 | 6 | 14 | 65 | 3 | 139 | 7 | 15 |

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Table 40. **Machinery and Equipment on Operation: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **VALUE OF MACHINERY AND EQUIPMENT** | | | | | | | | |
| Estimated market value of all machinery and equipment ..... farms, 2012 | 221 | 1,837 | 706 | 1,006 | 760 | 1,647 | 897 | 377 |
| 2007 | 211 | 1,790 | 664 | 1,038 | 893 | 1,717 | 798 | 471 |
| $1,000, 2012 | 8,155 | 71,692 | 19,069 | 78,059 | 63,535 | 79,917 | 156,074 | 15,416 |
| 2007 | 10,652 | 77,392 | 21,184 | 75,428 | 60,012 | 84,005 | 113,615 | 24,540 |
| Average per farm ..... dollars, 2012 | 36,901 | 39,027 | 27,010 | 77,593 | 83,599 | 48,523 | 173,996 | 40,892 |
| 2007 | 50,482 | 43,236 | 31,903 | 72,666 | 67,202 | 48,925 | 142,374 | 52,101 |
| Farms by value group: | | | | | | | | |
| $1 to $9,999 ..... 2012 | 68 | 557 | 234 | 218 | 173 | 411 | 208 | 128 |
| 2007 | 54 | 490 | 174 | 210 | 218 | 397 | 131 | 92 |
| $10,000 to $19,999 ..... 2012 | 33 | 454 | 115 | 125 | 170 | 342 | 93 | 56 |
| 2007 | 32 | 305 | 136 | 158 | 161 | 293 | 86 | 115 |
| $20,000 to $29,999 ..... 2012 | 51 | 232 | 141 | 159 | 92 | 242 | 94 | 50 |
| 2007 | 41 | 254 | 101 | 120 | 124 | 234 | 73 | 79 |
| $30,000 to $49,999 ..... 2012 | 22 | 231 | 89 | 188 | 109 | 253 | 88 | 61 |
| 2007 | 27 | 320 | 129 | 166 | 116 | 319 | 69 | 71 |
| $50,000 to $69,999 ..... 2012 | 14 | 118 | 60 | 106 | 57 | 119 | 44 | 34 |
| 2007 | 17 | 160 | 47 | 122 | 63 | 189 | 49 | 34 |
| $70,000 to $99,999 ..... 2012 | 16 | 82 | 41 | 60 | 43 | 82 | 55 | 18 |
| 2007 | 16 | 71 | 39 | 60 | 72 | 102 | 76 | 30 |
| $100,000 to $199,999 ..... 2012 | 10 | 99 | 23 | 50 | 44 | 114 | 79 | 15 |
| 2007 | 16 | 123 | 35 | 102 | 70 | 94 | 129 | 24 |
| $200,000 to $499,999 ..... 2012 | 6 | 56 | 3 | 72 | 53 | 71 | 131 | 12 |
| 2007 | 6 | 60 | 1 | 80 | 54 | 75 | 133 | 23 |
| $500,000 or more ..... 2012 | 1 | 8 | - | 28 | 19 | 13 | 105 | 3 |
| 2007 | 2 | 7 | 2 | 20 | 15 | 14 | 52 | 3 |
| **SELECTED MACHINERY AND EQUIPMENT** | | | | | | | | |
| Trucks, including pickups (see text) ..... farms, 2012 | 164 | 1,267 | 448 | 732 | 557 | 1,267 | 633 | 277 |
| 2007 | 155 | 1,398 | 541 | 813 | 768 | 1,404 | 707 | 390 |
| number, 2012 | 304 | 2,009 | 598 | 1,508 | 1,249 | 2,156 | 2,454 | 505 |
| 2007 | 252 | 2,155 | 843 | 1,572 | 1,615 | 2,339 | 2,509 | 633 |
| Tractors ..... farms, 2012 | 159 | 1,216 | 375 | 769 | 548 | 1,264 | 620 | 218 |
| 2007 | 158 | 1,337 | 453 | 852 | 611 | 1,442 | 646 | 328 |
| number, 2012 | 274 | 1,969 | 506 | 1,598 | 1,237 | 2,421 | 1,629 | 350 |
| 2007 | 254 | 2,058 | 674 | 1,676 | 1,253 | 2,652 | 1,649 | 502 |
| Less than 40 horsepower (PTO) ..... farms, 2012 | 103 | 898 | 295 | 432 | 289 | 823 | 241 | 162 |
| 2007 | 118 | 957 | 372 | 475 | 295 | 1,018 | 295 | 266 |
| number, 2012 | 134 | 1,191 | 369 | 575 | 407 | 1,056 | 301 | 213 |
| 2007 | 156 | 1,198 | 486 | 612 | 353 | 1,339 | 345 | 341 |
| 40 to 99 horsepower (PTO) ..... farms, 2012 | 83 | 474 | 101 | 457 | 317 | 723 | 372 | 86 |
| 2007 | 74 | 443 | 134 | 478 | 356 | 743 | 361 | 98 |
| number, 2012 | 123 | 647 | 123 | 705 | 552 | 1,147 | 525 | 119 |
| 2007 | (D) | 672 | 162 | 733 | 613 | 1,138 | 515 | 141 |
| 100 horsepower (PTO) or more ..... farms, 2012 | 14 | 92 | 14 | 170 | 143 | 142 | 368 | 13 |
| 2007 | 7 | 135 | 24 | 192 | 163 | 134 | 381 | 17 |
| number, 2012 | 17 | 131 | 14 | 318 | 278 | 218 | 803 | 18 |
| 2007 | (D) | 188 | 26 | 331 | 287 | 175 | 789 | 20 |
| Grain and bean combines, self-propelled ..... farms, 2012 | - | 6 | - | 27 | 66 | 31 | 285 | - |
| 2007 | - | 2 | - | 24 | 85 | 15 | 265 | - |
| number, 2012 | - | 6 | - | 28 | 84 | 42 | 447 | - |
| 2007 | - | (D) | - | 24 | 101 | 18 | 426 | - |
| Cotton pickers and strippers, self-propelled ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Forage harvesters, self-propelled ..... farms, 2012 | 5 | 8 | - | 115 | 64 | 15 | 66 | - |
| 2007 | 3 | 8 | 2 | 119 | 55 | 18 | 55 | - |
| number, 2012 | 5 | 11 | - | 131 | 71 | 16 | 73 | - |
| 2007 | 3 | 8 | (D) | 127 | 58 | 19 | 55 | - |
| Hay balers ..... farms, 2012 | 31 | 103 | 39 | 290 | 182 | 476 | 171 | 53 |
| 2007 | 33 | 108 | 38 | 315 | 196 | 459 | 161 | 53 |
| number, 2012 | 36 | 127 | 39 | 373 | 224 | 583 | 214 | 66 |
| 2007 | 35 | 116 | 40 | 367 | 218 | 542 | 186 | 58 |
| **2012 INVENTORY** | | | | | | | | |
| Manufactured 2008 to 2012: | | | | | | | | |
| Trucks, including pickups ..... farms | 19 | 210 | 49 | 99 | 112 | 137 | 146 | 33 |
| number | 20 | 239 | 53 | 114 | 143 | 157 | 180 | 43 |
| Tractors ..... farms | 19 | 168 | 59 | 117 | 82 | 207 | 119 | 32 |
| number | 21 | 182 | 60 | 159 | 134 | 249 | 152 | 32 |
| Less than 40 horsepower (PTO) ..... farms | 12 | 107 | 42 | 52 | 34 | 82 | 18 | 24 |
| number | 12 | 113 | 42 | 57 | 37 | 84 | 19 | 24 |
| 40 to 99 horsepower (PTO) ..... farms | 7 | 57 | 18 | 56 | 37 | 98 | 58 | 8 |
| number | 9 | 62 | 18 | 72 | 66 | 109 | 60 | 8 |
| 100 horsepower (PTO) or more ..... farms | - | 7 | - | 22 | 23 | 35 | 59 | - |
| number | - | 7 | - | 30 | 31 | 56 | 73 | - |
| Grain and bean combines ..... farms | - | - | - | - | 1 | - | 39 | - |
| number | - | - | - | - | (D) | - | 41 | - |
| Cotton pickers and strippers ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Forage harvesters self-propelled..... farms | - | - | - | 13 | 5 | - | 2 | - |
| number | - | - | - | 16 | 5 | - | (D) | - |
| Hay balers ..... farms | 1 | 12 | - | 31 | 14 | 48 | 27 | 4 |
| number | (D) | 16 | - | 32 | 14 | 59 | 27 | 4 |

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Table 40. **Machinery and Equipment on Operation: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **VALUE OF MACHINERY AND EQUIPMENT** | | | | | | | | |
| Estimated market value of all machinery and equipment ....farms, 2012 | 1,449 | 330 | 288 | 1,478 | 274 | 1,074 | 144 | 1,438 |
| 2007 | 1,662 | 390 | 316 | 1,448 | 291 | 1,215 | 123 | 1,670 |
| $1,000, 2012 | 106,600 | 19,989 | 13,110 | 52,540 | 7,789 | 127,804 | 5,272 | 57,695 |
| 2007 | 96,696 | 30,459 | 15,886 | 61,138 | 8,864 | 97,603 | 5,159 | 73,745 |
| Average per farm .... dollars, 2012 | 73,568 | 60,572 | 45,520 | 35,548 | 28,428 | 118,998 | 36,611 | 40,122 |
| 2007 | 58,180 | 78,099 | 50,271 | 42,222 | 30,459 | 80,332 | 41,944 | 44,159 |
| Farms by value group: | | | | | | | | |
| $1 to $9,999 ....2012 | 305 | 46 | 75 | 446 | 108 | 245 | 27 | 413 |
| 2007 | 309 | 51 | 57 | 373 | 83 | 380 | 36 | 453 |
| $10,000 to $19,999 ....2012 | 270 | 61 | 45 | 302 | 45 | 225 | 37 | 377 |
| 2007 | 345 | 66 | 35 | 276 | 68 | 213 | 27 | 353 |
| $20,000 to $29,999 ....2012 | 200 | 45 | 51 | 223 | 35 | 116 | 20 | 190 |
| 2007 | 240 | 55 | 62 | 204 | 54 | 145 | 20 | 190 |
| $30,000 to $49,999 ....2012 | 190 | 62 | 43 | 190 | 36 | 190 | 32 | 199 |
| 2007 | 254 | 77 | 61 | 235 | 32 | 138 | 9 | 263 |
| $50,000 to $69,999 ....2012 | 126 | 42 | 19 | 108 | 21 | 76 | 12 | 92 |
| 2007 | 168 | 39 | 47 | 150 | 20 | 108 | 10 | 158 |
| $70,000 to $99,999 ....2012 | 95 | 27 | 14 | 115 | 15 | 37 | 6 | 53 |
| 2007 | 88 | 26 | 17 | 88 | 11 | 51 | 9 | 89 |
| $100,000 to $199,999 ....2012 | 149 | 28 | 29 | 66 | 9 | 74 | 6 | 60 |
| 2007 | 144 | 43 | 21 | 82 | 20 | 80 | 8 | 97 |
| $200,000 to $499,999 ....2012 | 81 | 16 | 12 | 24 | 5 | 67 | 4 | 40 |
| 2007 | 99 | 28 | 13 | 30 | 3 | 62 | 3 | 56 |
| $500,000 or more ....2012 | 33 | 3 | - | 4 | - | 44 | - | 14 |
| 2007 | 15 | 5 | 3 | 10 | - | 38 | 1 | 11 |
| **SELECTED MACHINERY AND EQUIPMENT** | | | | | | | | |
| Trucks, including pickups (see text) ....farms, 2012 | 1,139 | 248 | 226 | 996 | 179 | 723 | 112 | 958 |
| 2007 | 1,370 | 321 | 270 | 1,187 | 241 | 974 | 110 | 1,347 |
| number, 2012 | 2,732 | 547 | 413 | 1,604 | 298 | 1,933 | 158 | 1,671 |
| 2007 | 2,696 | 643 | 537 | 1,936 | 343 | 2,198 | 146 | 2,277 |
| Tractors ....farms, 2012 | 1,108 | 255 | 214 | 980 | 170 | 820 | 112 | 1,009 |
| 2007 | 1,310 | 288 | 255 | 1,103 | 229 | 965 | 89 | 1,268 |
| number, 2012 | 3,085 | 490 | 441 | 1,644 | 276 | 2,221 | 145 | 1,931 |
| 2007 | 2,857 | 584 | 465 | 1,838 | 335 | 2,338 | 120 | 2,337 |
| Less than 40 horsepower (PTO) ....farms, 2012 | 566 | 176 | 117 | 703 | 118 | 517 | 71 | 721 |
| 2007 | 763 | 201 | 143 | 793 | 144 | 641 | 56 | 909 |
| number, 2012 | 890 | 241 | 177 | 930 | 145 | 781 | 76 | 969 |
| 2007 | 1,143 | 283 | 210 | 1,095 | 164 | 883 | 69 | 1,246 |
| 40 to 99 horsepower (PTO) ....farms, 2012 | 741 | 133 | 147 | 410 | 81 | 475 | 44 | 462 |
| 2007 | 823 | 147 | 150 | 478 | 101 | 547 | 40 | 585 |
| number, 2012 | 1,922 | 217 | 218 | 625 | 114 | 942 | 62 | 741 |
| 2007 | 1,478 | 267 | 216 | 639 | 152 | 1,029 | (D) | 885 |
| 100 horsepower (PTO) or more ....farms, 2012 | 128 | 17 | 23 | 68 | 13 | 157 | 7 | 105 |
| 2007 | 130 | 22 | 30 | 77 | 16 | 151 | 2 | 129 |
| number, 2012 | 273 | 32 | 46 | 89 | 17 | 498 | 7 | 221 |
| 2007 | 236 | 34 | 39 | 104 | 19 | 426 | (D) | 206 |
| Grain and bean combines, self-propelled ....farms, 2012 | 36 | 2 | 7 | 2 | 4 | 42 | - | 9 |
| 2007 | 36 | - | 8 | 4 | 4 | 38 | - | 15 |
| number, 2012 | 46 | (D) | 7 | (D) | 5 | 59 | - | 13 |
| 2007 | 38 | - | 8 | 4 | 5 | 51 | - | 18 |
| Cotton pickers and strippers, self-propelled ....farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Forage harvesters, self-propelled ....farms, 2012 | 111 | 12 | 37 | 4 | 4 | 25 | - | 9 |
| 2007 | 88 | 7 | 26 | 12 | 2 | 25 | - | 22 |
| number, 2012 | 120 | 16 | 39 | 6 | 4 | 31 | - | 15 |
| 2007 | 91 | 7 | 28 | 12 | (D) | 43 | - | 24 |
| Hay balers ....farms, 2012 | 374 | 79 | 126 | 141 | 49 | 222 | 17 | 175 |
| 2007 | 342 | 87 | 102 | 149 | 59 | 259 | 11 | 203 |
| number, 2012 | 453 | 96 | 155 | 168 | 56 | 283 | 20 | 213 |
| 2007 | 408 | 99 | 116 | 166 | 70 | 312 | 11 | 228 |
| **2012 INVENTORY** | | | | | | | | |
| Manufactured 2008 to 2012: | | | | | | | | |
| Trucks, including pickups ....farms | 200 | 51 | 27 | 135 | 7 | 107 | 20 | 138 |
| number | 322 | 78 | 29 | 178 | 7 | 157 | 23 | 165 |
| Tractors ....farms | 216 | 56 | 34 | 155 | 26 | 143 | 15 | 211 |
| number | 423 | 62 | 41 | 165 | 28 | 235 | 15 | 318 |
| Less than 40 horsepower (PTO) ....farms | 77 | 29 | 12 | 69 | 22 | 64 | 9 | 139 |
| number | 98 | (D) | (D) | (D) | 22 | 81 | 9 | 201 |
| 40 to 99 horsepower (PTO) ....farms | 137 | 27 | 25 | 86 | 4 | 65 | 6 | 72 |
| number | 264 | 29 | 27 | 89 | 6 | 90 | 6 | 88 |
| 100 horsepower (PTO) or more ....farms | 39 | 1 | 2 | 2 | - | 28 | - | 21 |
| number | 61 | (D) | (D) | (D) | - | 64 | - | 29 |
| Grain and bean combines ....farms | 2 | - | - | 1 | - | 3 | - | 1 |
| number | (D) | - | - | (D) | - | 5 | - | (D) |
| Cotton pickers and strippers ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Forage harvesters self-propelled ....farms | 3 | 1 | 1 | - | - | 4 | - | 1 |
| number | 3 | (D) | (D) | - | - | 4 | - | (D) |
| Hay balers ....farms | 32 | 4 | 10 | 5 | 1 | 18 | - | 21 |
| number | 40 | 4 | 14 | 5 | (D) | 20 | - | 26 |

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Table 40. **Machinery and Equipment on Operation: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **VALUE OF MACHINERY AND EQUIPMENT** | | | | | | | | |
| Estimated market value of all machinery and equipment ..... farms, 2012 | 2,501 | 1,148 | 1,336 | 109 | 943 | 1,702 | 1,195 | 3,143 |
| 2007 | 2,502 | 1,258 | 1,288 | 119 | 929 | 1,482 | 1,247 | 3,540 |
| $1,000, 2012 | 181,650 | 56,983 | 54,065 | 4,232 | 165,623 | 136,904 | 255,945 | 373,621 |
| 2007 | 164,280 | 70,297 | 73,014 | 5,857 | 135,219 | 141,216 | 190,803 | 346,594 |
| Average per farm ..... dollars, 2012 | 72,631 | 49,637 | 40,468 | 38,829 | 175,634 | 80,437 | 214,180 | 118,874 |
| 2007 | 65,660 | 55,880 | 56,688 | 49,220 | 145,553 | 95,287 | 153,010 | 97,908 |
| Farms by value group: | | | | | | | | |
| $1 to $9,999 ..... 2012 | 633 | 257 | 408 | 27 | 224 | 488 | 206 | 848 |
| 2007 | 590 | 299 | 292 | 26 | 159 | 342 | 188 | 717 |
| $10,000 to $19,999 ..... 2012 | 419 | 229 | 224 | 24 | 122 | 297 | 138 | 562 |
| 2007 | 420 | 239 | 186 | 26 | 181 | 252 | 151 | 717 |
| $20,000 to $29,999 ..... 2012 | 319 | 159 | 214 | 27 | 117 | 224 | 126 | 383 |
| 2007 | 351 | 154 | 178 | 17 | 96 | 217 | 100 | 450 |
| $30,000 to $49,999 ..... 2012 | 408 | 144 | 222 | 6 | 124 | 195 | 135 | 371 |
| 2007 | 393 | 182 | 249 | 11 | 120 | 178 | 133 | 505 |
| $50,000 to $69,999 ..... 2012 | 223 | 126 | 107 | 10 | 75 | 165 | 71 | 243 |
| 2007 | 252 | 109 | 157 | 10 | 97 | 138 | 97 | 338 |
| $70,000 to $99,999 ..... 2012 | 127 | 87 | 63 | 7 | 69 | 57 | 64 | 178 |
| 2007 | 160 | 87 | 81 | 13 | 57 | 82 | 99 | 177 |
| $100,000 to $199,999 ..... 2012 | 203 | 88 | 55 | 6 | 70 | 118 | 110 | 231 |
| 2007 | 182 | 108 | 90 | 12 | 70 | 92 | 155 | 298 |
| $200,000 to $499,999 ..... 2012 | 100 | 55 | 34 | 1 | 71 | 109 | 169 | 198 |
| 2007 | 100 | 70 | 43 | 3 | 90 | 127 | 229 | 213 |
| $500,000 or more ..... 2012 | 69 | 3 | 9 | 1 | 71 | 49 | 176 | 129 |
| 2007 | 54 | 10 | 12 | 1 | 59 | 54 | 95 | 125 |
| **SELECTED MACHINERY AND EQUIPMENT** | | | | | | | | |
| Trucks, including pickups (see text) ..... farms, 2012 | 1,838 | 917 | 971 | 78 | 663 | 1,107 | 933 | 2,307 |
| 2007 | 2,110 | 1,079 | 1,096 | 102 | 740 | 1,177 | 1,043 | 2,903 |
| number, 2012 | 3,814 | 1,718 | 1,577 | 116 | 2,094 | 2,341 | 3,544 | 6,350 |
| 2007 | 4,375 | 1,925 | 1,787 | 183 | 2,217 | 2,343 | 3,767 | 7,009 |
| Tractors ..... farms, 2012 | 1,761 | 908 | 834 | 93 | 684 | 1,216 | 916 | 2,406 |
| 2007 | 2,019 | 1,052 | 966 | 101 | 737 | 1,168 | 1,077 | 3,003 |
| number, 2012 | 3,376 | 1,753 | 1,413 | 176 | 1,733 | 2,716 | 2,509 | 7,110 |
| 2007 | 3,845 | 2,029 | 1,662 | 210 | 1,900 | 2,754 | 2,801 | 7,948 |
| Less than 40 horsepower (PTO) ..... farms, 2012 | 992 | 465 | 546 | 50 | 339 | 694 | 406 | 1,310 |
| 2007 | 1,150 | 516 | 724 | 60 | 386 | 708 | 462 | 1,701 |
| number, 2012 | 1,215 | 591 | 671 | 81 | 482 | 895 | 516 | 1,921 |
| 2007 | 1,485 | 665 | 944 | 85 | 540 | 904 | 615 | 2,552 |
| 40 to 99 horsepower (PTO) ..... farms, 2012 | 988 | 580 | 400 | 62 | 391 | 719 | 471 | 1,547 |
| 2007 | 1,139 | 720 | 406 | 58 | 363 | 725 | 589 | 1,828 |
| number, 2012 | 1,412 | 904 | 621 | 88 | 701 | 1,366 | 685 | 4,214 |
| 2007 | 1,600 | 1,087 | 591 | 106 | 702 | 1,395 | 764 | 4,382 |
| 100 horsepower (PTO) or more ..... farms, 2012 | 395 | 174 | 84 | 5 | 216 | 191 | 553 | 323 |
| 2007 | 431 | 201 | 72 | 14 | 283 | 199 | 671 | 415 |
| number, 2012 | 749 | 258 | 121 | 7 | 550 | 455 | 1,308 | 975 |
| 2007 | 760 | 277 | 127 | 19 | 658 | 455 | 1,422 | 1,014 |
| Grain and bean combines, self-propelled ..... farms, 2012 | 244 | 107 | 5 | - | 171 | 15 | 458 | 73 |
| 2007 | 255 | 89 | 3 | - | 162 | 9 | 477 | 87 |
| number, 2012 | 374 | 130 | 5 | - | 245 | 18 | 761 | 93 |
| 2007 | 393 | 99 | (D) | - | 246 | 9 | 859 | 110 |
| Cotton pickers and strippers, self-propelled ..... farms, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| number, 2012 | - | - | - | - | - | - | - | - |
| 2007 | - | - | - | - | - | - | - | - |
| Forage harvesters, self-propelled ..... farms, 2012 | 267 | 121 | 9 | 3 | 31 | 53 | 40 | 177 |
| 2007 | 202 | 109 | 10 | 3 | 31 | 62 | 37 | 142 |
| number, 2012 | 299 | 132 | 10 | 6 | 37 | 66 | 47 | 191 |
| 2007 | 209 | 112 | 10 | 3 | 34 | 63 | 43 | 151 |
| Hay balers ..... farms, 2012 | 682 | 431 | 210 | 39 | 126 | 271 | 214 | 457 |
| 2007 | 789 | 499 | 158 | 53 | 109 | 284 | 178 | 507 |
| number, 2012 | 809 | 549 | 257 | 45 | 145 | 315 | 247 | 532 |
| 2007 | 904 | 602 | 197 | 56 | 136 | 309 | 193 | 579 |
| **2012 INVENTORY** | | | | | | | | |
| Manufactured 2008 to 2012: | | | | | | | | |
| Trucks, including pickups ..... farms | 262 | 98 | 119 | 12 | 162 | 125 | 263 | 531 |
| number | 319 | 104 | 136 | 14 | 280 | 181 | 336 | 828 |
| Tractors ..... farms | 275 | 91 | 161 | 8 | 168 | 216 | 184 | 522 |
| number | 311 | 100 | 190 | 12 | 267 | 319 | 240 | 1,157 |
| Less than 40 horsepower (PTO) ..... farms | 132 | 37 | 104 | 1 | 47 | 111 | 50 | 161 |
| number | 139 | 37 | 110 | (D) | 52 | 123 | 51 | 206 |
| 40 to 99 horsepower (PTO) ..... farms | 114 | 45 | 50 | 8 | 84 | 108 | 78 | 347 |
| number | 122 | 47 | 63 | 10 | 135 | 144 | 79 | 771 |
| 100 horsepower (PTO) or more ..... farms | 41 | 16 | 16 | 1 | 51 | 27 | 79 | 89 |
| number | 50 | 16 | 17 | (D) | 80 | 52 | 110 | 180 |
| Grain and bean combines ..... farms | 19 | 2 | - | - | 26 | - | 96 | 5 |
| number | 21 | (D) | - | - | 30 | - | 115 | 7 |
| Cotton pickers and strippers ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Forage harvesters self-propelled ..... farms | 4 | 4 | - | - | 3 | 14 | 3 | 16 |
| number | 4 | 4 | - | - | 3 | 14 | 3 | 19 |
| Hay balers ..... farms | 62 | 24 | 32 | 3 | 15 | 20 | 38 | 48 |
| number | 65 | 27 | 39 | 3 | 16 | 21 | 38 | 51 |

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Table 40. **Machinery and Equipment on Operation: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **2012 INVENTORY** - Con. | | | | | | | | |
| Manufactured prior to 2008: | | | | | | | | |
| Trucks, including pickups (see text) ....farms | 24,975 | 434 | 130 | 1,021 | 647 | 351 | 1,167 | 184 |
| number | 57,381 | 1,863 | 370 | 2,356 | 1,308 | 581 | 1,687 | 555 |
| Tractors ....farms | 24,520 | 432 | 120 | 918 | 721 | 350 | 1,265 | 181 |
| number | 54,506 | 1,310 | 267 | 2,032 | 1,899 | 651 | 2,140 | 406 |
| Less than 40 horsepower (PTO) ....farms | 13,845 | 131 | 51 | 530 | 386 | 254 | 920 | 94 |
| number | 18,664 | 180 | 63 | 695 | 619 | (D) | 1,181 | 126 |
| 40 to 99 horsepower (PTO) ....farms | 13,561 | 235 | 74 | 503 | 522 | 151 | 524 | 104 |
| number | 24,748 | 436 | 97 | 1,018 | 1,213 | 242 | 829 | 142 |
| 100 horsepower (PTO) or more ....farms | 5,159 | 294 | 55 | 135 | 45 | 31 | 86 | 74 |
| number | 11,094 | 694 | 107 | 319 | 67 | (D) | 130 | 138 |
| Grain and bean combines ....farms | 2,292 | 172 | 26 | 48 | 3 | 4 | 15 | 44 |
| number | 3,398 | 276 | (D) | 59 | 6 | 6 | 17 | 66 |
| Cotton pickers and strippers ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Forage harvesters, self-propelled ....farms | 1,473 | 29 | 5 | 63 | 16 | 4 | 19 | 2 |
| number | 1,657 | 37 | 7 | 67 | 17 | 5 | 19 | (D) |
| Hay balers ....farms | 6,278 | 73 | 27 | 166 | 52 | 115 | 292 | 46 |
| number | 7,584 | 95 | 33 | 185 | (D) | 136 | 355 | 55 |

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **2012 INVENTORY** - Con. | | | | | | | | |
| Manufactured prior to 2008: | | | | | | | | |
| Trucks, including pickups (see text) ....farms | 338 | 579 | 208 | 623 | 136 | 1,081 | 390 | 236 |
| number | 617 | 1,812 | 416 | 2,355 | 467 | 4,352 | 720 | 335 |
| Tractors ....farms | 323 | 575 | 179 | 621 | 140 | 1,115 | 339 | 226 |
| number | 586 | 1,566 | 283 | 2,003 | 330 | 3,767 | 731 | 404 |
| Less than 40 horsepower (PTO) ....farms | 214 | 261 | 82 | 248 | 52 | 359 | 216 | 160 |
| number | 273 | 383 | (D) | 340 | 67 | 580 | 320 | 196 |
| 40 to 99 horsepower (PTO) ....farms | 159 | 384 | 110 | 363 | 68 | 723 | 188 | 110 |
| number | 257 | 832 | 152 | 795 | 100 | 1,753 | 315 | 168 |
| 100 horsepower (PTO) or more ....farms | 33 | 189 | 21 | 310 | 85 | 561 | 41 | 22 |
| number | 56 | 351 | (D) | 868 | 163 | 1,434 | 96 | 40 |
| Grain and bean combines ....farms | 12 | 118 | 15 | 121 | 76 | 177 | 2 | 10 |
| number | 23 | 193 | 15 | 165 | 112 | 264 | (D) | 14 |
| Cotton pickers and strippers ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Forage harvesters, self-propelled ....farms | 5 | 15 | 15 | 41 | 5 | 121 | 14 | 4 |
| number | 5 | 16 | 18 | 49 | (D) | 144 | (D) | 4 |
| Hay balers ....farms | 78 | 65 | 96 | 122 | 37 | 314 | 143 | 70 |
| number | 95 | 75 | 115 | 175 | 43 | 440 | 167 | 79 |

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **2012 INVENTORY** - Con. | | | | | | | | |
| Manufactured prior to 2008: | | | | | | | | |
| Trucks, including pickups (see text) ....farms | 153 | 1,164 | 412 | 686 | 502 | 1,187 | 612 | 255 |
| number | 284 | 1,770 | 545 | 1,394 | 1,106 | 1,999 | 2,274 | 462 |
| Tractors ....farms | 152 | 1,103 | 327 | 701 | 516 | 1,167 | 579 | 197 |
| number | 253 | 1,787 | 446 | 1,439 | 1,103 | 2,172 | 1,477 | 318 |
| Less than 40 horsepower (PTO) ....farms | 95 | 814 | 258 | 389 | 261 | 765 | 223 | 139 |
| number | 122 | 1,078 | 327 | 518 | 370 | 972 | 282 | 189 |
| 40 to 99 horsepower (PTO) ....farms | 80 | 425 | 89 | 417 | 300 | 656 | 324 | 78 |
| number | 114 | 585 | 105 | 633 | 486 | 1,038 | 465 | 111 |
| 100 horsepower (PTO) or more ....farms | 14 | 85 | 14 | 158 | 138 | 113 | 348 | 13 |
| number | 17 | 124 | 14 | 288 | 247 | 162 | 730 | 18 |
| Grain and bean combines ....farms | - | 6 | - | 27 | 65 | 31 | 252 | - |
| number | - | 6 | - | 28 | (D) | 42 | 406 | - |
| Cotton pickers and strippers ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Forage harvesters, self-propelled ....farms | 5 | 8 | - | 105 | 61 | 15 | 64 | - |
| number | 5 | 11 | - | 115 | 66 | 16 | (D) | - |
| Hay balers ....farms | 30 | 93 | 39 | 262 | 173 | 440 | 147 | 49 |
| number | (D) | 111 | 39 | 341 | 210 | 524 | 187 | 62 |

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **2012 INVENTORY** - Con. | | | | | | | | |
| Manufactured prior to 2008: | | | | | | | | |
| Trucks, including pickups (see text) ....farms | 1,086 | 221 | 224 | 912 | 175 | 678 | 100 | 885 |
| number | 2,410 | 469 | 384 | 1,426 | 291 | 1,776 | 135 | 1,506 |
| Tractors ....farms | 1,043 | 226 | 194 | 903 | 154 | 750 | 101 | 872 |
| number | 2,662 | 428 | 400 | 1,479 | 248 | 1,986 | 130 | 1,613 |
| Less than 40 horsepower (PTO) ....farms | 516 | 155 | 108 | 653 | 102 | 465 | 62 | 599 |
| number | 792 | (D) | (D) | (D) | 123 | 700 | 67 | 768 |
| 40 to 99 horsepower (PTO) ....farms | 699 | 115 | 128 | 373 | 77 | 437 | 42 | 413 |
| number | 1,658 | 188 | 191 | 536 | 108 | 852 | 56 | 653 |
| 100 horsepower (PTO) or more ....farms | 104 | 17 | 21 | 66 | 13 | 146 | 7 | 91 |
| number | 212 | (D) | (D) | (D) | 17 | 434 | 7 | 192 |
| Grain and bean combines ....farms | 34 | 2 | 7 | 1 | 4 | 41 | - | 9 |
| number | (D) | (D) | 7 | (D) | 5 | 54 | - | (D) |
| Cotton pickers and strippers ....farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Forage harvesters, self-propelled ....farms | 108 | 11 | 36 | 4 | 4 | 23 | - | 9 |
| number | 117 | (D) | (D) | 6 | 4 | 27 | - | (D) |
| Hay balers ....farms | 343 | 77 | 116 | 139 | 48 | 215 | 17 | 156 |
| number | 413 | 92 | 141 | 163 | (D) | 263 | 20 | 187 |

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Table 40. **Machinery and Equipment on Operation: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **2012 INVENTORY** - Con. | | | | | | | | |
| Manufactured prior to 2008: | | | | | | | | |
| Trucks, including pickups (see text) ..... farms | 1,712 | 883 | 907 | 67 | 603 | 1,050 | 861 | 2,115 |
| number | 3,495 | 1,614 | 1,441 | 102 | 1,814 | 2,160 | 3,208 | 5,522 |
| Tractors ..... farms | 1,597 | 862 | 716 | 87 | 617 | 1,099 | 839 | 2,213 |
| number | 3,065 | 1,653 | 1,223 | 164 | 1,466 | 2,397 | 2,269 | 5,953 |
| Less than 40 horsepower (PTO) ..... farms | 878 | 440 | 456 | 49 | 304 | 602 | 364 | 1,190 |
| number | 1,076 | 554 | 561 | (D) | 430 | 772 | 465 | 1,715 |
| 40 to 99 horsepower (PTO) ..... farms | 897 | 549 | 360 | 56 | 340 | 665 | 407 | 1,416 |
| number | 1,290 | 857 | 558 | 78 | 566 | 1,222 | 606 | 3,443 |
| 100 horsepower (PTO) or more ..... farms | 383 | 164 | 72 | 5 | 205 | 184 | 525 | 291 |
| number | 699 | 242 | 104 | (D) | 470 | 403 | 1,198 | 795 |
| Grain and bean combines ..... farms | 237 | 105 | 5 | - | 153 | 15 | 387 | 68 |
| number | 353 | (D) | 5 | - | 215 | 18 | 646 | 86 |
| Cotton pickers and strippers ..... farms | - | - | - | - | - | - | - | - |
| number | - | - | - | - | - | - | - | - |
| Forage harvesters, self-propelled ..... farms | 263 | 118 | 9 | 3 | 28 | 41 | 37 | 163 |
| number | 295 | 128 | 10 | 6 | 34 | 52 | 44 | 172 |
| Hay balers ..... farms | 642 | 412 | 184 | 36 | 112 | 258 | 180 | 414 |
| number | 744 | 522 | 218 | 42 | 129 | 294 | 209 | 481 |

## Table 41. **Fertilizers and Chemicals Applied: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Commercial fertilizer, lime, and soil conditioners ....farms, 2012 | 12,017 | 353 | 69 | 506 | 491 | 102 | 468 | 145 |
| 2007 | 14,769 | 386 | 58 | 658 | 719 | 118 | 610 | 134 |
| acres treated, 2012 | 3,547,373 | 300,170 | 34,605 | 217,279 | 17,546 | 3,561 | 10,345 | 82,032 |
| 2007 | 3,984,358 | 363,717 | 37,354 | 222,107 | 22,197 | 3,336 | 10,184 | 120,917 |
| Cropland fertilized, except cropland pasture ....farms, 2012 | 10,098 | 339 | 57 | 342 | 466 | 82 | 326 | 130 |
| 2007 | 12,078 | 342 | 49 | 493 | 690 | 103 | 370 | 109 |
| acres treated, 2012 | 3,479,796 | 299,097 | 31,868 | 215,931 | 17,312 | 3,017 | 8,181 | 79,696 |
| 2007 | 3,838,654 | 358,784 | 34,460 | 219,095 | 21,751 | 2,547 | 7,398 | 113,857 |
| Pastureland and rangeland fertilized ....farms, 2012 | 2,677 | 28 | 14 | 192 | 33 | 32 | 189 | 42 |
| 2007 | 3,587 | 60 | 17 | 201 | 40 | 32 | 292 | 40 |
| acres treated, 2012 | 67,577 | 1,073 | 2,737 | 1,348 | 234 | 544 | 2,164 | 2,336 |
| 2007 | 145,704 | 4,933 | 2,894 | 3,012 | 446 | 789 | 2,786 | 7,060 |
| Manure ....farms, 2012 | 4,167 | 33 | 24 | 174 | 63 | 60 | 245 | 21 |
| 2007 | 4,665 | 48 | 13 | 130 | 57 | 78 | 319 | 13 |
| acres treated, 2012 | 215,683 | 4,527 | 365 | 18,818 | 323 | 1,041 | 3,673 | 316 |
| 2007 | 226,588 | 6,851 | 132 | 5,531 | 1,110 | 1,757 | 3,256 | 128 |
| Acres treated to control-- | | | | | | | | |
| Insects ....farms, 2012 | 6,052 | 141 | 19 | 296 | 509 | 31 | 163 | 48 |
| 2007 | 6,456 | 134 | 14 | 398 | 690 | 19 | 151 | 33 |
| acres, 2012 | 1,289,791 | 103,320 | 2,933 | 145,098 | 17,641 | 366 | 2,333 | 17,042 |
| 2007 | 1,286,462 | 90,932 | (D) | 146,784 | 22,249 | 367 | 4,467 | 19,645 |
| Weeds, grass, or brush ....farms, 2012 | 13,002 | 406 | 101 | 546 | 509 | 73 | 567 | 162 |
| 2007 | 12,114 | 358 | 70 | 498 | 555 | 44 | 652 | 144 |
| acres, 2012 | 4,469,109 | 461,131 | 48,288 | 310,849 | 17,048 | 2,272 | 12,619 | 110,331 |
| 2007 | 3,816,454 | 374,027 | 40,446 | 216,247 | 16,789 | 1,319 | 11,306 | 130,409 |
| Nematodes ....farms, 2012 | 1,081 | 43 | - | 52 | 80 | 11 | 32 | 9 |
| 2007 | 655 | 17 | - | 29 | 64 | 4 | 14 | 3 |
| acres, 2012 | 348,374 | 56,245 | - | 54,901 | 1,352 | 137 | 543 | 672 |
| 2007 | 142,248 | 18,087 | - | 22,849 | 2,390 | 19 | 144 | (D) |
| Diseases in crops and orchards ....farms, 2012 | 4,312 | 139 | 22 | 175 | 320 | 27 | 108 | 53 |
| 2007 | 3,403 | 51 | 9 | 206 | 443 | 17 | 80 | 4 |
| acres, 2012 | 1,613,635 | 184,840 | 15,342 | 128,212 | 11,476 | 309 | 1,140 | 41,846 |
| 2007 | 543,911 | 33,892 | (D) | 80,433 | 13,880 | 141 | 655 | 1,555 |
| Chemicals used to control growth, thin fruit, ripen, or defoliate ....farms, 2012 | 2,560 | 42 | 2 | 164 | 354 | 4 | 17 | 4 |
| 2007 | 2,489 | 37 | 5 | 146 | 424 | 2 | 36 | 2 |
| acres on which used, 2012 | 389,684 | 12,684 | (D) | 54,078 | 13,597 | (D) | 222 | 622 |
| 2007 | 252,324 | 10,216 | (D) | 23,918 | 13,603 | (D) | 230 | (D) |

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| Commercial fertilizer, lime, and soil conditioners ....farms, 2012 | 94 | 428 | 48 | 515 | 99 | 931 | 112 | 88 |
| 2007 | 104 | 507 | 57 | 580 | 105 | 1,111 | 169 | 135 |
| acres treated, 2012 | 15,438 | 163,363 | 2,565 | 214,608 | 90,809 | 466,036 | 12,887 | 2,942 |
| 2007 | 4,933 | 214,512 | 4,482 | 248,635 | 97,705 | 521,165 | 8,379 | 3,441 |
| Cropland fertilized, except cropland pasture ....farms, 2012 | 58 | 418 | 31 | 452 | 95 | 852 | 84 | 72 |
| 2007 | 66 | 486 | 43 | 514 | 94 | 1,006 | 119 | 106 |
| acres treated, 2012 | 14,016 | (D) | 1,874 | 213,068 | 86,263 | 459,979 | 12,249 | 2,637 |
| 2007 | 4,207 | (D) | 2,518 | 239,768 | 95,740 | 511,970 | 7,358 | 3,039 |
| Pastureland and rangeland fertilized ....farms, 2012 | 44 | 14 | 19 | 91 | 11 | 140 | 38 | 23 |
| 2007 | 46 | 33 | 17 | 109 | 17 | 183 | 57 | 39 |
| acres treated, 2012 | 1,422 | (D) | 691 | 1,540 | 4,546 | 6,057 | 638 | 305 |
| 2007 | 726 | (D) | 1,964 | 8,867 | 1,965 | 9,195 | 1,021 | 402 |
| Manure ....farms, 2012 | 69 | 39 | 24 | 65 | 5 | 159 | 66 | 66 |
| 2007 | 77 | 39 | 20 | 84 | 13 | 194 | 91 | 92 |
| acres treated, 2012 | 1,823 | 1,442 | 314 | 9,363 | (D) | 42,890 | 3,007 | 1,265 |
| 2007 | 1,955 | 889 | (D) | 8,096 | 246 | 33,217 | 2,665 | 1,522 |
| Acres treated to control-- | | | | | | | | |
| Insects ....farms, 2012 | 50 | 314 | 10 | 336 | 19 | 606 | 55 | 31 |
| 2007 | 28 | 359 | 7 | 358 | 9 | 627 | 54 | 16 |
| acres, 2012 | 8,286 | 21,955 | 333 | 121,676 | 10,321 | 246,637 | 6,952 | 259 |
| 2007 | 1,760 | 31,903 | 621 | 131,089 | 16,051 | 255,069 | 2,566 | 257 |
| Weeds, grass, or brush ....farms, 2012 | 142 | 474 | 76 | 525 | 120 | 916 | 135 | 83 |
| 2007 | 134 | 423 | 43 | 471 | 113 | 905 | 120 | 61 |
| acres, 2012 | 14,925 | 254,791 | 3,605 | 275,467 | 113,367 | 498,355 | 12,550 | 1,971 |
| 2007 | 4,615 | 179,347 | 3,445 | 237,495 | 113,339 | 447,587 | 6,366 | 1,763 |
| Nematodes ....farms, 2012 | 11 | 42 | 5 | 86 | 2 | 147 | 12 | 10 |
| 2007 | 6 | 47 | - | 50 | - | 104 | 13 | 5 |
| acres, 2012 | 405 | 4,163 | 176 | 46,351 | (D) | 70,090 | 1,157 | 109 |
| 2007 | 588 | 2,670 | - | 22,914 | - | 37,811 | 1,963 | 5 |
| Diseases in crops and orchards ....farms, 2012 | 37 | 193 | 5 | 244 | 59 | 415 | 36 | 26 |
| 2007 | 17 | 228 | - | 189 | 5 | 324 | 21 | 25 |
| acres, 2012 | 6,972 | 34,230 | 173 | 94,504 | 48,191 | 183,142 | 2,530 | 139 |
| 2007 | 2,019 | 28,873 | - | 48,012 | 4,456 | 106,031 | 618 | 269 |
| Chemicals used to control growth, thin fruit, ripen, or defoliate ....farms, 2012 | 7 | 208 | 3 | 168 | 2 | 315 | 12 | 4 |
| 2007 | 4 | 228 | 1 | 130 | 1 | 272 | 7 | 7 |
| acres on which used, 2012 | (D) | 12,517 | 150 | 31,131 | (D) | 86,952 | 2,065 | 13 |
| 2007 | (D) | 11,956 | (D) | 18,848 | (D) | 51,034 | 27 | (D) |

--continued

Table 41. **Fertilizers and Chemicals Applied: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Commercial fertilizer, lime, and soil conditioners ..... farms, 2012 | 37 | 372 | 151 | 403 | 214 | 302 | 388 | 69 |
| 2007 | 61 | 469 | 176 | 408 | 236 | 418 | 397 | 136 |
| acres treated, 2012 | 963 | 5,661 | 760 | 42,907 | 65,007 | 16,702 | 402,043 | 1,972 |
| 2007 | 937 | 5,125 | 997 | 45,845 | 63,255 | 15,672 | 410,193 | 2,801 |
| Cropland fertilized, except cropland pasture ..... farms, 2012 | 35 | 258 | 103 | 332 | 194 | 220 | 371 | 51 |
| 2007 | 46 | 296 | 135 | 354 | 201 | 289 | 371 | 100 |
| acres treated, 2012 | 623 | 4,493 | 410 | 41,097 | 61,615 | 15,191 | 398,274 | 1,385 |
| 2007 | 573 | (D) | 723 | 40,980 | 61,187 | 12,921 | 391,015 | 2,140 |
| Pastureland and rangeland fertilized ..... farms, 2012 | 7 | 124 | 57 | 122 | 27 | 111 | 34 | 25 |
| 2007 | 19 | 174 | 43 | 107 | 47 | 158 | 42 | 45 |
| acres treated, 2012 | 340 | 1,168 | 350 | 1,810 | 3,392 | 1,511 | 3,769 | 587 |
| 2007 | 364 | (D) | 274 | 4,865 | 2,068 | 2,751 | 19,178 | 661 |
| Manure ..... farms, 2012 | 26 | 254 | 114 | 103 | 77 | 256 | 36 | 36 |
| 2007 | 30 | 290 | 100 | 97 | 58 | 319 | 40 | 49 |
| acres treated, 2012 | 703 | 4,314 | 319 | 2,269 | 1,858 | 9,806 | 7,541 | 333 |
| 2007 | 575 | 6,745 | (D) | 2,206 | 6,706 | 12,145 | 2,827 | 537 |
| Acres treated to control-- | | | | | | | | |
| Insects ..... farms, 2012 | 12 | 187 | 48 | 94 | 102 | 125 | 63 | 16 |
| 2007 | 9 | 78 | 23 | 103 | 110 | 122 | 39 | 7 |
| acres, 2012 | 51 | 2,473 | 183 | 10,294 | 28,901 | 7,864 | 46,865 | 601 |
| 2007 | 19 | 884 | 149 | 10,621 | 25,111 | 6,931 | 32,955 | (D) |
| Weeds, grass, or brush ..... farms, 2012 | 25 | 396 | 106 | 358 | 210 | 371 | 479 | 52 |
| 2007 | 22 | 263 | 68 | 420 | 156 | 344 | 420 | 79 |
| acres, 2012 | 339 | 5,302 | 701 | 33,990 | 65,000 | 15,657 | 459,948 | 1,050 |
| 2007 | 209 | 2,512 | 499 | 41,643 | 49,069 | 10,575 | 404,343 | 1,575 |
| Nematodes ..... farms, 2012 | 4 | 35 | 13 | 15 | 11 | 18 | 14 | 1 |
| 2007 | - | 5 | 4 | 7 | 7 | 9 | 2 | - |
| acres, 2012 | 7 | 428 | 35 | 684 | (D) | 1,868 | 18,612 | (D) |
| 2007 | - | 5 | 25 | 146 | 119 | 42 | (D) | - |
| Diseases in crops and orchards ..... farms, 2012 | 8 | 90 | 43 | 40 | 47 | 51 | 176 | 7 |
| 2007 | 5 | 34 | 18 | 30 | 38 | 44 | 17 | 14 |
| acres, 2012 | (D) | 1,376 | 143 | 2,288 | 14,076 | 3,654 | 185,107 | 136 |
| 2007 | 5 | 296 | (D) | 974 | 4,513 | 1,949 | 13,360 | 79 |
| Chemicals used to control growth, thin fruit, ripen, or defoliate ..... farms, 2012 | 5 | 22 | 8 | 30 | 31 | 18 | 11 | 2 |
| 2007 | - | 16 | 1 | 21 | 19 | 6 | 6 | 6 |
| acres on which used, 2012 | 38 | 487 | 16 | 628 | 1,537 | 404 | 5,039 | (D) |
| 2007 | - | 96 | (D) | 629 | 1,574 | 10 | 437 | 6 |

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Commercial fertilizer, lime, and soil conditioners ..... farms, 2012 | 490 | 110 | 70 | 261 | 43 | 283 | 41 | 250 |
| 2007 | 624 | 139 | 76 | 355 | 85 | 371 | 23 | 385 |
| acres treated, 2012 | 55,115 | 2,105 | 6,781 | 3,985 | 280 | 42,675 | 353 | 11,813 |
| 2007 | 49,068 | 2,746 | 6,872 | 6,025 | 1,280 | 45,922 | 644 | 14,563 |
| Cropland fertilized, except cropland pasture ..... farms, 2012 | 430 | 96 | 55 | 157 | 40 | 230 | 30 | 180 |
| 2007 | 539 | 129 | 62 | 203 | 68 | 297 | 21 | 253 |
| acres treated, 2012 | 53,959 | 1,716 | 5,944 | 2,881 | 190 | 41,620 | 216 | 10,971 |
| 2007 | 43,902 | 2,490 | 5,847 | 4,306 | 755 | 42,731 | 509 | 13,110 |
| Pastureland and rangeland fertilized ..... farms, 2012 | 74 | 16 | 24 | 119 | 5 | 65 | 13 | 87 |
| 2007 | 123 | 16 | 32 | 168 | 19 | 92 | 7 | 139 |
| acres treated, 2012 | 1,156 | 389 | 837 | 1,104 | 90 | 1,055 | 137 | 842 |
| 2007 | 5,166 | 256 | 1,025 | 1,719 | 525 | 3,191 | 135 | 1,453 |
| Manure ..... farms, 2012 | 138 | 30 | 25 | 182 | 37 | 174 | 16 | 175 |
| 2007 | 123 | 32 | 39 | 253 | 45 | 175 | 9 | 240 |
| acres treated, 2012 | 15,618 | 1,567 | 255 | 1,841 | 192 | 7,944 | (D) | 7,453 |
| 2007 | 4,024 | 2,200 | 672 | 3,532 | 215 | 11,762 | 70 | 8,653 |
| Acres treated to control-- | | | | | | | | |
| Insects ..... farms, 2012 | 336 | 91 | 3 | 118 | 22 | 166 | 10 | 110 |
| 2007 | 363 | 94 | 8 | 104 | 13 | 133 | 12 | 109 |
| acres, 2012 | 27,533 | 1,621 | (D) | 1,901 | 70 | 28,948 | 151 | 4,298 |
| 2007 | 25,239 | 1,617 | 137 | 2,421 | 92 | 32,504 | 294 | 7,504 |
| Weeds, grass, or brush ..... farms, 2012 | 467 | 121 | 90 | 287 | 25 | 310 | 34 | 264 |
| 2007 | 447 | 126 | 78 | 274 | 24 | 234 | 24 | 306 |
| acres, 2012 | 69,255 | 2,121 | 3,179 | 3,615 | 189 | 43,762 | 496 | 12,058 |
| 2007 | 44,751 | 2,334 | 4,501 | 4,493 | 171 | 34,793 | 538 | 13,268 |
| Nematodes ..... farms, 2012 | 42 | 13 | - | 10 | 6 | 35 | 2 | 27 |
| 2007 | 34 | 16 | 3 | 7 | 1 | 19 | - | 8 |
| acres, 2012 | 1,815 | 347 | - | 577 | 19 | 9,471 | (D) | 1,469 |
| 2007 | 1,457 | 158 | 21 | 37 | (D) | 3,392 | - | 128 |
| Diseases in crops and orchards ..... farms, 2012 | 243 | 60 | 1 | 48 | 10 | 114 | 9 | 65 |
| 2007 | 226 | 66 | - | 39 | 17 | 79 | 8 | 61 |
| acres, 2012 | 10,587 | 1,145 | (D) | 881 | 34 | 22,373 | 77 | 3,069 |
| 2007 | 11,403 | 1,159 | - | 669 | 102 | 13,125 | 146 | 1,310 |
| Chemicals used to control growth, thin fruit, ripen, or defoliate ..... farms, 2012 | 270 | 11 | - | 9 | 2 | 28 | 6 | 15 |
| 2007 | 234 | - | 2 | 5 | 3 | 25 | 5 | 6 |
| acres on which used, 2012 | 20,537 | 267 | - | (D) | (D) | 8,946 | 43 | 1,828 |
| 2007 | 13,255 | - | (D) | 17 | 12 | 2,999 | 52 | 252 |

--continued

Table 41. **Fertilizers and Chemicals Applied: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Commercial fertilizer, lime, and soil conditioners ....farms, 2012 | 750 | 303 | 226 | 9 | 468 | 442 | 635 | 1,251 |
| 2007 | 805 | 345 | 325 | 13 | 447 | 454 | 679 | 1,891 |
| acres treated, 2012 | 215,706 | 26,226 | 3,866 | 182 | 241,195 | 39,522 | 560,571 | 166,797 |
| 2007 | 246,119 | 27,145 | 9,121 | 378 | 261,940 | 39,781 | 646,643 | 198,222 |
| Cropland fertilized, except cropland pasture ....farms, 2012 | 609 | 256 | 146 | 4 | 364 | 395 | 607 | 1,131 |
| 2007 | 640 | 261 | 185 | 1 | 361 | 392 | 627 | 1,657 |
| acres treated, 2012 | 211,108 | 24,766 | 3,013 | (D) | 238,446 | 38,550 | 553,208 | 162,834 |
| 2007 | 236,902 | 22,819 | 6,533 | (D) | 259,914 | 37,988 | 642,247 | 191,784 |
| Pastureland and rangeland fertilized ....farms, 2012 | 188 | 90 | 100 | 5 | 136 | 66 | 60 | 212 |
| 2007 | 227 | 140 | 151 | 12 | 122 | 101 | 91 | 329 |
| acres treated, 2012 | 4,598 | 1,460 | 853 | (D) | 2,749 | 972 | 7,363 | 3,963 |
| 2007 | 9,217 | 4,326 | 2,588 | (D) | 2,026 | 1,793 | 4,396 | 6,438 |
| Manure ....farms, 2012 | 229 | 139 | 228 | 14 | 91 | 353 | 41 | 280 |
| 2007 | 217 | 156 | 230 | 23 | 67 | 350 | 72 | 383 |
| acres treated, 2012 | 2,662 | 2,230 | 5,177 | 672 | 3,295 | 30,930 | 818 | 18,146 |
| 2007 | 9,451 | 3,728 | 8,054 | 964 | 4,558 | 34,640 | 1,245 | 27,742 |
| Acres treated to control-- | | | | | | | | |
| Insects ....farms, 2012 | 224 | 56 | 78 | 4 | 191 | 226 | 249 | 893 |
| 2007 | 147 | 44 | 55 | 3 | 170 | 202 | 239 | 1,372 |
| acres, 2012 | 51,542 | 799 | 1,442 | (D) | 76,347 | 18,327 | 178,809 | 95,575 |
| 2007 | 34,445 | 2,225 | 1,481 | (D) | 84,006 | 17,172 | 129,305 | 145,866 |
| Weeds, grass, or brush ....farms, 2012 | 888 | 350 | 201 | 23 | 558 | 444 | 748 | 1,360 |
| 2007 | 763 | 273 | 246 | 23 | 463 | 323 | 733 | 1,414 |
| acres, 2012 | 267,130 | 23,355 | 3,443 | 304 | 345,814 | 36,077 | 766,795 | 171,960 |
| 2007 | 230,886 | 21,364 | 6,770 | 373 | 292,200 | 25,890 | 682,373 | 156,824 |
| Nematodes ....farms, 2012 | 19 | 8 | 9 | - | 23 | 81 | 22 | 131 |
| 2007 | 8 | - | 6 | - | 13 | 45 | 13 | 92 |
| acres, 2012 | 14,739 | 796 | (D) | - | 15,390 | 6,242 | 18,693 | 15,302 |
| 2007 | (D) | - | 352 | - | 11,261 | 2,648 | 4,833 | 3,260 |
| Diseases in crops and orchards ....farms, 2012 | 167 | 31 | 32 | 2 | 176 | 140 | 354 | 539 |
| 2007 | 50 | 17 | 36 | - | 61 | 117 | 91 | 716 |
| acres, 2012 | 78,629 | 1,639 | 523 | (D) | 146,505 | 11,793 | 319,057 | 57,477 |
| 2007 | 4,349 | 740 | 646 | - | 21,664 | 10,604 | 66,085 | 69,049 |
| Chemicals used to control growth, thin fruit, ripen, or defoliate ....farms, 2012 | 57 | 4 | 9 | - | 46 | 64 | 73 | 533 |
| 2007 | 24 | 5 | 1 | - | 30 | 36 | 30 | 706 |
| acres on which used, 2012 | 6,324 | (D) | 20 | - | 19,489 | 5,952 | 34,784 | 66,905 |
| 2007 | 1,564 | 5 | (D) | - | 16,800 | 3,082 | 17,855 | 60,863 |

# Table 42. **Organic Agriculture: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **TYPE OF PRODUCTION** | | | | | | | | |
| USDA National Organic Program certified organic production ... farms | 674 | 11 | - | 26 | 41 | 8 | 14 | - |
| USDA National Organic Program organic production exempt from certification ... farms | 182 | 2 | - | 5 | 2 | 7 | 12 | - |
| Acres transitioning into USDA National Organic Program organic production ... farms | 106 | 4 | - | - | 4 | 2 | 2 | - |
| **VALUE OF SALES OF CERTIFIED OR EXEMPT ORGANICALLY PRODUCED COMMODITIES** | | | | | | | | |
| Total organic product sales (see text) ... farms | 767 | 10 | - | 30 | 42 | 10 | 25 | - |
| $1,000 | 291,410 | 7,796 | - | 24,248 | 18,027 | (D) | 841 | - |
| By value of sales: | | | | | | | | |
| $1 to $4,999 ... farms | 207 | - | - | 6 | 5 | 7 | 13 | - |
| $1,000 | 408 | - | - | 5 | 10 | 8 | 27 | - |
| $5,000 or more ... farms | 560 | 10 | - | 24 | 37 | 3 | 12 | - |
| $1,000 | 291,002 | 7,796 | - | 24,244 | 18,017 | (D) | 814 | - |

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **TYPE OF PRODUCTION** | | | | | | | | |
| USDA National Organic Program certified organic production ... farms | 2 | 26 | - | 30 | - | 69 | 7 | 15 |
| USDA National Organic Program organic production exempt from certification ... farms | 2 | - | - | - | - | 2 | 2 | 6 |
| Acres transitioning into USDA National Organic Program organic production ... farms | 1 | 2 | - | 2 | - | 8 | - | 3 |
| **VALUE OF SALES OF CERTIFIED OR EXEMPT ORGANICALLY PRODUCED COMMODITIES** | | | | | | | | |
| Total organic product sales (see text) ... farms | 4 | 25 | - | 29 | - | 66 | 8 | 21 |
| $1,000 | (D) | 5,447 | - | 17,416 | - | 108,636 | 2,068 | 259 |
| By value of sales: | | | | | | | | |
| $1 to $4,999 ... farms | 2 | 2 | - | - | - | - | 2 | 14 |
| $1,000 | (D) | (D) | - | - | - | - | (D) | 25 |
| $5,000 or more ... farms | 2 | 23 | - | 29 | - | 66 | 6 | 7 |
| $1,000 | (D) | (D) | - | 17,416 | - | 108,636 | (D) | 233 |

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **TYPE OF PRODUCTION** | | | | | | | | |
| USDA National Organic Program certified organic production ... farms | 15 | 23 | 10 | 1 | 24 | 22 | 9 | 2 |
| USDA National Organic Program organic production exempt from certification ... farms | 2 | 11 | 8 | 3 | 7 | 3 | - | 2 |
| Acres transitioning into USDA National Organic Program organic production ... farms | - | 5 | 3 | 4 | 3 | 5 | - | - |
| **VALUE OF SALES OF CERTIFIED OR EXEMPT ORGANICALLY PRODUCED COMMODITIES** | | | | | | | | |
| Total organic product sales (see text) ... farms | 17 | 27 | 16 | 4 | 23 | 24 | 9 | 2 |
| $1,000 | 1,370 | 11,870 | 377 | (D) | 4,189 | 4,220 | 3,919 | (D) |
| By value of sales: | | | | | | | | |
| $1 to $4,999 ... farms | 4 | 9 | 9 | 3 | 9 | 4 | 1 | 2 |
| $1,000 | 11 | 22 | 22 | 9 | 11 | 2 | (D) | (D) |
| $5,000 or more ... farms | 13 | 18 | 7 | 1 | 14 | 20 | 8 | - |
| $1,000 | 1,359 | 11,848 | 354 | (D) | 4,177 | 4,218 | (D) | - |

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **TYPE OF PRODUCTION** | | | | | | | | |
| USDA National Organic Program certified organic production ... farms | 62 | 2 | - | 11 | 8 | 40 | 3 | 14 |
| USDA National Organic Program organic production exempt from certification ... farms | 4 | 1 | 1 | 13 | 9 | 21 | - | 18 |
| Acres transitioning into USDA National Organic Program organic production ... farms | 13 | - | - | - | 1 | 5 | - | 7 |
| **VALUE OF SALES OF CERTIFIED OR EXEMPT ORGANICALLY PRODUCED COMMODITIES** | | | | | | | | |
| Total organic product sales (see text) ... farms | 55 | 3 | 1 | 18 | 16 | 54 | 3 | 27 |
| $1,000 | 6,999 | (D) | (D) | 2,063 | 220 | 10,565 | 104 | 3,385 |
| By value of sales: | | | | | | | | |
| $1 to $4,999 ... farms | 12 | - | 1 | 9 | 11 | 23 | - | 13 |
| $1,000 | 18 | - | (D) | 13 | 27 | 64 | - | 16 |
| $5,000 or more ... farms | 43 | 3 | - | 9 | 5 | 31 | 3 | 14 |
| $1,000 | 6,981 | (D) | - | 2,050 | 193 | 10,501 | 104 | 3,369 |

--continued

## Table 42. **Organic Agriculture: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| **TYPE OF PRODUCTION** | | | | | | | | |
| USDA National Organic Program certified organic production ....farms | 10 | 20 | 22 | 1 | 13 | 25 | 5 | 83 |
| USDA National Organic Program organic production exempt from certification ....farms | 4 | 7 | 9 | - | - | 14 | - | 5 |
| Acres transitioning into USDA National Organic Program organic production ....farms | 1 | 10 | 2 | - | 1 | 1 | 1 | 16 |
| **VALUE OF SALES OF CERTIFIED OR EXEMPT ORGANICALLY PRODUCED COMMODITIES** | | | | | | | | |
| Total organic product sales (see text) ....farms | 11 | 18 | 27 | 1 | 13 | 37 | 5 | 86 |
| $1,000 | 68 | 496 | 2,093 | (D) | 16,107 | 13,423 | 112 | 23,159 |
| By value of sales: | | | | | | | | |
| $1 to $4,999 ....farms | 7 | 3 | 9 | - | - | 18 | 1 | 8 |
| $1,000 | 21 | 10 | 6 | - | - | 45 | (D) | 14 |
| $5,000 or more ....farms | 4 | 15 | 18 | 1 | 13 | 19 | 4 | 78 |
| $1,000 | 47 | 486 | 2,087 | (D) | 16,107 | 13,378 | (D) | 23,145 |

## Table 43. **Selected Practices: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Received irrigation water from the U.S. Bureau of Reclamation (farms) | Practiced alley cropping or silvopasture (farms) | Harvested biomass for use in renewable energy (farms) | Practiced rotational or management-intensive grazing (farms) | Marketed products directly to retail outlets (farms) | Produced and sold value-added commodities (farms) | Marketed products through community supported agriculture (CSA) (farms) | Raised or sold veal calves (farms) | On-farm packing facility (farms) |
|---|---|---|---|---|---|---|---|---|---|
| **State Total** | | | | | | | | | |
| Washington | 4,815 | 82 | 253 | 5,798 | 1,654 | 2,267 | 388 | 107 | 756 |
| Counties | | | | | | | | | |
| Adams | 147 | - | 5 | 39 | 10 | 11 | 2 | - | 10 |
| Asotin | 1 | 1 | 1 | 32 | 7 | 13 | - | - | 3 |
| Benton | 605 | - | 4 | 231 | 39 | 100 | 4 | 10 | 18 |
| Chelan | 334 | - | 4 | 42 | 71 | 55 | 13 | 3 | 25 |
| Clallam | 9 | 3 | 5 | 139 | 50 | 60 | 4 | 1 | 24 |
| Clark | 3 | 2 | 22 | 345 | 85 | 141 | 39 | 11 | 43 |
| Columbia | - | 2 | 1 | 36 | 5 | 6 | 1 | - | 2 |
| Cowlitz | - | 1 | 9 | 73 | 12 | 43 | 4 | 6 | 9 |
| Douglas | 162 | - | 1 | 47 | 36 | 26 | 8 | - | 21 |
| Ferry | 3 | 2 | 7 | 58 | 13 | 21 | 2 | - | 4 |
| Franklin | 409 | - | 4 | 71 | 17 | 21 | 3 | 2 | 9 |
| Garfield | 1 | - | - | 13 | 1 | 4 | 1 | - | 1 |
| Grant | 793 | - | 7 | 129 | 31 | 67 | 1 | 7 | 17 |
| Grays Harbor | - | 2 | 7 | 90 | 20 | 42 | 2 | - | 10 |
| Island | - | 1 | 6 | 91 | 51 | 58 | 8 | - | 20 |
| Jefferson | 1 | 2 | 1 | 46 | 36 | 26 | 9 | - | 10 |
| King | 4 | 5 | 15 | 405 | 123 | 163 | 46 | 4 | 60 |
| Kitsap | 2 | 4 | 4 | 138 | 54 | 67 | 21 | - | 15 |
| Kittitas | 496 | 1 | 3 | 283 | 22 | 43 | 4 | 2 | 10 |
| Klickitat | 12 | 2 | 1 | 130 | 39 | 46 | 7 | 2 | 12 |
| Lewis | 4 | 6 | 12 | 293 | 70 | 97 | 13 | 2 | 25 |
| Lincoln | 5 | - | - | 83 | 3 | 19 | 5 | - | - |
| Mason | - | - | 5 | 49 | 37 | 23 | 3 | 1 | 12 |
| Okanogan | 271 | 13 | 13 | 211 | 80 | 77 | 17 | 2 | 39 |
| Pacific | - | - | 10 | 43 | 23 | 17 | 4 | 1 | 16 |
| Pend Oreille | 1 | - | - | 61 | 9 | 13 | 1 | - | - |
| Pierce | 1 | 5 | 6 | 303 | 44 | 93 | 18 | 2 | 23 |
| San Juan | 2 | 4 | 1 | 85 | 67 | 31 | 14 | 4 | 21 |
| Skagit | 2 | 2 | 11 | 214 | 79 | 104 | 28 | 2 | 48 |
| Skamania | - | - | 2 | 16 | 13 | 6 | 3 | - | 5 |
| Snohomish | 6 | - | 9 | 278 | 70 | 101 | 20 | 1 | 25 |
| Spokane | 25 | 4 | 15 | 294 | 85 | 131 | 6 | 2 | 40 |
| Stevens | 4 | 7 | 13 | 219 | 30 | 61 | 7 | 5 | 18 |
| Thurston | 1 | 7 | 11 | 288 | 79 | 94 | 26 | 6 | 33 |
| Wahkiakum | - | 2 | - | 33 | 5 | 10 | 1 | - | 2 |
| Walla Walla | 56 | - | 5 | 94 | 39 | 49 | 4 | - | 23 |
| Whatcom | 9 | 4 | 15 | 312 | 88 | 107 | 20 | 7 | 38 |
| Whitman | 2 | - | - | 118 | 9 | 34 | 7 | - | - |
| Yakima | 1,444 | - | 18 | 366 | 102 | 187 | 12 | 24 | 65 |

## Table 44. **Farms by North American Industry Classification System: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| Total farms | 37,249 | 713 | 185 | 1,509 | 890 | 536 | 1,929 | 308 |
| Oilseed and grain farming (1111) | 2,620 | 215 | 37 | 40 | 5 | - | 6 | 95 |
| Vegetable and melon farming (1112) | 1,924 | 38 | 2 | 43 | 31 | 28 | 124 | 2 |
| Fruit and tree nut farming (1113) | 4,825 | 37 | 7 | 331 | 629 | 47 | 175 | 3 |
| Greenhouse, nursery, and floriculture production (1114) | 1,753 | 4 | 4 | 18 | 10 | 43 | 139 | - |
| Other crop farming (1119) | 7,926 | 299 | 36 | 185 | 58 | 84 | 316 | 128 |
| Tobacco farming (11191) | - | - | - | - | - | - | - | - |
| Cotton farming (11192) | - | - | - | - | - | - | - | - |
| Sugarcane farming, hay farming, and all other crop farming (11193,11194,11199) | 7,926 | 299 | 36 | 185 | 58 | 84 | 316 | 128 |
| Beef cattle ranching and farming (112111) | 9,008 | 87 | 42 | 520 | 34 | 167 | 608 | 46 |
| Cattle feedlots (112112) | 116 | 2 | 3 | 10 | 2 | - | 6 | 2 |
| Dairy cattle and milk production (11212) | 471 | 4 | - | 6 | - | 4 | 15 | - |
| Hog and pig farming (1122) | 485 | 1 | - | 22 | 15 | 11 | 13 | - |
| Poultry and egg production (1123) | 1,016 | 1 | 2 | 25 | 9 | 24 | 87 | 4 |
| Sheep and goat farming (1124) | 1,407 | 4 | 4 | 67 | 20 | 33 | 88 | 6 |
| Animal aquaculture and other animal production (1125,1129) | 5,698 | 21 | 48 | 242 | 77 | 95 | 352 | 22 |

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| Total farms | 492 | 849 | 255 | 883 | 211 | 1,552 | 557 | 377 |
| Oilseed and grain farming (1111) | - | 160 | 3 | 116 | 93 | 200 | 1 | 5 |
| Vegetable and melon farming (1112) | 15 | 11 | 5 | 106 | - | 129 | 32 | 44 |
| Fruit and tree nut farming (1113) | 32 | 323 | 13 | 171 | 1 | 297 | 31 | 22 |
| Greenhouse, nursery, and floriculture production (1114) | 41 | 9 | 7 | 13 | - | 11 | 43 | 23 |
| Other crop farming (1119) | 73 | 224 | 80 | 224 | 70 | 485 | 95 | 61 |
| Tobacco farming (11191) | - | - | - | - | - | - | - | - |
| Cotton farming (11192) | - | - | - | - | - | - | - | - |
| Sugarcane farming, hay farming, and all other crop farming (11193,11194,11199) | 73 | 224 | 80 | 224 | 70 | 485 | 95 | 61 |
| Beef cattle ranching and farming (112111) | 189 | 54 | 75 | 133 | 28 | 229 | 189 | 86 |
| Cattle feedlots (112112) | 3 | - | 6 | 3 | 2 | 6 | 3 | 1 |
| Dairy cattle and milk production (11212) | 2 | - | - | 14 | - | 21 | 12 | 4 |
| Hog and pig farming (1122) | 9 | 9 | 5 | 7 | - | 19 | 14 | 13 |
| Poultry and egg production (1123) | 20 | 7 | 6 | 8 | 3 | 15 | 14 | 15 |
| Sheep and goat farming (1124) | 30 | 12 | 10 | 23 | - | 27 | 12 | 19 |
| Animal aquaculture and other animal production (1125,1129) | 78 | 40 | 45 | 65 | 14 | 113 | 111 | 84 |

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| Total farms | 221 | 1,837 | 706 | 1,006 | 760 | 1,647 | 897 | 377 |
| Oilseed and grain farming (1111) | - | 2 | - | 10 | 55 | 10 | 322 | - |
| Vegetable and melon farming (1112) | 13 | 158 | 97 | 30 | 22 | 49 | 10 | 14 |
| Fruit and tree nut farming (1113) | 12 | 98 | 73 | 42 | 64 | 43 | 7 | 21 |
| Greenhouse, nursery, and floriculture production (1114) | 16 | 268 | 82 | 9 | 18 | 134 | 5 | 61 |
| Other crop farming (1119) | 42 | 138 | 40 | 342 | 254 | 386 | 358 | 41 |
| Tobacco farming (11191) | - | - | - | - | - | - | - | - |
| Cotton farming (11192) | - | - | - | - | - | - | - | - |
| Sugarcane farming, hay farming, and all other crop farming (11193,11194,11199) | 42 | 138 | 40 | 342 | 254 | 386 | 358 | 41 |
| Beef cattle ranching and farming (112111) | 72 | 401 | 127 | 295 | 179 | 598 | 86 | 66 |
| Cattle feedlots (112112) | - | 6 | - | 4 | 4 | 6 | 5 | - |
| Dairy cattle and milk production (11212) | 1 | 33 | 6 | 1 | 5 | 36 | 1 | 5 |
| Hog and pig farming (1122) | 1 | 23 | 20 | 13 | 13 | 21 | 6 | 12 |
| Poultry and egg production (1123) | 5 | 99 | 42 | 12 | 22 | 61 | 8 | 21 |
| Sheep and goat farming (1124) | 10 | 91 | 50 | 38 | 37 | 72 | 29 | 17 |
| Animal aquaculture and other animal production (1125,1129) | 49 | 520 | 169 | 210 | 87 | 231 | 60 | 119 |

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| Total farms | 1,449 | 330 | 288 | 1,478 | 274 | 1,074 | 144 | 1,438 |
| Oilseed and grain farming (1111) | 11 | 1 | - | 1 | 1 | 14 | - | 8 |
| Vegetable and melon farming (1112) | 64 | 3 | 9 | 116 | 22 | 113 | 14 | 73 |
| Fruit and tree nut farming (1113) | 373 | 85 | 4 | 68 | 32 | 92 | 28 | 65 |
| Greenhouse, nursery, and floriculture production (1114) | 19 | 24 | 5 | 112 | 25 | 65 | 10 | 164 |
| Other crop farming (1119) | 318 | 57 | 129 | 132 | 64 | 167 | 11 | 155 |
| Tobacco farming (11191) | - | - | - | - | - | - | - | - |
| Cotton farming (11192) | - | - | - | - | - | - | - | - |
| Sugarcane farming, hay farming, and all other crop farming (11193,11194,11199) | 318 | 57 | 129 | 132 | 64 | 167 | 11 | 155 |
| Beef cattle ranching and farming (112111) | 369 | 90 | 62 | 513 | 42 | 342 | 34 | 414 |
| Cattle feedlots (112112) | 5 | - | - | 5 | - | 12 | 1 | 6 |
| Dairy cattle and milk production (11212) | 6 | 9 | - | 13 | 6 | 26 | - | 27 |
| Hog and pig farming (1122) | 4 | - | 7 | 22 | 16 | 9 | 2 | 30 |
| Poultry and egg production (1123) | 25 | 8 | 4 | 49 | 7 | 29 | 11 | 71 |
| Sheep and goat farming (1124) | 43 | 7 | 20 | 69 | 24 | 45 | 15 | 62 |
| Animal aquaculture and other animal production (1125,1129) | 212 | 46 | 48 | 378 | 35 | 160 | 18 | 363 |

--continued

Table 44. **Farms by North American Industry Classification System: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|
| Total farms | 2,501 | 1,148 | 1,336 | 109 | 943 | 1,702 | 1,195 | 3,143 |
| Oilseed and grain farming (1111) | 266 | 47 | 1 | - | 224 | 28 | 549 | 94 |
| Vegetable and melon farming (1112) | 102 | 59 | 73 | 5 | 51 | 67 | 11 | 139 |
| Fruit and tree nut farming (1113) | 89 | 43 | 87 | 2 | 100 | 252 | 6 | 1,020 |
| Greenhouse, nursery, and floriculture production (1114) | 89 | 19 | 121 | 5 | 13 | 85 | 7 | 32 |
| Other crop farming (1119) | 779 | 381 | 172 | 23 | 267 | 320 | 417 | 515 |
| Tobacco farming (11191) | - | - | - | - | - | - | - | - |
| Cotton farming (11192) | - | - | - | - | - | - | - | - |
| Sugarcane farming, hay farming, and all other crop farming (11193,11194,11199) | 779 | 381 | 172 | 23 | 267 | 320 | 417 | 515 |
| Beef cattle ranching and farming (112111) | 512 | 324 | 418 | 53 | 150 | 505 | 103 | 766 |
| Cattle feedlots (112112) | 1 | 3 | 1 | - | 3 | - | 1 | 4 |
| Dairy cattle and milk production (11212) | 9 | 8 | 12 | 7 | - | 110 | 4 | 64 |
| Hog and pig farming (1122) | 21 | 17 | 28 | 5 | 5 | 31 | 9 | 32 |
| Poultry and egg production (1123) | 75 | 25 | 72 | 3 | 11 | 44 | 11 | 61 |
| Sheep and goat farming (1124) | 78 | 36 | 61 | 2 | 29 | 63 | 25 | 129 |
| Animal aquaculture and other animal production (1125,1129) | 480 | 186 | 290 | 4 | 90 | 197 | 52 | 287 |

## Table 45. **Selected Operation and Operator Characteristics: 2012 and 2007**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|
| **FARMS** | | | | | | | | |
| Land in farms ..... farms, 2012 | 37,249 | 713 | 185 | 1,509 | 890 | 536 | 1,929 | 308 |
| 2007 | 39,284 | 782 | 192 | 1,630 | 979 | 512 | 2,101 | 283 |
| acres, 2012 | 14,748,107 | 1,036,975 | 263,166 | 703,505 | 75,820 | 23,640 | 74,758 | 297,412 |
| 2007 | 14,972,789 | 1,098,487 | 273,860 | 632,636 | 93,883 | 22,822 | 78,359 | 313,307 |
| Harvested cropland ..... farms, 2012 | 20,846 | 370 | 74 | 675 | 734 | 278 | 1,022 | 147 |
| 2007 | 20,091 | 375 | 64 | 700 | 842 | 256 | 1,037 | 126 |
| acres, 2012 | 4,342,904 | 364,428 | 35,811 | 296,362 | 23,458 | 6,513 | 24,099 | 98,182 |
| 2007 | 4,387,169 | 368,235 | (D) | 251,332 | 25,790 | 6,995 | 25,423 | 105,501 |
| **TENURE** | | | | | | | | |
| Full owners ..... farms, 2012 | 29,070 | 432 | 126 | 1,261 | 707 | 438 | 1,682 | 229 |
| 2007 | 30,268 | 498 | 131 | 1,373 | 797 | 393 | 1,781 | 206 |
| acres, 2012 | 6,486,223 | 289,112 | 88,066 | 277,593 | 45,273 | 14,892 | 41,854 | 88,070 |
| 2007 | 6,316,566 | 271,612 | 93,765 | 198,952 | 59,895 | 14,260 | 49,706 | 94,964 |
| Harvested cropland ..... farms, 2012 | 14,551 | 144 | 39 | 528 | 559 | 216 | 860 | 86 |
| 2007 | 13,646 | 153 | 31 | 557 | 680 | 201 | 817 | 62 |
| acres, 2012 | 924,177 | 108,387 | 8,714 | 114,125 | 12,588 | 1,880 | 9,411 | 13,361 |
| 2007 | 975,131 | 56,551 | (D) | 78,140 | 16,552 | (D) | 10,624 | 16,362 |
| Part owners ..... farms, 2012 | 5,927 | 182 | 48 | 163 | 125 | 83 | 182 | 61 |
| 2007 | 6,593 | 171 | 49 | 169 | 125 | 85 | 252 | 53 |
| acres, 2012 | 6,043,663 | 459,337 | 144,088 | 315,471 | 25,302 | 6,924 | 29,503 | 167,467 |
| 2007 | 6,651,624 | 555,411 | 148,187 | 339,936 | 32,471 | 6,988 | 24,912 | 156,502 |
| Owned land in farms ..... acres, 2012 | 2,673,970 | 239,167 | 71,528 | 199,523 | 18,222 | 1,702 | 8,002 | 82,385 |
| 2007 | 2,961,738 | 285,018 | 79,292 | 220,581 | 16,125 | 2,193 | 9,859 | 75,096 |
| Rented land in farms ..... acres, 2012 | 3,369,693 | 220,170 | 72,560 | 115,948 | 7,080 | 5,222 | 21,501 | 85,082 |
| 2007 | 3,689,886 | 270,393 | 68,895 | 119,355 | 16,346 | 4,795 | 15,053 | 81,406 |
| Harvested cropland ..... farms, 2012 | 4,644 | 150 | 28 | 96 | 119 | 56 | 127 | 47 |
| 2007 | 4,842 | 141 | 28 | 91 | 114 | 48 | 179 | 44 |
| acres, 2012 | 2,415,653 | 152,878 | 18,208 | 141,879 | 6,603 | 3,430 | 12,314 | 62,803 |
| 2007 | 2,473,630 | 198,899 | 20,404 | 140,003 | 8,112 | 3,329 | 13,149 | 57,652 |
| Tenants ..... farms, 2012 | 2,252 | 99 | 11 | 85 | 58 | 15 | 65 | 18 |
| 2007 | 2,423 | 113 | 12 | 88 | 57 | 34 | 68 | 24 |
| acres, 2012 | 2,218,221 | 288,526 | 31,012 | 110,441 | 5,245 | 1,824 | 3,401 | 41,875 |
| 2007 | 2,004,599 | 271,464 | 31,908 | 93,748 | 1,517 | 1,574 | 3,741 | 61,841 |
| Harvested cropland ..... farms, 2012 | 1,651 | 76 | 7 | 51 | 56 | 6 | 35 | 14 |
| 2007 | 1,603 | 81 | 5 | 52 | 48 | 7 | 41 | 20 |
| acres, 2012 | 1,003,074 | 103,163 | 8,889 | 40,358 | 4,267 | 1,203 | 2,374 | 22,018 |
| 2007 | 938,408 | 112,785 | (D) | 33,189 | 1,126 | (D) | 1,650 | 31,487 |
| **2012 NUMBER OF ALL OPERATORS** | | | | | | | | |
| Total operators ..... number | 60,912 | 1,154 | 317 | 2,565 | 1,383 | 891 | 3,072 | 474 |
| Farms by number of operators: | | | | | | | | |
| 1 operator ..... | 17,360 | 382 | 70 | 622 | 476 | 243 | 890 | 171 |
| 2 operators ..... | 17,243 | 263 | 102 | 764 | 352 | 263 | 954 | 117 |
| 3 operators ..... | 2,025 | 50 | 9 | 90 | 49 | 19 | 70 | 17 |
| 4 operators ..... | 404 | 9 | 4 | 25 | 10 | 3 | 12 | 2 |
| 5 or more operators ..... | 217 | 9 | - | 8 | 3 | 8 | 3 | 1 |
| Total women operators ..... number | 22,840 | 360 | 115 | 941 | 411 | 379 | 1,272 | 180 |
| Farms by number of women operators: | | | | | | | | |
| 1 operator ..... | 20,043 | 312 | 102 | 831 | 377 | 321 | 1,139 | 159 |
| 2 operators ..... | 1,118 | 16 | 5 | 52 | 14 | 20 | 56 | 9 |
| 3 operators ..... | 122 | 2 | 1 | 2 | 2 | 1 | 7 | 1 |
| 4 operators ..... | 29 | - | - | - | - | - | - | - |
| 5 or more operators ..... | 14 | 2 | - | - | - | 3 | - | - |
| **2007 NUMBER OF ALL OPERATORS** | | | | | | | | |
| Total operators ..... number | 63,645 | 1,240 | 321 | 2,656 | 1,528 | 878 | 3,432 | 474 |
| Farms by number of operators: | | | | | | | | |
| 1 operator ..... | 19,049 | 444 | 89 | 812 | 527 | 203 | 947 | 145 |
| 2 operators ..... | 17,387 | 255 | 83 | 689 | 379 | 266 | 1,042 | 107 |
| 3 operators ..... | 2,115 | 59 | 17 | 85 | 55 | 29 | 73 | 19 |
| 4 operators ..... | 486 | 13 | - | 25 | 14 | 14 | 30 | 7 |
| 5 or more operators ..... | 247 | 11 | 3 | 19 | 4 | - | 9 | 5 |
| Total women operators ..... number | 23,678 | 320 | 120 | 955 | 426 | 393 | 1,422 | 163 |
| Farms by number of women operators: | | | | | | | | |
| 1 operator ..... | 20,589 | 277 | 93 | 837 | 391 | 323 | 1,230 | 119 |
| 2 operators ..... | 1,254 | 17 | 6 | 54 | 16 | 35 | 68 | 7 |
| 3 operators ..... | 125 | 3 | 5 | 2 | 1 | - | 9 | 1 |
| 4 operators ..... | 24 | - | - | 1 | - | - | 1 | 3 |
| 5 or more operators ..... | 20 | - | - | - | - | - | 5 | 3 |
| **PRINCIPAL OPERATOR CHARACTERISTICS** | | | | | | | | |
| Sex of operator: | | | | | | | | |
| Male ..... farms, 2012 | 29,730 | 605 | 157 | 1,267 | 769 | 378 | 1,483 | 252 |
| 2007 | 31,194 | 683 | 157 | 1,328 | 866 | 358 | 1,622 | 248 |
| acres, 2012 | 13,972,060 | 987,599 | 231,779 | 685,774 | 62,030 | 18,810 | 65,659 | 282,081 |
| 2007 | 14,091,177 | 1,052,466 | 262,138 | 597,773 | 90,897 | 19,137 | 66,488 | 301,326 |
| Female ..... farms, 2012 | 7,519 | 108 | 28 | 242 | 121 | 158 | 446 | 56 |
| 2007 | 8,090 | 99 | 35 | 302 | 113 | 154 | 479 | 35 |
| acres, 2012 | 776,047 | 49,376 | 31,387 | 17,731 | 13,790 | 4,830 | 9,099 | 15,331 |
| 2007 | 881,612 | 46,021 | 11,722 | 34,863 | 2,986 | 3,685 | 11,871 | 11,981 |
| Primary occupation: | | | | | | | | |
| Farming ..... 2012 | 17,650 | 391 | 112 | 676 | 496 | 246 | 682 | 131 |
| 2007 | 18,021 | 452 | 102 | 653 | 542 | 211 | 816 | 147 |
| Other ..... 2012 | 19,599 | 322 | 73 | 833 | 394 | 290 | 1,247 | 177 |
| 2007 | 21,263 | 330 | 90 | 977 | 437 | 301 | 1,285 | 136 |
| Place of residence: | | | | | | | | |
| On farm operated ..... 2012 | 30,701 | 401 | 130 | 1,204 | 711 | 482 | 1,741 | 181 |
| 2007 | 32,472 | 427 | 148 | 1,322 | 741 | 471 | 1,860 | 160 |
| Not on farm operated ..... 2012 | 6,548 | 312 | 55 | 305 | 179 | 54 | 188 | 127 |
| 2007 | 6,812 | 355 | 44 | 308 | 238 | 41 | 241 | 123 |

--continued

Table 45. **Selected Operation and Operator Characteristics: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|
| **FARMS** | | | | | | | | |
| Land in farms ....farms, 2012 | 492 | 849 | 255 | 883 | 211 | 1,552 | 557 | 377 |
| 2007 | 481 | 955 | 232 | 891 | 239 | 1,858 | 628 | 458 |
| acres, 2012 | 39,009 | 814,109 | 792,250 | 625,047 | 308,486 | 963,784 | 119,440 | 15,249 |
| 2007 | 30,702 | 883,094 | 749,452 | 609,046 | 308,212 | 1,087,952 | 119,267 | 17,699 |
| Harvested cropland ....farms, 2012 | 221 | 545 | 145 | 563 | 113 | 1,047 | 293 | 219 |
| 2007 | 186 | 581 | 105 | 597 | 98 | 1,158 | 311 | 237 |
| acres, 2012 | 17,462 | 191,252 | 8,895 | 261,364 | 90,550 | 525,432 | 20,461 | 6,454 |
| 2007 | 9,091 | 183,242 | (D) | (D) | 83,518 | (D) | 17,391 | 7,019 |
| **TENURE** | | | | | | | | |
| Full owners ....farms, 2012 | 422 | 590 | 212 | 549 | 129 | 951 | 477 | 286 |
| 2007 | 391 | 688 | 176 | 553 | 154 | 1,201 | 529 | 385 |
| acres, 2012 | 19,881 | 148,474 | (D) | 168,279 | 91,487 | 250,571 | 94,705 | 7,767 |
| 2007 | 19,243 | 188,954 | (D) | 182,405 | 74,237 | 300,292 | 102,030 | 9,634 |
| Harvested cropland ....farms, 2012 | 173 | 317 | 111 | 278 | 45 | 510 | 233 | 153 |
| 2007 | 133 | 369 | 65 | 305 | 32 | 604 | 257 | 186 |
| acres, 2012 | 2,723 | 19,409 | 4,226 | 60,994 | 13,873 | 116,739 | 4,524 | 1,748 |
| 2007 | (D) | 22,246 | (D) | 72,174 | 12,499 | 124,864 | (D) | 2,384 |
| Part owners ....farms, 2012 | 56 | 208 | 40 | 209 | 48 | 391 | 66 | 59 |
| 2007 | 84 | 195 | 53 | 203 | 56 | 444 | 79 | 56 |
| acres, 2012 | 18,472 | 572,635 | (D) | 266,481 | 158,603 | 521,234 | 23,671 | 6,795 |
| 2007 | (D) | 586,035 | (D) | 309,055 | 189,843 | 573,953 | 16,626 | 6,032 |
| Owned land in farms ....acres, 2012 | 8,401 | 229,712 | (D) | 114,090 | 54,531 | 227,659 | 11,976 | 3,519 |
| 2007 | (D) | 229,696 | (D) | 184,246 | 78,892 | 244,247 | 8,618 | 2,902 |
| Rented land in farms ....acres, 2012 | 10,071 | 342,923 | 34,324 | 152,391 | 104,072 | 293,575 | 11,695 | 3,276 |
| 2007 | 6,316 | 356,339 | 36,348 | 124,809 | 110,951 | 329,706 | 8,008 | 3,130 |
| Harvested cropland ....farms, 2012 | 43 | 183 | 31 | 186 | 40 | 353 | 56 | 49 |
| 2007 | 51 | 158 | 37 | 177 | 47 | 389 | 53 | 45 |
| acres, 2012 | 14,308 | 140,211 | (D) | 140,500 | 51,985 | 297,648 | 15,883 | 4,389 |
| 2007 | 5,733 | 130,434 | 4,630 | 137,883 | 53,900 | 316,303 | 9,292 | 3,227 |
| Tenants ....farms, 2012 | 14 | 51 | 3 | 125 | 34 | 210 | 14 | 32 |
| 2007 | 6 | 72 | 3 | 135 | 29 | 213 | 20 | 17 |
| acres, 2012 | 656 | 93,000 | (D) | 190,287 | 58,396 | 191,979 | 1,064 | 687 |
| 2007 | (D) | 108,105 | (D) | 117,586 | 44,132 | 213,707 | 611 | 2,033 |
| Harvested cropland ....farms, 2012 | 5 | 45 | 3 | 99 | 28 | 184 | 4 | 17 |
| 2007 | 2 | 54 | 3 | 115 | 19 | 165 | 1 | 6 |
| acres, 2012 | 431 | 31,632 | (D) | 59,870 | 24,692 | 111,045 | 54 | 317 |
| 2007 | (D) | 30,562 | 21 | (D) | 17,119 | (D) | (D) | 1,408 |
| **2012 NUMBER OF ALL OPERATORS** | | | | | | | | |
| Total operators ....number | 811 | 1,357 | 448 | 1,519 | 356 | 2,539 | 892 | 646 |
| Farms by number of operators: | | | | | | | | |
| 1 operator .... | 251 | 433 | 89 | 389 | 92 | 793 | 258 | 141 |
| 2 operators .... | 194 | 355 | 150 | 396 | 97 | 590 | 265 | 212 |
| 3 operators .... | 26 | 47 | 8 | 68 | 20 | 136 | 32 | 18 |
| 4 operators .... | 16 | 7 | 6 | 23 | - | 21 | 2 | 4 |
| 5 or more operators .... | 5 | 7 | 2 | 7 | 2 | 12 | - | 2 |
| Total women operators ....number | 293 | 403 | 203 | 441 | 101 | 695 | 349 | 297 |
| Farms by number of women operators: | | | | | | | | |
| 1 operator .... | 240 | 368 | 179 | 395 | 99 | 628 | 307 | 257 |
| 2 operators .... | 13 | 16 | 9 | 17 | 1 | 23 | 21 | 16 |
| 3 operators .... | 9 | 1 | 2 | - | - | 7 | - | - |
| 4 operators .... | - | - | - | 3 | - | - | - | 2 |
| 5 or more operators .... | - | - | - | - | - | - | - | - |
| **2007 NUMBER OF ALL OPERATORS** | | | | | | | | |
| Total operators ....number | 798 | 1,448 | 367 | 1,444 | 380 | 2,988 | 1,049 | 755 |
| Farms by number of operators: | | | | | | | | |
| 1 operator .... | 220 | 561 | 112 | 449 | 113 | 987 | 307 | 181 |
| 2 operators .... | 217 | 322 | 109 | 360 | 112 | 682 | 265 | 259 |
| 3 operators .... | 32 | 55 | 7 | 60 | 13 | 149 | 44 | 16 |
| 4 operators .... | 12 | 12 | 4 | 16 | 1 | 22 | 8 | 2 |
| 5 or more operators .... | - | 5 | - | 6 | - | 18 | 4 | - |
| Total women operators ....number | 305 | 413 | 133 | 375 | 135 | 784 | 418 | 353 |
| Farms by number of women operators: | | | | | | | | |
| 1 operator .... | 278 | 374 | 125 | 334 | 115 | 696 | 328 | 295 |
| 2 operators .... | 9 | 16 | 4 | 19 | 10 | 32 | 34 | 29 |
| 3 operators .... | 3 | 1 | - | 1 | - | 8 | 3 | - |
| 4 operators .... | - | 1 | - | - | - | - | - | - |
| 5 or more operators .... | - | - | - | - | - | - | 1 | - |
| **PRINCIPAL OPERATOR CHARACTERISTICS** | | | | | | | | |
| Sex of operator: | | | | | | | | |
| Male ....farms, 2012 | 393 | 736 | 174 | 758 | 191 | 1,391 | 433 | 244 |
| 2007 | 382 | 822 | 182 | 807 | 200 | 1,684 | 465 | 315 |
| acres, 2012 | 34,337 | 752,907 | 774,191 | 599,926 | 301,450 | 927,838 | 114,353 | 12,524 |
| 2007 | 26,233 | 819,905 | 735,722 | 588,030 | 281,582 | 1,056,715 | 110,139 | 14,926 |
| Female ....farms, 2012 | 99 | 113 | 81 | 125 | 20 | 161 | 124 | 133 |
| 2007 | 99 | 133 | 50 | 84 | 39 | 174 | 163 | 143 |
| acres, 2012 | 4,672 | 61,202 | 18,059 | 25,121 | 7,036 | 35,946 | 5,087 | 2,725 |
| 2007 | 4,469 | 63,189 | 13,730 | 21,016 | 26,630 | 31,237 | 9,128 | 2,773 |
| Primary occupation: | | | | | | | | |
| Farming ....2012 | 230 | 475 | 133 | 554 | 120 | 1,034 | 249 | 176 |
| 2007 | 213 | 534 | 104 | 552 | 115 | 1,039 | 276 | 213 |
| Other ....2012 | 262 | 374 | 122 | 329 | 91 | 518 | 308 | 201 |
| 2007 | 268 | 421 | 128 | 339 | 124 | 819 | 352 | 245 |
| Place of residence: | | | | | | | | |
| On farm operated ....2012 | 444 | 526 | 237 | 663 | 107 | 1,076 | 502 | 317 |
| 2007 | 446 | 595 | 217 | 682 | 152 | 1,420 | 549 | 399 |
| Not on farm operated ....2012 | 48 | 323 | 18 | 220 | 104 | 476 | 55 | 60 |
| 2007 | 35 | 360 | 15 | 209 | 87 | 438 | 79 | 59 |

--continued

Table 45. **Selected Operation and Operator Characteristics: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|
| **FARMS** | | | | | | | | |
| Land in farms ..... farms, 2012 | 221 | 1,837 | 706 | 1,006 | 760 | 1,647 | 897 | 377 |
| 2007 | 211 | 1,790 | 664 | 1,038 | 893 | 1,717 | 798 | 471 |
| acres, 2012 | 15,556 | 46,717 | 10,070 | 183,124 | 551,097 | 132,839 | 1,114,940 | 23,743 |
| 2007 | 12,717 | 49,285 | 15,294 | 191,087 | 601,216 | 131,554 | 1,090,178 | 25,185 |
| Harvested cropland ..... farms, 2012 | 122 | 851 | 327 | 525 | 365 | 965 | 461 | 156 |
| 2007 | 119 | 621 | 269 | 505 | 358 | 889 | 437 | 157 |
| acres, 2012 | 2,903 | 13,340 | 1,913 | 51,234 | 80,898 | 45,858 | 383,304 | 3,847 |
| 2007 | 1,999 | 9,459 | 2,211 | 53,117 | 87,324 | 37,388 | 386,081 | 3,374 |
| **TENURE** | | | | | | | | |
| Full owners ..... farms, 2012 | 183 | 1,520 | 621 | 794 | 564 | 1,336 | 531 | 329 |
| 2007 | 172 | 1,494 | 570 | 813 | 692 | 1,419 | 439 | 399 |
| acres, 2012 | 10,762 | 30,411 | 8,248 | 75,433 | 170,715 | (D) | 242,195 | 11,473 |
| 2007 | 8,209 | 35,502 | 12,534 | 66,439 | 211,180 | 88,081 | 208,901 | 21,745 |
| Harvested cropland ..... farms, 2012 | 105 | 652 | 287 | 383 | 222 | 721 | 159 | 142 |
| 2007 | 97 | 469 | 229 | 364 | 244 | 661 | 140 | 137 |
| acres, 2012 | 1,457 | 6,206 | 1,268 | 16,442 | 14,478 | 16,033 | 38,208 | 1,957 |
| 2007 | 1,265 | 5,309 | 1,610 | 20,629 | 23,559 | 17,963 | 51,535 | (D) |
| Part owners ..... farms, 2012 | 24 | 167 | 53 | 170 | 156 | 261 | 207 | 34 |
| 2007 | 29 | 164 | 72 | 197 | 140 | 251 | 208 | 47 |
| acres, 2012 | 4,222 | 14,337 | 1,595 | 99,435 | 324,924 | (D) | 518,085 | (D) |
| 2007 | 4,006 | 11,612 | 2,327 | 114,202 | 333,467 | 37,633 | 562,823 | 2,023 |
| Owned land in farms ..... acres, 2012 | 2,467 | 6,294 | 745 | 50,472 | 195,771 | (D) | 199,170 | (D) |
| 2007 | 2,607 | 6,178 | 1,637 | 59,775 | 207,831 | 20,555 | 203,013 | 1,193 |
| Rented land in farms ..... acres, 2012 | 1,755 | 8,043 | 850 | 48,963 | 129,153 | 23,838 | 318,915 | 1,610 |
| 2007 | 1,399 | 5,434 | 690 | 54,427 | 125,636 | 17,078 | 359,810 | 830 |
| Harvested cropland ..... farms, 2012 | 15 | 82 | 21 | 110 | 119 | 212 | 179 | 8 |
| 2007 | 17 | 61 | 28 | 126 | 94 | 197 | 176 | 10 |
| acres, 2012 | (D) | 6,164 | 592 | 27,749 | 50,049 | 24,612 | 185,150 | (D) |
| 2007 | 695 | 3,424 | 401 | 29,536 | 52,947 | 15,888 | 189,951 | 374 |
| Tenants ..... farms, 2012 | 14 | 150 | 32 | 42 | 40 | 50 | 159 | 14 |
| 2007 | 10 | 132 | 22 | 28 | 61 | 47 | 151 | 25 |
| acres, 2012 | 572 | 1,969 | 227 | 8,256 | 55,458 | 7,821 | 354,660 | (D) |
| 2007 | 502 | 2,171 | 433 | 10,446 | 56,569 | 5,840 | 318,454 | 1,417 |
| Harvested cropland ..... farms, 2012 | 2 | 117 | 19 | 32 | 24 | 32 | 123 | 6 |
| 2007 | 5 | 91 | 12 | 15 | 20 | 31 | 121 | 10 |
| acres, 2012 | (D) | 970 | 53 | 7,043 | 16,371 | 5,213 | 159,946 | (D) |
| 2007 | 39 | 726 | 200 | 2,952 | 10,818 | 3,537 | 144,595 | (D) |
| **2012 NUMBER OF ALL OPERATORS** | | | | | | | | |
| Total operators ..... number | 387 | 3,151 | 1,204 | 1,638 | 1,240 | 2,728 | 1,529 | 635 |
| Farms by number of operators: | | | | | | | | |
| 1 operator ..... | 84 | 782 | 248 | 470 | 365 | 675 | 387 | 178 |
| 2 operators ..... | 111 | 848 | 426 | 468 | 347 | 891 | 417 | 159 |
| 3 operators ..... | 23 | 171 | 25 | 51 | 36 | 59 | 77 | 32 |
| 4 operators ..... | 3 | 22 | 6 | 12 | 6 | 16 | 8 | 4 |
| 5 or more operators ..... | - | 14 | 1 | 5 | 6 | 6 | 8 | 4 |
| Total women operators ..... number | 157 | 1,440 | 578 | 610 | 486 | 1,120 | 524 | 257 |
| Farms by number of women operators: | | | | | | | | |
| 1 operator ..... | 119 | 1,182 | 499 | 552 | 422 | 1,017 | 464 | 215 |
| 2 operators ..... | 16 | 107 | 35 | 25 | 18 | 41 | 19 | 14 |
| 3 operators ..... | 2 | 12 | 3 | - | 2 | 7 | 2 | 2 |
| 4 operators ..... | - | 2 | - | 2 | 1 | - | 4 | 2 |
| 5 or more operators ..... | - | - | - | - | 3 | - | - | - |
| **2007 NUMBER OF ALL OPERATORS** | | | | | | | | |
| Total operators ..... number | 357 | 3,005 | 1,133 | 1,660 | 1,527 | 2,796 | 1,272 | 794 |
| Farms by number of operators: | | | | | | | | |
| 1 operator ..... | 88 | 783 | 302 | 481 | 390 | 759 | 406 | 216 |
| 2 operators ..... | 106 | 866 | 288 | 503 | 412 | 867 | 326 | 207 |
| 3 operators ..... | 13 | 102 | 48 | 46 | 66 | 69 | 56 | 38 |
| 4 operators ..... | 3 | 27 | 19 | 6 | 16 | 15 | 7 | 7 |
| 5 or more operators ..... | 1 | 12 | 7 | 2 | 9 | 7 | 3 | 3 |
| Total women operators ..... number | 165 | 1,391 | 540 | 598 | 596 | 1,150 | 386 | 338 |
| Farms by number of women operators: | | | | | | | | |
| 1 operator ..... | 133 | 1,176 | 422 | 553 | 496 | 1,064 | 358 | 290 |
| 2 operators ..... | 16 | 83 | 59 | 18 | 31 | 37 | 14 | 22 |
| 3 operators ..... | - | 11 | - | 3 | 10 | 4 | - | - |
| 4 operators ..... | - | 4 | - | - | 2 | - | - | 1 |
| 5 or more operators ..... | - | - | - | - | - | - | - | - |
| **PRINCIPAL OPERATOR CHARACTERISTICS** | | | | | | | | |
| Sex of operator: | | | | | | | | |
| Male ..... farms, 2012 | 167 | 1,228 | 463 | 794 | 571 | 1,340 | 786 | 273 |
| 2007 | 135 | 1,136 | 389 | 886 | 704 | 1,354 | 698 | 353 |
| acres, 2012 | 12,257 | 36,853 | 6,762 | 170,091 | 470,097 | 117,291 | 1,056,769 | 21,863 |
| 2007 | 10,047 | 34,743 | 11,517 | 179,147 | 520,970 | 111,490 | 1,040,174 | 20,985 |
| Female ..... farms, 2012 | 54 | 609 | 243 | 212 | 189 | 307 | 111 | 104 |
| 2007 | 76 | 654 | 275 | 152 | 189 | 363 | 100 | 118 |
| acres, 2012 | 3,299 | 9,864 | 3,308 | 13,033 | 81,000 | 15,548 | 58,171 | 1,880 |
| 2007 | 2,670 | 14,542 | 3,777 | 11,940 | 80,246 | 20,064 | 50,004 | 4,200 |
| Primary occupation: | | | | | | | | |
| Farming ..... 2012 | 109 | 814 | 315 | 492 | 393 | 676 | 487 | 153 |
| 2007 | 103 | 753 | 302 | 441 | 380 | 710 | 497 | 165 |
| Other ..... 2012 | 112 | 1,023 | 391 | 514 | 367 | 971 | 410 | 224 |
| 2007 | 108 | 1,037 | 362 | 597 | 513 | 1,007 | 301 | 306 |
| Place of residence: | | | | | | | | |
| On farm operated ..... 2012 | 181 | 1,535 | 643 | 889 | 627 | 1,481 | 641 | 337 |
| 2007 | 175 | 1,524 | 600 | 905 | 718 | 1,531 | 542 | 392 |
| Not on farm operated ..... 2012 | 40 | 302 | 63 | 117 | 133 | 166 | 256 | 40 |
| 2007 | 36 | 266 | 64 | 133 | 175 | 186 | 256 | 79 |

--continued

Table 45. **Selected Operation and Operator Characteristics: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|
| **FARMS** | | | | | | | | |
| Land in farms ....farms, 2012 | 1,449 | 330 | 288 | 1,478 | 274 | 1,074 | 144 | 1,438 |
| 2007 | 1,662 | 390 | 316 | 1,448 | 291 | 1,215 | 123 | 1,670 |
| acres, 2012 | 1,205,285 | 52,157 | 43,619 | 49,483 | 15,669 | 106,538 | 6,473 | 70,863 |
| 2007 | 1,205,229 | 61,749 | 55,109 | 47,677 | 21,472 | 108,541 | 5,472 | 76,837 |
| Harvested cropland ....farms, 2012 | 941 | 226 | 173 | 603 | 180 | 612 | 81 | 609 |
| 2007 | 878 | 258 | 134 | 497 | 185 | 640 | 48 | 616 |
| acres, 2012 | 78,819 | 6,529 | 12,433 | 9,643 | 4,332 | 57,055 | 972 | 23,425 |
| 2007 | 75,704 | 8,406 | 10,948 | 12,100 | 5,607 | 58,163 | 1,111 | 25,965 |
| **TENURE** | | | | | | | | |
| Full owners ....farms, 2012 | 1,119 | 267 | 243 | 1,305 | 217 | 834 | 126 | 1,209 |
| 2007 | 1,319 | 306 | 280 | 1,238 | 225 | 929 | 96 | 1,376 |
| acres, 2012 | 841,742 | 33,117 | 26,392 | 36,095 | 8,711 | (D) | 4,219 | 43,982 |
| 2007 | 733,644 | (D) | 37,919 | 30,926 | 11,758 | 37,640 | 3,765 | 42,336 |
| Harvested cropland ....farms, 2012 | 687 | 185 | 134 | 516 | 136 | 416 | 69 | 455 |
| 2007 | 661 | 203 | 113 | 384 | 138 | 423 | 39 | 452 |
| acres, 2012 | 25,675 | 4,106 | 5,564 | 5,806 | 1,618 | 11,853 | 639 | 5,575 |
| 2007 | 33,470 | (D) | 4,966 | 5,062 | 2,309 | 9,738 | (D) | 8,035 |
| Part owners ....farms, 2012 | 284 | 58 | 42 | 135 | 39 | 185 | 15 | 147 |
| 2007 | 286 | 80 | 33 | 167 | 44 | 222 | 23 | 205 |
| acres, 2012 | 348,141 | 19,002 | 16,537 | 12,407 | 5,486 | (D) | 1,984 | 23,636 |
| 2007 | 457,240 | (D) | 17,010 | 15,549 | 7,678 | 55,853 | 1,592 | 24,946 |
| Owned land in farms ....acres, 2012 | 168,061 | 14,999 | 10,813 | 4,869 | 2,775 | (D) | 1,039 | 10,739 |
| 2007 | 184,149 | (D) | 9,079 | 8,024 | 3,253 | 23,025 | 713 | 9,824 |
| Rented land in farms ....acres, 2012 | 180,080 | 4,003 | 5,724 | 7,538 | 2,711 | 34,686 | 945 | 12,897 |
| 2007 | 273,091 | 6,988 | 7,931 | 7,525 | 4,425 | 32,828 | 879 | 15,122 |
| Harvested cropland ....farms, 2012 | 219 | 37 | 36 | 69 | 32 | 158 | 9 | 105 |
| 2007 | 194 | 54 | 21 | 99 | 31 | 170 | 7 | 126 |
| acres, 2012 | 46,306 | 2,407 | 6,344 | 3,614 | 2,189 | 36,451 | 248 | 16,026 |
| 2007 | 36,045 | 4,090 | 5,982 | 6,508 | 2,637 | 36,735 | 339 | 16,208 |
| Tenants ....farms, 2012 | 46 | 5 | 3 | 38 | 18 | 55 | 3 | 82 |
| 2007 | 57 | 4 | 3 | 43 | 22 | 64 | 4 | 89 |
| acres, 2012 | 15,402 | 38 | 690 | 981 | 1,472 | (D) | 270 | 3,245 |
| 2007 | 14,345 | (D) | 180 | 1,202 | 2,036 | 15,048 | 115 | 9,555 |
| Harvested cropland ....farms, 2012 | 35 | 4 | 3 | 18 | 12 | 38 | 3 | 49 |
| 2007 | 23 | 1 | - | 14 | 16 | 47 | 2 | 38 |
| acres, 2012 | 6,838 | 16 | 525 | 223 | 525 | 8,751 | 85 | 1,824 |
| 2007 | 6,189 | (D) | - | 530 | 661 | 11,690 | (D) | 1,722 |
| **2012 NUMBER OF ALL OPERATORS** | | | | | | | | |
| Total operators ....number | 2,320 | 534 | 472 | 2,460 | 472 | 1,798 | 252 | 2,397 |
| Farms by number of operators: | | | | | | | | |
| 1 operator .... | 695 | 160 | 125 | 617 | 126 | 466 | 56 | 647 |
| 2 operators .... | 667 | 144 | 145 | 768 | 126 | 531 | 81 | 694 |
| 3 operators .... | 73 | 22 | 17 | 75 | 7 | 51 | 3 | 72 |
| 4 operators .... | 8 | 2 | - | 13 | 8 | 18 | 2 | 15 |
| 5 or more operators .... | 6 | 2 | 1 | 5 | 7 | 8 | 2 | 10 |
| Total women operators ....number | 819 | 187 | 190 | 1,098 | 248 | 727 | 94 | 1,115 |
| Farms by number of women operators: | | | | | | | | |
| 1 operator .... | 744 | 169 | 168 | 969 | 177 | 613 | 81 | 954 |
| 2 operators .... | 29 | 6 | 11 | 53 | 18 | 51 | 5 | 65 |
| 3 operators .... | 4 | 2 | - | 5 | 1 | 4 | 1 | 2 |
| 4 operators .... | - | - | - | 2 | 8 | - | - | 1 |
| 5 or more operators .... | 1 | - | - | - | - | - | - | 3 |
| **2007 NUMBER OF ALL OPERATORS** | | | | | | | | |
| Total operators ....number | 2,647 | 653 | 515 | 2,417 | 467 | 1,953 | 205 | 2,842 |
| Farms by number of operators: | | | | | | | | |
| 1 operator .... | 837 | 201 | 142 | 597 | 139 | 588 | 46 | 740 |
| 2 operators .... | 705 | 157 | 158 | 749 | 134 | 556 | 73 | 808 |
| 3 operators .... | 94 | 21 | 13 | 89 | 14 | 46 | 3 | 70 |
| 4 operators .... | 14 | 4 | - | 11 | 2 | 17 | 1 | 26 |
| 5 or more operators .... | 12 | 7 | 3 | 2 | 2 | 8 | - | 26 |
| Total women operators ....number | 1,006 | 205 | 233 | 1,133 | 238 | 751 | 78 | 1,300 |
| Farms by number of women operators: | | | | | | | | |
| 1 operator .... | 885 | 193 | 210 | 965 | 188 | 633 | 74 | 1,027 |
| 2 operators .... | 35 | 6 | 7 | 75 | 13 | 43 | 2 | 104 |
| 3 operators .... | 4 | - | 3 | 6 | 8 | 6 | - | 11 |
| 4 operators .... | 1 | - | - | - | - | 1 | - | 8 |
| 5 or more operators .... | 7 | - | - | - | - | 2 | - | - |
| **PRINCIPAL OPERATOR CHARACTERISTICS** | | | | | | | | |
| Sex of operator: | | | | | | | | |
| Male ....farms, 2012 | 1,189 | 297 | 238 | 962 | 164 | 817 | 113 | 961 |
| 2007 | 1,348 | 343 | 230 | 977 | 192 | 940 | 98 | 1,150 |
| acres, 2012 | 1,166,669 | 48,428 | 40,112 | 38,811 | 10,884 | 97,008 | 6,119 | 51,734 |
| 2007 | 1,131,788 | 57,628 | 42,888 | 38,353 | 13,618 | 98,919 | 5,151 | 64,134 |
| Female ....farms, 2012 | 260 | 33 | 50 | 516 | 110 | 257 | 31 | 477 |
| 2007 | 314 | 47 | 86 | 471 | 99 | 275 | 25 | 520 |
| acres, 2012 | 38,616 | 3,729 | 3,507 | 10,672 | 4,785 | 9,530 | 354 | 19,129 |
| 2007 | 73,441 | 4,121 | 12,221 | 9,324 | 7,854 | 9,622 | 321 | 12,703 |
| Primary occupation: | | | | | | | | |
| Farming ....2012 | 703 | 151 | 109 | 694 | 145 | 515 | 66 | 511 |
| 2007 | 743 | 194 | 112 | 607 | 113 | 479 | 54 | 659 |
| Other ....2012 | 746 | 179 | 179 | 784 | 129 | 559 | 78 | 927 |
| 2007 | 919 | 196 | 204 | 841 | 178 | 736 | 69 | 1,011 |
| Place of residence: | | | | | | | | |
| On farm operated ....2012 | 1,245 | 259 | 257 | 1,373 | 205 | 908 | 134 | 1,276 |
| 2007 | 1,397 | 300 | 286 | 1,315 | 258 | 1,042 | 110 | 1,459 |
| Not on farm operated ....2012 | 204 | 71 | 31 | 105 | 69 | 166 | 10 | 162 |
| 2007 | 265 | 90 | 30 | 133 | 33 | 173 | 13 | 211 |

--continued

Table 45. **Selected Operation and Operator Characteristics: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|---|
| **FARMS** | | | | | | | | | |
| Land in farms | farms, 2012 | 2,501 | 1,148 | 1,336 | 109 | 943 | 1,702 | 1,195 | 3,143 |
| | 2007 | 2,502 | 1,258 | 1,288 | 119 | 929 | 1,483 | 1,247 | 3,540 |
| | acres, 2012 | 537,406 | 527,123 | 76,638 | 9,557 | 645,121 | 115,831 | 1,275,110 | 1,780,498 |
| | 2007 | 626,329 | 531,082 | 80,617 | 12,025 | 682,350 | 102,584 | 1,271,141 | 1,649,281 |
| Harvested cropland | farms, 2012 | 1,402 | 687 | 647 | 68 | 532 | 1,110 | 709 | 2,048 |
| | 2007 | 1,254 | 635 | 494 | 68 | 455 | 840 | 708 | 2,353 |
| | acres, 2012 | 289,301 | 57,638 | 18,357 | 2,201 | 280,934 | 69,731 | 659,460 | 218,054 |
| | 2007 | 297,843 | 55,263 | 18,066 | 2,140 | 282,092 | 64,336 | 685,419 | 251,114 |
| **TENURE** | | | | | | | | | |
| Full owners | farms, 2012 | 1,982 | 933 | 1,150 | 87 | 684 | 1,312 | 691 | 2,542 |
| | 2007 | 1,936 | 979 | 1,097 | 86 | 655 | 1,048 | 707 | 2,737 |
| | acres, 2012 | 166,591 | 278,809 | 48,906 | 5,826 | 194,363 | 43,558 | 259,030 | 1,465,916 |
| | 2007 | 194,396 | 288,108 | 55,829 | 7,085 | 227,068 | (D) | 320,521 | 1,246,652 |
| Harvested cropland | farms, 2012 | 991 | 517 | 543 | 53 | 320 | 774 | 270 | 1,562 |
| | 2007 | 845 | 436 | 390 | 45 | 246 | 487 | 260 | 1,731 |
| | acres, 2012 | 38,194 | 21,830 | 7,572 | 974 | 37,330 | 12,663 | 85,445 | 70,582 |
| | 2007 | 43,981 | 20,789 | 8,333 | 1,008 | 48,461 | 11,518 | 110,020 | 101,139 |
| Part owners | farms, 2012 | 433 | 187 | 140 | 22 | 168 | 302 | 300 | 477 |
| | 2007 | 441 | 229 | 131 | 31 | 168 | 344 | 342 | 665 |
| | acres, 2012 | 299,238 | 241,603 | 23,078 | 3,731 | 253,571 | 60,489 | 628,965 | 266,497 |
| | 2007 | 354,709 | 224,152 | 19,529 | (D) | 302,115 | (D) | 634,500 | 372,689 |
| Owned land in farms | acres, 2012 | 118,062 | 57,263 | 8,827 | 1,740 | 103,861 | 29,535 | 233,064 | 116,728 |
| | 2007 | 116,594 | 54,069 | 9,393 | (D) | 123,774 | (D) | 231,872 | 178,800 |
| Rented land in farms | acres, 2012 | 181,176 | 184,340 | 14,251 | 1,991 | 149,710 | 30,954 | 395,901 | 149,769 |
| | 2007 | 238,115 | 170,083 | 10,136 | 2,440 | 178,341 | 28,311 | 402,628 | 193,889 |
| Harvested cropland | farms, 2012 | 350 | 155 | 83 | 15 | 137 | 265 | 271 | 393 |
| | 2007 | 331 | 166 | 69 | 23 | 132 | 293 | 291 | 524 |
| | acres, 2012 | 198,768 | 33,041 | 9,286 | 1,227 | 141,467 | 47,113 | 374,778 | 132,249 |
| | 2007 | 209,747 | 28,585 | 7,931 | 1,132 | 150,283 | 44,412 | 390,898 | 135,932 |
| Tenants | farms, 2012 | 86 | 28 | 46 | - | 91 | 88 | 204 | 124 |
| | 2007 | 125 | 50 | 60 | 2 | 106 | 91 | 198 | 138 |
| | acres, 2012 | 71,577 | 6,711 | 4,654 | - | 197,187 | 11,784 | 387,115 | 48,085 |
| | 2007 | 77,224 | 18,822 | 5,259 | (D) | 153,167 | 10,191 | 316,120 | 29,940 |
| Harvested cropland | farms, 2012 | 61 | 15 | 21 | - | 75 | 71 | 168 | 93 |
| | 2007 | 78 | 33 | 35 | - | 77 | 60 | 157 | 98 |
| | acres, 2012 | 52,339 | 2,767 | 1,499 | - | 102,137 | 9,955 | 199,237 | 15,223 |
| | 2007 | 44,115 | 5,889 | 1,802 | - | 83,348 | 8,406 | 184,501 | 14,043 |
| **2012 NUMBER OF ALL OPERATORS** | | | | | | | | | |
| Total operators | number | 4,049 | 1,824 | 2,165 | 166 | 1,526 | 2,697 | 1,908 | 4,936 |
| Farms by number of operators: | | | | | | | | | |
| 1 operator | | 1,131 | 550 | 620 | 52 | 470 | 866 | 628 | 1,662 |
| 2 operators | | 1,247 | 544 | 638 | 57 | 397 | 726 | 459 | 1,278 |
| 3 operators | | 101 | 36 | 57 | - | 60 | 84 | 87 | 147 |
| 4 operators | | 16 | 13 | 12 | - | 14 | 16 | 15 | 31 |
| 5 or more operators | | 6 | 5 | 9 | - | 2 | 10 | 6 | 25 |
| Total women operators | number | 1,548 | 697 | 910 | 55 | 509 | 955 | 589 | 1,487 |
| Farms by number of women operators: | | | | | | | | | |
| 1 operator | | 1,388 | 648 | 780 | 55 | 435 | 807 | 510 | 1,361 |
| 2 operators | | 62 | 23 | 50 | - | 34 | 64 | 29 | 55 |
| 3 operators | | 12 | 1 | 10 | - | 2 | 2 | 7 | 4 |
| 4 operators | | - | - | - | - | - | 1 | - | 1 |
| 5 or more operators | | - | - | - | - | - | 2 | - | - |
| **2007 NUMBER OF ALL OPERATORS** | | | | | | | | | |
| Total operators | number | 4,023 | 1,983 | 2,087 | 188 | 1,492 | 2,363 | 2,012 | 5,496 |
| Farms by number of operators: | | | | | | | | | |
| 1 operator | | 1,210 | 607 | 589 | 56 | 464 | 725 | 646 | 1,940 |
| 2 operators | | 1,126 | 598 | 623 | 59 | 398 | 676 | 473 | 1,372 |
| 3 operators | | 139 | 41 | 54 | 2 | 56 | 62 | 104 | 156 |
| 4 operators | | 21 | 6 | 20 | 2 | 8 | 15 | 15 | 44 |
| 5 or more operators | | 6 | 6 | 2 | - | 3 | 5 | 9 | 28 |
| Total women operators | number | 1,530 | 741 | 898 | 65 | 518 | 848 | 577 | 1,678 |
| Farms by number of women operators: | | | | | | | | | |
| 1 operator | | 1,340 | 683 | 763 | 59 | 463 | 766 | 519 | 1,514 |
| 2 operators | | 86 | 29 | 54 | 3 | 26 | 35 | 26 | 74 |
| 3 operators | | 6 | - | 9 | - | 1 | - | 2 | 4 |
| 4 operators | | - | - | - | - | - | - | - | 1 |
| 5 or more operators | | - | - | - | - | - | 2 | - | - |
| **PRINCIPAL OPERATOR CHARACTERISTICS** | | | | | | | | | |
| Sex of operator: | | | | | | | | | |
| Male | farms, 2012 | 2,095 | 947 | 983 | 103 | 792 | 1,382 | 1,008 | 2,826 |
| | 2007 | 1,983 | 1,060 | 917 | 108 | 756 | 1,215 | 1,056 | 3,047 |
| | acres, 2012 | 509,283 | 509,659 | 68,437 | 9,082 | 583,197 | 108,404 | 1,225,707 | 1,755,285 |
| | 2007 | 569,928 | 506,206 | 68,587 | 11,218 | 630,075 | 95,969 | 1,202,248 | 1,601,917 |
| Female | farms, 2012 | 406 | 201 | 353 | 6 | 151 | 320 | 187 | 317 |
| | 2007 | 519 | 198 | 371 | 11 | 173 | 268 | 191 | 493 |
| | acres, 2012 | 28,123 | 17,464 | 8,201 | 475 | 61,924 | 7,427 | 49,403 | 25,213 |
| | 2007 | 56,401 | 24,876 | 12,030 | 807 | 52,275 | 6,615 | 68,893 | 47,364 |
| Primary occupation: | | | | | | | | | |
| Farming | 2012 | 1,039 | 536 | 410 | 55 | 456 | 773 | 711 | 1,632 |
| | 2007 | 908 | 599 | 521 | 63 | 450 | 671 | 701 | 1,827 |
| Other | 2012 | 1,462 | 612 | 926 | 54 | 487 | 929 | 484 | 1,511 |
| | 2007 | 1,594 | 659 | 767 | 56 | 479 | 812 | 546 | 1,713 |
| Place of residence: | | | | | | | | | |
| On farm operated | 2012 | 2,201 | 985 | 1,238 | 95 | 667 | 1,439 | 815 | 2,548 |
| | 2007 | 2,166 | 1,146 | 1,179 | 108 | 654 | 1,321 | 799 | 2,956 |
| Not on farm operated | 2012 | 300 | 163 | 98 | 14 | 276 | 263 | 380 | 595 |
| | 2007 | 336 | 112 | 109 | 11 | 275 | 162 | 448 | 584 |

--continued

Table 45. **Selected Operation and Operator Characteristics: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Washington | Adams | Asotin | Benton | Chelan | Clallam | Clark | Columbia |
|---|---|---|---|---|---|---|---|---|---|
| **PRINCIPAL OPERATOR CHARACTERISTICS** - Con. | | | | | | | | | |
| Days worked off farm: | | | | | | | | | |
| None | 2012 | 14,862 | 317 | 76 | 561 | 365 | 228 | 668 | 161 |
| | 2007 | 13,701 | 351 | 60 | 507 | 349 | 154 | 680 | 99 |
| Any | 2012 | 22,387 | 396 | 109 | 948 | 525 | 308 | 1,261 | 147 |
| | 2007 | 25,583 | 431 | 132 | 1,123 | 630 | 358 | 1,421 | 184 |
| 1 to 49 days | 2012 | 3,247 | 74 | 13 | 78 | 67 | 27 | 180 | 15 |
| | 2007 | 4,242 | 145 | 42 | 140 | 108 | 61 | 286 | 58 |
| 50 to 99 days | 2012 | 1,596 | 17 | 21 | 44 | 39 | 40 | 70 | 12 |
| | 2007 | 2,019 | 46 | 15 | 48 | 59 | 37 | 123 | 15 |
| 100 to 199 days | 2012 | 3,364 | 37 | 8 | 116 | 93 | 60 | 164 | 15 |
| | 2007 | 3,926 | 44 | 22 | 209 | 99 | 46 | 186 | 19 |
| 200 days or more | 2012 | 14,180 | 268 | 67 | 710 | 326 | 181 | 847 | 105 |
| | 2007 | 15,396 | 196 | 53 | 726 | 364 | 214 | 826 | 92 |
| Years on present farm: | | | | | | | | | |
| 2 years or less | 2012 | 1,449 | 32 | 6 | 69 | 29 | 38 | 58 | 5 |
| | 2007 | 1,684 | 34 | 18 | 89 | 52 | 15 | 91 | 17 |
| 3 or 4 years | 2012 | 2,200 | 21 | 10 | 118 | 46 | 31 | 130 | 16 |
| | 2007 | 3,058 | 28 | 12 | 148 | 59 | 57 | 195 | 28 |
| 5 to 9 years | 2012 | 6,451 | 85 | 27 | 265 | 143 | 103 | 325 | 43 |
| | 2007 | 7,311 | 123 | 35 | 327 | 189 | 117 | 387 | 50 |
| 10 years or more | 2012 | 27,149 | 575 | 142 | 1,057 | 672 | 364 | 1,416 | 244 |
| | 2007 | 27,231 | 597 | 127 | 1,066 | 679 | 323 | 1,428 | 188 |
| Average years on present farm | 2012 | 20.9 | 23.7 | 20.3 | 18.9 | 22.0 | 18.7 | 20.3 | 23.3 |
| | 2007 | 19.6 | 23.1 | 19.3 | 17.5 | 20.0 | 16.9 | 18.9 | 19.3 |
| Years operating any farm (see text): | | | | | | | | | |
| 2 years or less | 2012 | 1,086 | 22 | 4 | 44 | 26 | 35 | 47 | 3 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 3 or 4 years | 2012 | 1,769 | 17 | 10 | 80 | 37 | 27 | 99 | 12 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 5 to 9 years | 2012 | 5,500 | 67 | 25 | 242 | 106 | 89 | 301 | 27 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 10 years or more | 2012 | 28,894 | 607 | 146 | 1,143 | 721 | 385 | 1,482 | 266 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Average years on any farm | 2012 | 23.2 | 26.3 | 22.0 | 22.6 | 24.5 | 20.9 | 22.0 | 26.6 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Age group: | | | | | | | | | |
| Under 25 years | 2012 | 181 | 3 | 1 | 1 | 3 | - | 2 | - |
| | 2007 | 145 | 2 | - | 9 | 3 | 1 | 10 | 1 |
| 25 to 34 years | 2012 | 1,526 | 49 | 7 | 90 | 33 | 13 | 76 | 12 |
| | 2007 | 1,535 | 36 | 18 | 60 | 27 | 18 | 75 | 27 |
| 35 to 44 years | 2012 | 3,502 | 60 | 18 | 166 | 70 | 32 | 195 | 22 |
| | 2007 | 4,399 | 63 | 16 | 233 | 87 | 42 | 257 | 19 |
| 45 to 54 years | 2012 | 7,887 | 148 | 34 | 313 | 194 | 93 | 395 | 56 |
| | 2007 | 10,780 | 198 | 50 | 450 | 326 | 113 | 623 | 67 |
| 55 to 59 years | 2012 | 5,836 | 105 | 22 | 222 | 154 | 61 | 364 | 31 |
| | 2007 | 6,359 | 132 | 24 | 238 | 145 | 77 | 268 | 50 |
| 60 to 64 years | 2012 | 5,928 | 138 | 32 | 198 | 150 | 95 | 265 | 64 |
| | 2007 | 5,512 | 102 | 36 | 235 | 154 | 99 | 272 | 34 |
| 65 to 69 years | 2012 | 5,024 | 97 | 19 | 187 | 116 | 120 | 228 | 36 |
| | 2007 | 4,050 | 77 | 29 | 162 | 91 | 71 | 219 | 34 |
| 70 years and over | 2012 | 7,365 | 113 | 52 | 332 | 170 | 122 | 404 | 87 |
| | 2007 | 6,504 | 172 | 19 | 243 | 146 | 91 | 377 | 51 |
| Average age | 2012 | 58.8 | 57.9 | 59.4 | 58.5 | 58.8 | 62.1 | 59.0 | 61.6 |
| | 2007 | 57.0 | 58.5 | 55.6 | 56.0 | 56.7 | 59.2 | 57.0 | 57.3 |
| **INTERNET ACCESS (SEE TEXT)** | | | | | | | | | |
| Internet access | 2012 | 29,827 | 566 | 138 | 1,211 | 734 | 416 | 1,578 | 238 |
| | 2007 | 27,265 | 511 | 122 | 1,100 | 654 | 368 | 1,404 | 182 |
| Dial-up service | farms, 2012 | 2,800 | 35 | 7 | 124 | 57 | 35 | 227 | 17 |
| DSL service | farms, 2012 | 10,682 | 130 | 62 | 396 | 127 | 234 | 777 | 51 |
| Cable modem service | farms, 2012 | 5,140 | 39 | 37 | 169 | 115 | 78 | 308 | 32 |
| Fiber-optic service | farms, 2012 | 1,389 | 34 | 7 | 21 | 261 | 7 | 32 | - |
| Mobile broadband plan for computer or cell phone | farms, 2012 | 4,785 | 106 | 10 | 241 | 85 | 46 | 233 | 20 |
| Satellite service | farms, 2012 | 6,484 | 157 | 38 | 293 | 117 | 52 | 188 | 131 |
| Broadband over Power Lines (BPL) | farms, 2012 | 913 | 44 | 7 | 68 | 6 | 12 | 59 | 3 |
| Other Internet service | farms, 2012 | 1,064 | 77 | 2 | 58 | 17 | 7 | 17 | 5 |
| **TYPE OF ORGANIZATION (SEE TEXT)** | | | | | | | | | |
| Operation with over 50 percent ownership interest held by operator and/or persons related to operator by blood/marriage/adoption | farms, 2012 | 35,620 | 647 | 179 | 1,440 | 827 | 503 | 1,883 | 289 |
| | acres, 2012 | 10,757,375 | 947,397 | 249,491 | 677,288 | 58,320 | 20,992 | 70,766 | 281,146 |
| Limited Liability Corporation | farms, 2012 | 2,788 | 54 | 22 | 97 | 108 | 29 | 119 | 38 |
| | acres, 2012 | 1,200,467 | 111,369 | 22,392 | 61,538 | 6,738 | 2,096 | 6,751 | 30,459 |
| **OPERATION'S LEGAL STATUS FOR TAX PURPOSES (SEE TEXT)** | | | | | | | | | |
| Family or individual | farms, 2012 | 30,167 | 420 | 146 | 1,261 | 641 | 453 | 1,678 | 235 |
| | 2007 | 32,547 | 474 | 158 | 1,380 | 733 | 450 | 1,896 | 212 |
| | acres, 2012 | 5,140,660 | (D) | (D) | 307,390 | 39,927 | 17,486 | 60,254 | 120,920 |
| | 2007 | 6,195,951 | 308,474 | (D) | (D) | 61,312 | 16,285 | 67,185 | 117,666 |
| Partnership | farms, 2012 | 2,685 | 72 | 24 | 141 | 94 | 22 | 117 | 33 |
| | 2007 | 2,932 | 106 | 23 | 137 | 96 | 23 | 107 | 37 |
| | acres, 2012 | 2,733,462 | 243,542 | 72,805 | 192,392 | 7,602 | 228 | 8,191 | 106,327 |
| | 2007 | 2,770,407 | 290,385 | (D) | 197,172 | 8,180 | 1,293 | 6,668 | 133,167 |
| Corporation: | | | | | | | | | |
| Family-held | farms, 2012 | 3,157 | 189 | 9 | 65 | 116 | 32 | 71 | 27 |
| | 2007 | 2,969 | 180 | 7 | 81 | 117 | 22 | 70 | 26 |
| | acres, 2012 | 3,466,028 | 485,522 | 32,205 | 96,661 | 23,276 | 3,190 | 2,966 | 64,867 |
| | 2007 | 3,177,316 | 460,731 | 32,344 | 87,476 | 13,657 | 2,791 | 3,022 | 60,414 |
| Other than family held | farms, 2012 | 306 | 9 | - | 20 | 18 | 3 | 9 | 3 |
| | 2007 | 297 | 6 | 1 | 24 | 18 | 2 | 3 | 3 |
| | acres, 2012 | 324,534 | 5,652 | - | (D) | 3,842 | 240 | 917 | 1,261 |
| | 2007 | 292,992 | 13,997 | (D) | (D) | 9,467 | (D) | (D) | 1,440 |
| Other - cooperative, estate or trust, institutional, etc. | farms, 2012 | 934 | 23 | 6 | 22 | 21 | 26 | 54 | 10 |
| | 2007 | 539 | 16 | 3 | 8 | 15 | 15 | 25 | 5 |
| | acres, 2012 | 3,083,423 | (D) | (D) | (D) | 1,173 | 2,496 | 2,430 | 4,037 |
| | 2007 | 2,536,123 | 24,900 | 3,800 | 2,191 | 1,267 | (D) | (D) | 620 |

--continued

Table 45. **Selected Operation and Operator Characteristics: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Cowlitz | Douglas | Ferry | Franklin | Garfield | Grant | Grays Harbor | Island |
|---|---|---|---|---|---|---|---|---|---|
| **PRINCIPAL OPERATOR CHARACTERISTICS** - Con. | | | | | | | | | |
| Days worked off farm: | | | | | | | | | |
| None | 2012 | 239 | 367 | 111 | 416 | 122 | 829 | 222 | 151 |
| | 2007 | 154 | 418 | 84 | 426 | 80 | 790 | 203 | 175 |
| Any | 2012 | 253 | 482 | 144 | 467 | 89 | 723 | 335 | 226 |
| | 2007 | 327 | 537 | 148 | 465 | 159 | 1,068 | 425 | 283 |
| 1 to 49 days | 2012 | 25 | 60 | 27 | 141 | 25 | 79 | 48 | 42 |
| | 2007 | 60 | 107 | 26 | 92 | 35 | 171 | 49 | 55 |
| 50 to 99 days | 2012 | 15 | 28 | 18 | 23 | 5 | 42 | 14 | 19 |
| | 2007 | 28 | 35 | 21 | 30 | 13 | 72 | 48 | 21 |
| 100 to 199 days | 2012 | 47 | 65 | 14 | 44 | 10 | 84 | 57 | 41 |
| | 2007 | 66 | 93 | 20 | 67 | 39 | 186 | 86 | 37 |
| 200 days or more | 2012 | 166 | 329 | 85 | 259 | 49 | 518 | 216 | 124 |
| | 2007 | 173 | 302 | 81 | 276 | 72 | 639 | 242 | 170 |
| Years on present farm: | | | | | | | | | |
| 2 years or less | 2012 | 16 | 22 | 4 | 44 | 5 | 52 | 21 | 18 |
| | 2007 | 13 | 24 | 2 | 40 | 9 | 68 | 37 | 19 |
| 3 or 4 years | 2012 | 36 | 51 | 16 | 47 | 10 | 76 | 30 | 32 |
| | 2007 | 23 | 52 | 17 | 42 | 21 | 104 | 29 | 53 |
| 5 to 9 years | 2012 | 57 | 132 | 45 | 94 | 24 | 212 | 97 | 86 |
| | 2007 | 77 | 143 | 29 | 115 | 54 | 336 | 144 | 115 |
| 10 years or more | 2012 | 383 | 644 | 190 | 698 | 172 | 1,212 | 409 | 241 |
| | 2007 | 368 | 736 | 184 | 694 | 155 | 1,350 | 418 | 271 |
| Average years on present farm | 2012 | 23.7 | 23.2 | 20.5 | 21.2 | 25.8 | 22.6 | 21.7 | 17.6 |
| | 2007 | 23.1 | 23.6 | 20.3 | 21.2 | 19.0 | 20.5 | 20.3 | 16.8 |
| Years operating any farm (see text): | | | | | | | | | |
| 2 years or less | 2012 | 16 | 15 | 4 | 24 | 2 | 32 | 21 | 15 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 3 or 4 years | 2012 | 35 | 36 | 15 | 37 | 8 | 53 | 24 | 25 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 5 to 9 years | 2012 | 49 | 107 | 34 | 74 | 22 | 170 | 76 | 82 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 10 years or more | 2012 | 392 | 691 | 202 | 748 | 179 | 1,297 | 436 | 255 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Average years on any farm | 2012 | 24.6 | 25.9 | 22.5 | 24.3 | 28.9 | 25.4 | 23.7 | 19.8 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Age group: | | | | | | | | | |
| Under 25 years | 2012 | - | 2 | 2 | 2 | 1 | 12 | 2 | - |
| | 2007 | 6 | - | - | 2 | 1 | 9 | 9 | 4 |
| 25 to 34 years | 2012 | 24 | 23 | 11 | 49 | 8 | 79 | 15 | 17 |
| | 2007 | 23 | 38 | 5 | 66 | 13 | 125 | 16 | 7 |
| 35 to 44 years | 2012 | 43 | 70 | 20 | 92 | 11 | 169 | 44 | 28 |
| | 2007 | 39 | 68 | 11 | 105 | 20 | 209 | 66 | 32 |
| 45 to 54 years | 2012 | 104 | 155 | 51 | 252 | 33 | 360 | 107 | 79 |
| | 2007 | 104 | 241 | 49 | 256 | 53 | 553 | 153 | 117 |
| 55 to 59 years | 2012 | 51 | 198 | 34 | 179 | 27 | 253 | 72 | 54 |
| | 2007 | 77 | 166 | 64 | 177 | 42 | 287 | 106 | 89 |
| 60 to 64 years | 2012 | 81 | 141 | 65 | 138 | 33 | 230 | 102 | 77 |
| | 2007 | 63 | 119 | 14 | 95 | 42 | 224 | 82 | 81 |
| 65 to 69 years | 2012 | 98 | 89 | 24 | 75 | 40 | 147 | 84 | 52 |
| | 2007 | 64 | 105 | 35 | 75 | 21 | 212 | 89 | 53 |
| 70 years and over | 2012 | 91 | 171 | 48 | 96 | 58 | 302 | 131 | 70 |
| | 2007 | 105 | 218 | 54 | 115 | 47 | 239 | 107 | 75 |
| Average age | 2012 | 59.5 | 59.3 | 59.1 | 55.5 | 61.8 | 57.3 | 60.4 | 59.0 |
| | 2007 | 58.6 | 59.8 | 60.3 | 55.0 | 58.8 | 55.2 | 57.8 | 58.6 |
| **INTERNET ACCESS (SEE TEXT)** | | | | | | | | | |
| Internet access | 2012 | 404 | 697 | 189 | 788 | 149 | 1,289 | 435 | 319 |
| | 2007 | 317 | 615 | 141 | 667 | 138 | 1,322 | 450 | 343 |
| Dial-up service | farms, 2012 | 29 | 48 | 22 | 33 | 8 | 77 | 56 | 10 |
| DSL service | farms, 2012 | 174 | 110 | 19 | 146 | 53 | 164 | 227 | 177 |
| Cable modem service | farms, 2012 | 53 | 150 | 33 | 95 | 9 | 79 | 122 | 75 |
| Fiber-optic service | farms, 2012 | 12 | 149 | 2 | 11 | 2 | 208 | 3 | 8 |
| Mobile broadband plan for computer or cell phone | farms, 2012 | 29 | 59 | 17 | 281 | 4 | 249 | 35 | 35 |
| Satellite service | farms, 2012 | 115 | 188 | 86 | 241 | 74 | 531 | 40 | 23 |
| Broadband over Power Lines (BPL) | farms, 2012 | 4 | 13 | 5 | 6 | 1 | 16 | 8 | 7 |
| Other Internet service | farms, 2012 | 15 | 23 | 14 | 50 | 4 | 94 | 7 | 7 |
| **TYPE OF ORGANIZATION (SEE TEXT)** | | | | | | | | | |
| Operation with over 50 percent ownership interest held by operator and/or persons related to operator by blood/marriage/adoption | farms, 2012 | 475 | 769 | 249 | 818 | 200 | 1,433 | 535 | 363 |
| | acres, 2012 | 37,829 | 706,057 | 95,331 | 575,243 | 290,765 | 833,769 | 51,772 | 14,604 |
| Limited Liability Corporation | farms, 2012 | 23 | 86 | 10 | 104 | 13 | 195 | 49 | 34 |
| | acres, 2012 | 3,583 | 57,727 | 7,980 | 70,892 | 25,758 | 102,468 | 17,798 | 3,367 |
| **OPERATION'S LEGAL STATUS FOR TAX PURPOSES (SEE TEXT)** | | | | | | | | | |
| Family or individual | farms, 2012 | 429 | 538 | 219 | 607 | 152 | 972 | 483 | 308 |
| | 2007 | 430 | 688 | 196 | 636 | 173 | 1,368 | 542 | 387 |
| | acres, 2012 | 29,652 | 301,945 | (D) | 270,048 | 170,005 | 313,920 | (D) | 9,745 |
| | 2007 | 23,814 | 448,654 | (D) | 270,487 | (D) | 508,075 | (D) | 11,795 |
| Partnership | farms, 2012 | 27 | 101 | 15 | 89 | 32 | 202 | 18 | 39 |
| | 2007 | 30 | 99 | 24 | 88 | 30 | 178 | 48 | 34 |
| | acres, 2012 | 5,232 | 224,717 | 9,812 | 64,392 | 71,237 | 235,287 | 4,427 | 3,296 |
| | 2007 | 5,178 | 212,421 | (D) | 132,241 | (D) | 220,631 | 12,039 | 3,052 |
| Corporation: | | | | | | | | | |
| Family-held | farms, 2012 | 18 | 174 | 12 | 164 | 15 | 312 | 20 | 18 |
| | 2007 | 12 | 113 | 9 | 144 | 26 | 265 | 27 | 32 |
| | acres, 2012 | 2,597 | 228,689 | (D) | 279,962 | 63,360 | 376,042 | 7,380 | 1,626 |
| | 2007 | 1,503 | 183,199 | 10,338 | 172,123 | 88,908 | 315,112 | 8,410 | 2,584 |
| Other than family held | farms, 2012 | - | 12 | - | 7 | 1 | 33 | 3 | 6 |
| | 2007 | - | 19 | - | 13 | - | 22 | 1 | - |
| | acres, 2012 | - | 20,413 | - | 2,439 | (D) | 19,970 | (D) | (D) |
| | 2007 | - | 20,487 | - | 29,454 | - | 23,931 | (D) | - |
| Other - cooperative, estate or trust, institutional, etc. | farms, 2012 | 18 | 24 | 9 | 16 | 11 | 33 | 33 | 6 |
| | 2007 | 9 | 36 | 3 | 10 | 10 | 25 | 10 | 5 |
| | acres, 2012 | 1,528 | 38,345 | (D) | 8,206 | (D) | 18,565 | (D) | (D) |
| | 2007 | 207 | 18,333 | (D) | 4,741 | 2,370 | 20,203 | (D) | 268 |

--continued

Table 45. **Selected Operation and Operator Characteristics: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Jefferson | King | Kitsap | Kittitas | Klickitat | Lewis | Lincoln | Mason |
|---|---|---|---|---|---|---|---|---|---|
| **PRINCIPAL OPERATOR CHARACTERISTICS** - Con. | | | | | | | | | |
| Days worked off farm: | | | | | | | | | |
| None | 2012 | 102 | 612 | 296 | 343 | 360 | 601 | 411 | 157 |
| | 2007 | 73 | 516 | 240 | 353 | 326 | 556 | 330 | 127 |
| Any | 2012 | 119 | 1,225 | 410 | 663 | 400 | 1,046 | 486 | 220 |
| | 2007 | 138 | 1,274 | 424 | 685 | 567 | 1,161 | 468 | 344 |
| 1 to 49 days | 2012 | 17 | 208 | 39 | 64 | 57 | 282 | 74 | 33 |
| | 2007 | 21 | 183 | 57 | 128 | 75 | 196 | 88 | 55 |
| 50 to 99 days | 2012 | 17 | 99 | 34 | 36 | 30 | 59 | 28 | 16 |
| | 2007 | 9 | 118 | 31 | 50 | 40 | 99 | 43 | 36 |
| 100 to 199 days | 2012 | 16 | 157 | 38 | 71 | 82 | 145 | 43 | 39 |
| | 2007 | 40 | 170 | 85 | 102 | 93 | 194 | 71 | 60 |
| 200 days or more | 2012 | 69 | 761 | 299 | 492 | 231 | 560 | 341 | 132 |
| | 2007 | 68 | 803 | 251 | 405 | 359 | 672 | 266 | 193 |
| Years on present farm: | | | | | | | | | |
| 2 years or less | 2012 | 9 | 60 | 40 | 46 | 28 | 43 | 22 | 14 |
| | 2007 | 2 | 95 | 8 | 68 | 50 | 74 | 24 | 18 |
| 3 or 4 years | 2012 | 11 | 109 | 48 | 57 | 36 | 85 | 40 | 17 |
| | 2007 | 17 | 198 | 56 | 101 | 106 | 165 | 45 | 40 |
| 5 to 9 years | 2012 | 55 | 448 | 155 | 205 | 132 | 325 | 109 | 70 |
| | 2007 | 39 | 416 | 171 | 246 | 205 | 327 | 142 | 88 |
| 10 years or more | 2012 | 146 | 1,220 | 463 | 698 | 564 | 1,194 | 726 | 276 |
| | 2007 | 153 | 1,081 | 429 | 623 | 532 | 1,151 | 587 | 325 |
| Average years on present farm | 2012 | 19.1 | 17.7 | 17.4 | 20.6 | 20.9 | 20.0 | 23.5 | 18.2 |
| | 2007 | 19.5 | 16.9 | 17.4 | 16.8 | 17.2 | 19.2 | 21.4 | 18.1 |
| Years operating any farm (see text): | | | | | | | | | |
| 2 years or less | 2012 | 7 | 48 | 32 | 32 | 19 | 33 | 15 | 5 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 3 or 4 years | 2012 | 5 | 92 | 44 | 46 | 27 | 61 | 30 | 15 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 5 to 9 years | 2012 | 44 | 390 | 132 | 182 | 116 | 285 | 97 | 60 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 10 years or more | 2012 | 165 | 1,307 | 498 | 746 | 598 | 1,268 | 755 | 297 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Average years on any farm | 2012 | 22.6 | 19.3 | 19.3 | 22.7 | 23.5 | 22.7 | 26.2 | 20.0 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Age group: | | | | | | | | | |
| Under 25 years | 2012 | - | 68 | 4 | - | - | 5 | 5 | 4 |
| | 2007 | 3 | 3 | 11 | 4 | 9 | 5 | - | - |
| 25 to 34 years | 2012 | 13 | 75 | 36 | 46 | 32 | 35 | 34 | 25 |
| | 2007 | 6 | 43 | 22 | 57 | 20 | 55 | 39 | 12 |
| 35 to 44 years | 2012 | 12 | 173 | 83 | 76 | 61 | 146 | 97 | 24 |
| | 2007 | 15 | 270 | 64 | 106 | 60 | 197 | 66 | 61 |
| 45 to 54 years | 2012 | 56 | 459 | 187 | 219 | 110 | 320 | 168 | 61 |
| | 2007 | 36 | 537 | 187 | 264 | 249 | 431 | 270 | 143 |
| 55 to 59 years | 2012 | 25 | 220 | 99 | 145 | 94 | 222 | 208 | 52 |
| | 2007 | 38 | 308 | 117 | 183 | 151 | 268 | 134 | 86 |
| 60 to 64 years | 2012 | 31 | 252 | 94 | 158 | 163 | 355 | 134 | 67 |
| | 2007 | 30 | 216 | 85 | 150 | 143 | 268 | 123 | 49 |
| 65 to 69 years | 2012 | 35 | 252 | 91 | 149 | 123 | 213 | 120 | 80 |
| | 2007 | 42 | 169 | 86 | 114 | 127 | 207 | 66 | 46 |
| 70 years and over | 2012 | 49 | 338 | 112 | 213 | 177 | 351 | 131 | 64 |
| | 2007 | 41 | 244 | 92 | 160 | 134 | 286 | 100 | 74 |
| Average age | 2012 | 59.5 | 57.1 | 56.6 | 59.4 | 60.7 | 60.1 | 57.8 | 58.9 |
| | 2007 | 60.1 | 55.7 | 56.4 | 56.5 | 58.0 | 57.7 | 56.1 | 56.8 |
| **INTERNET ACCESS (SEE TEXT)** | | | | | | | | | |
| Internet access | 2012 | 191 | 1,587 | 656 | 826 | 579 | 1,325 | 751 | 300 |
| | 2007 | 151 | 1,400 | 541 | 717 | 560 | 1,216 | 530 | 325 |
| Dial-up service | farms, 2012 | 15 | 156 | 56 | 42 | 56 | 139 | 72 | 77 |
| DSL service | farms, 2012 | 115 | 464 | 331 | 531 | 236 | 788 | 266 | 101 |
| Cable modem service | farms, 2012 | 23 | 485 | 204 | 66 | 52 | 96 | 61 | 54 |
| Fiber-optic service | farms, 2012 | 3 | 27 | 7 | 18 | 11 | 102 | 8 | 10 |
| Mobile broadband plan for computer or cell phone | farms, 2012 | 14 | 361 | 68 | 111 | 77 | 112 | 92 | 55 |
| Satellite service | farms, 2012 | 37 | 181 | 43 | 76 | 185 | 276 | 221 | 23 |
| Broadband over Power Lines (BPL) | farms, 2012 | 6 | 65 | 26 | 13 | 4 | 20 | 42 | 21 |
| Other Internet service | farms, 2012 | 2 | 23 | 8 | 42 | 15 | 16 | 55 | 3 |
| **TYPE OF ORGANIZATION (SEE TEXT)** | | | | | | | | | |
| Operation with over 50 percent ownership interest held by operator and/or persons related to operator by blood/marriage/adoption | farms, 2012 | 206 | 1,759 | 690 | 987 | 727 | 1,578 | 858 | 348 |
| | acres, 2012 | 13,790 | 42,481 | 9,374 | 150,644 | 491,925 | 125,188 | 1,048,901 | 17,366 |
| Limited Liability Corporation | farms, 2012 | 15 | 181 | 35 | 52 | 62 | 67 | 46 | 36 |
| | acres, 2012 | 563 | 6,466 | 935 | 16,157 | 93,892 | 9,804 | 37,629 | 3,447 |
| **OPERATION'S LEGAL STATUS FOR TAX PURPOSES (SEE TEXT)** | | | | | | | | | |
| Family or individual | farms, 2012 | 174 | 1,532 | 628 | 883 | 645 | 1,441 | 528 | 301 |
| | 2007 | 184 | 1,527 | 584 | 928 | 759 | 1,542 | 470 | 414 |
| | acres, 2012 | 11,857 | 32,420 | 8,187 | 92,053 | 353,076 | 94,967 | 341,089 | 10,938 |
| | 2007 | 10,505 | 36,327 | (D) | 124,975 | 376,309 | 95,496 | 399,563 | 16,685 |
| Partnership | farms, 2012 | 18 | 126 | 30 | 47 | 38 | 74 | 90 | 15 |
| | 2007 | 12 | 101 | 40 | 42 | 57 | 100 | 90 | 20 |
| | acres, 2012 | 610 | 5,762 | 867 | 64,493 | 44,080 | 16,820 | 207,932 | 4,076 |
| | 2007 | 572 | 4,210 | 2,335 | 39,228 | 64,740 | 20,247 | 175,897 | 2,034 |
| Corporation: | | | | | | | | | |
| Family-held | farms, 2012 | 9 | 117 | 38 | 56 | 58 | 73 | 248 | 29 |
| | 2007 | 9 | 129 | 35 | 49 | 58 | 57 | 203 | 19 |
| | acres, 2012 | 1,222 | 5,482 | 646 | 19,835 | 133,691 | 17,493 | 524,582 | 7,356 |
| | 2007 | 1,083 | 6,094 | 824 | 19,655 | 143,402 | 14,298 | 486,528 | 5,295 |
| Other than family held | farms, 2012 | 8 | 19 | - | 6 | 2 | 3 | 7 | 5 |
| | 2007 | - | 20 | 1 | 8 | 4 | 2 | 8 | 4 |
| | acres, 2012 | 1,296 | 1,104 | - | 3,659 | (D) | (D) | 27,248 | (D) |
| | 2007 | - | 2,354 | (D) | 4,708 | (D) | (D) | 17,456 | (D) |
| Other - cooperative, estate or trust, institutional, etc. | farms, 2012 | 12 | 43 | 10 | 14 | 17 | 56 | 24 | 27 |
| | 2007 | 6 | 13 | 4 | 11 | 15 | 16 | 27 | 14 |
| | acres, 2012 | 571 | 1,949 | 370 | 3,084 | (D) | (D) | 14,089 | (D) |
| | 2007 | 557 | 300 | (D) | 2,521 | (D) | (D) | 10,734 | (D) |

--continued

Table 45. **Selected Operation and Operator Characteristics: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Okanogan | Pacific | Pend Oreille | Pierce | San Juan | Skagit | Skamania | Snohomish |
|---|---|---|---|---|---|---|---|---|---|
| **PRINCIPAL OPERATOR CHARACTERISTICS** - Con. | | | | | | | | | |
| Days worked off farm: | | | | | | | | | |
| None | 2012 | 615 | 134 | 106 | 594 | 105 | 403 | 51 | 484 |
| | 2007 | 602 | 127 | 104 | 491 | 110 | 398 | 28 | 544 |
| Any | 2012 | 834 | 196 | 182 | 884 | 169 | 671 | 93 | 954 |
| | 2007 | 1,060 | 263 | 212 | 957 | 181 | 817 | 95 | 1,126 |
| 1 to 49 days | 2012 | 113 | 31 | 25 | 126 | 32 | 100 | 11 | 108 |
| | 2007 | 177 | 42 | 21 | 119 | 42 | 149 | 17 | 187 |
| 50 to 99 days | 2012 | 75 | 13 | 8 | 42 | 13 | 88 | 9 | 71 |
| | 2007 | 86 | 18 | 6 | 62 | 17 | 72 | 5 | 87 |
| 100 to 199 days | 2012 | 189 | 27 | 32 | 158 | 33 | 81 | 16 | 98 |
| | 2007 | 189 | 48 | 42 | 150 | 11 | 103 | 26 | 177 |
| 200 days or more | 2012 | 457 | 125 | 117 | 558 | 91 | 402 | 57 | 677 |
| | 2007 | 608 | 155 | 143 | 626 | 111 | 493 | 47 | 675 |
| Years on present farm: | | | | | | | | | |
| 2 years or less | 2012 | 43 | 5 | 11 | 59 | 2 | 41 | 5 | 101 |
| | 2007 | 55 | 25 | 19 | 69 | 12 | 37 | 13 | 57 |
| 3 or 4 years | 2012 | 88 | 17 | 17 | 101 | 29 | 48 | 14 | 80 |
| | 2007 | 106 | 18 | 36 | 113 | 28 | 85 | 11 | 126 |
| 5 to 9 years | 2012 | 355 | 60 | 52 | 246 | 55 | 196 | 32 | 229 |
| | 2007 | 279 | 50 | 53 | 268 | 46 | 261 | 45 | 330 |
| 10 years or more | 2012 | 963 | 248 | 208 | 1,072 | 188 | 789 | 93 | 1,028 |
| | 2007 | 1,222 | 297 | 208 | 998 | 205 | 832 | 54 | 1,157 |
| Average years on present farm | 2012 | 20.0 | 22.3 | 21.7 | 21.9 | 18.2 | 20.7 | 17.7 | 19.8 |
| | 2007 | 19.6 | 21.5 | 19.1 | 18.5 | 19.3 | 19.6 | 14.2 | 19.1 |
| Years operating any farm (see text): | | | | | | | | | |
| 2 years or less | 2012 | 29 | 4 | 11 | 52 | - | 25 | 3 | 87 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 3 or 4 years | 2012 | 54 | 12 | 11 | 82 | 24 | 53 | 11 | 77 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 5 to 9 years | 2012 | 256 | 50 | 51 | 213 | 38 | 170 | 33 | 199 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 10 years or more | 2012 | 1,110 | 264 | 215 | 1,131 | 212 | 826 | 97 | 1,075 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Average years on any farm | 2012 | 23.3 | 23.9 | 24.1 | 23.4 | 21.5 | 22.9 | 19.0 | 21.3 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Age group: | | | | | | | | | |
| Under 25 years | 2012 | 1 | - | 1 | 11 | - | 7 | - | 2 |
| | 2007 | 3 | - | 6 | 3 | 2 | - | - | 2 |
| 25 to 34 years | 2012 | 64 | 13 | 12 | 57 | 2 | 49 | 5 | 57 |
| | 2007 | 51 | 17 | 11 | 22 | 4 | 41 | 6 | 36 |
| 35 to 44 years | 2012 | 128 | 32 | 30 | 116 | 16 | 112 | 26 | 113 |
| | 2007 | 192 | 56 | 37 | 174 | 16 | 137 | 31 | 199 |
| 45 to 54 years | 2012 | 301 | 51 | 41 | 365 | 69 | 221 | 37 | 330 |
| | 2007 | 447 | 90 | 75 | 433 | 61 | 376 | 31 | 535 |
| 55 to 59 years | 2012 | 233 | 62 | 51 | 227 | 65 | 141 | 18 | 303 |
| | 2007 | 273 | 52 | 47 | 219 | 56 | 190 | 17 | 261 |
| 60 to 64 years | 2012 | 257 | 57 | 56 | 188 | 37 | 189 | 22 | 173 |
| | 2007 | 257 | 56 | 60 | 229 | 37 | 215 | 14 | 262 |
| 65 to 69 years | 2012 | 172 | 45 | 45 | 221 | 33 | 152 | 12 | 228 |
| | 2007 | 177 | 51 | 23 | 113 | 21 | 85 | 18 | 129 |
| 70 years and over | 2012 | 293 | 70 | 52 | 293 | 52 | 203 | 24 | 232 |
| | 2007 | 262 | 68 | 57 | 255 | 94 | 171 | 6 | 246 |
| Average age | 2012 | 58.8 | 59.1 | 59.9 | 59.8 | 60.0 | 58.4 | 55.9 | 58.5 |
| | 2007 | 57.1 | 57.4 | 57.4 | 57.6 | 61.8 | 56.4 | 53.1 | 56.7 |
| **INTERNET ACCESS (SEE TEXT)** | | | | | | | | | |
| Internet access | 2012 | 1,117 | 277 | 223 | 1,166 | 246 | 896 | 119 | 1,032 |
| | 2007 | 1,059 | 297 | 202 | 1,052 | 225 | 876 | 94 | 1,240 |
| Dial-up service | farms, 2012 | 90 | 21 | 31 | 71 | 11 | 95 | 16 | 110 |
| DSL service | farms, 2012 | 292 | 154 | 34 | 633 | 194 | 222 | 46 | 380 |
| Cable modem service | farms, 2012 | 62 | 60 | 8 | 284 | 23 | 288 | 4 | 240 |
| Fiber-optic service | farms, 2012 | 53 | 6 | 7 | 17 | 5 | 53 | 9 | 30 |
| Mobile broadband plan for computer or cell phone | farms, 2012 | 124 | 14 | 57 | 94 | 17 | 180 | 24 | 185 |
| Satellite service | farms, 2012 | 455 | 39 | 102 | 179 | 11 | 133 | 23 | 175 |
| Broadband over Power Lines (BPL) | farms, 2012 | 39 | 5 | 2 | 53 | 2 | 44 | 3 | 46 |
| Other Internet service | farms, 2012 | 56 | - | 12 | 12 | 3 | 24 | 6 | 39 |
| **TYPE OF ORGANIZATION (SEE TEXT)** | | | | | | | | | |
| Operation with over 50 percent ownership interest held by operator and/or persons related to operator by blood/marriage/adoption | farms, 2012 | 1,385 | 313 | 284 | 1,432 | 257 | 1,010 | 134 | 1,393 |
| | acres, 2012 | 474,227 | 39,818 | 39,284 | 43,318 | 10,861 | 84,525 | 5,616 | 68,832 |
| Limited Liability Corporation | farms, 2012 | 112 | 19 | 8 | 76 | 25 | 79 | 9 | 88 |
| | acres, 2012 | 93,231 | 2,187 | 855 | 4,248 | 1,866 | 19,824 | 1,216 | 3,897 |
| **OPERATION'S LEGAL STATUS FOR TAX PURPOSES (SEE TEXT)** | | | | | | | | | |
| Family or individual | farms, 2012 | 1,211 | 277 | 265 | 1,291 | 209 | 896 | 118 | 1,212 |
| | 2007 | 1,400 | 325 | 276 | 1,264 | 239 | 1,030 | 101 | 1,469 |
| | acres, 2012 | (D) | 21,905 | (D) | 34,701 | 7,951 | 47,266 | 3,680 | 37,002 |
| | 2007 | (D) | 36,097 | (D) | 34,681 | (D) | 55,162 | 3,928 | 52,657 |
| Partnership | farms, 2012 | 115 | 19 | 15 | 65 | 21 | 63 | 8 | 90 |
| | 2007 | 124 | 21 | 31 | 97 | 27 | 74 | 6 | 72 |
| | acres, 2012 | 113,875 | 6,690 | 8,470 | 3,828 | 1,310 | 18,448 | 901 | 5,198 |
| | 2007 | 132,339 | 2,022 | 11,997 | 5,490 | 2,209 | 14,179 | 320 | 5,639 |
| Corporation: | | | | | | | | | |
| Family-held | farms, 2012 | 90 | 22 | 6 | 60 | 28 | 69 | 10 | 88 |
| | 2007 | 97 | 28 | 6 | 58 | 23 | 78 | 10 | 98 |
| | acres, 2012 | 126,962 | 19,258 | 1,446 | 4,272 | 3,776 | 32,424 | 1,081 | (D) |
| | 2007 | 149,942 | 20,748 | 1,209 | 5,513 | 3,270 | 33,420 | 409 | 15,534 |
| Other than family held | farms, 2012 | 13 | 1 | - | 10 | 6 | 15 | - | 13 |
| | 2007 | 8 | 6 | - | 10 | 2 | 12 | - | 11 |
| | acres, 2012 | 5,021 | (D) | - | 305 | 174 | 3,147 | - | (D) |
| | 2007 | 1,072 | 1,692 | - | 659 | (D) | 1,636 | - | 1,103 |
| Other - cooperative, estate or trust, institutional, etc. | farms, 2012 | 20 | 11 | 2 | 52 | 10 | 31 | 8 | 35 |
| | 2007 | 33 | 10 | 3 | 19 | - | 21 | 6 | 20 |
| | acres, 2012 | (D) | (D) | (D) | 6,377 | 2,458 | 5,253 | 811 | 6,144 |
| | 2007 | (D) | 1,190 | (D) | 1,334 | - | 4,144 | 815 | 1,904 |

--continued

Table 45. **Selected Operation and Operator Characteristics: 2012 and 2007** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Spokane | Stevens | Thurston | Wahkiakum | Walla Walla | Whatcom | Whitman | Yakima |
|---|---|---|---|---|---|---|---|---|---|
| **PRINCIPAL OPERATOR CHARACTERISTICS** - Con. | | | | | | | | | |
| Days worked off farm: | | | | | | | | | |
| None | 2012 | 839 | 485 | 402 | 53 | 363 | 670 | 645 | 1,198 |
| | 2007 | 852 | 441 | 391 | 46 | 369 | 409 | 565 | 1,173 |
| Any | 2012 | 1,662 | 663 | 934 | 56 | 580 | 1,032 | 550 | 1,945 |
| | 2007 | 1,650 | 817 | 897 | 73 | 560 | 1,074 | 682 | 2,367 |
| 1 to 49 days | 2012 | 205 | 80 | 163 | 5 | 75 | 127 | 83 | 288 |
| | 2007 | 269 | 108 | 120 | 22 | 84 | 146 | 160 | 341 |
| 50 to 99 days | 2012 | 77 | 43 | 62 | 2 | 80 | 64 | 42 | 181 |
| | 2007 | 112 | 68 | 81 | 2 | 54 | 83 | 48 | 181 |
| 100 to 199 days | 2012 | 316 | 127 | 143 | 12 | 74 | 249 | 86 | 277 |
| | 2007 | 221 | 156 | 116 | 16 | 70 | 171 | 87 | 309 |
| 200 days or more | 2012 | 1,064 | 413 | 566 | 37 | 351 | 592 | 339 | 1,199 |
| | 2007 | 1,048 | 485 | 580 | 33 | 352 | 674 | 387 | 1,536 |
| Years on present farm: | | | | | | | | | |
| 2 years or less | 2012 | 94 | 51 | 60 | - | 30 | 65 | 48 | 153 |
| | 2007 | 111 | 60 | 47 | 4 | 39 | 60 | 31 | 178 |
| 3 or 4 years | 2012 | 152 | 69 | 90 | 6 | 62 | 110 | 66 | 178 |
| | 2007 | 223 | 95 | 114 | 1 | 64 | 127 | 96 | 219 |
| 5 to 9 years | 2012 | 475 | 186 | 217 | 23 | 182 | 292 | 146 | 468 |
| | 2007 | 476 | 195 | 286 | 27 | 188 | 252 | 139 | 541 |
| 10 years or more | 2012 | 1,780 | 842 | 969 | 80 | 669 | 1,235 | 935 | 2,344 |
| | 2007 | 1,692 | 908 | 841 | 87 | 638 | 1,044 | 981 | 2,602 |
| Average years on present farm | 2012 | 21.0 | 21.7 | 18.9 | 21.8 | 20.2 | 20.3 | 25.2 | 21.8 |
| | 2007 | 19.8 | 20.1 | 18.4 | 21.7 | 20.4 | 20.2 | 24.5 | 20.6 |
| Years operating any farm (see text): | | | | | | | | | |
| 2 years or less | 2012 | 72 | 32 | 46 | - | 20 | 47 | 38 | 119 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 3 or 4 years | 2012 | 124 | 62 | 70 | 5 | 53 | 85 | 60 | 151 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 5 to 9 years | 2012 | 412 | 160 | 192 | 19 | 153 | 255 | 120 | 402 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| 10 years or more | 2012 | 1,893 | 894 | 1,028 | 85 | 717 | 1,315 | 977 | 2,471 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Average years on any farm | 2012 | 23.3 | 24.1 | 20.9 | 23.7 | 23.2 | 22.5 | 26.7 | 24.7 |
| | 2007 | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) | (NA) |
| Age group: | | | | | | | | | |
| Under 25 years | 2012 | 4 | - | 13 | - | 3 | 4 | 3 | 15 |
| | 2007 | 3 | 3 | 7 | 4 | 3 | 1 | 4 | 12 |
| 25 to 34 years | 2012 | 103 | 24 | 41 | 2 | 21 | 85 | 99 | 90 |
| | 2007 | 69 | 35 | 58 | 3 | 44 | 89 | 91 | 150 |
| 35 to 44 years | 2012 | 214 | 114 | 119 | 4 | 99 | 190 | 113 | 364 |
| | 2007 | 335 | 105 | 135 | 10 | 105 | 200 | 128 | 433 |
| 45 to 54 years | 2012 | 624 | 221 | 271 | 15 | 166 | 373 | 216 | 632 |
| | 2007 | 630 | 309 | 365 | 22 | 215 | 412 | 334 | 975 |
| 55 to 59 years | 2012 | 332 | 172 | 240 | 18 | 155 | 241 | 201 | 485 |
| | 2007 | 406 | 232 | 204 | 19 | 160 | 253 | 180 | 563 |
| 60 to 64 years | 2012 | 364 | 173 | 227 | 28 | 140 | 307 | 149 | 498 |
| | 2007 | 331 | 185 | 163 | 21 | 140 | 202 | 150 | 474 |
| 65 to 69 years | 2012 | 392 | 171 | 123 | 14 | 184 | 207 | 117 | 433 |
| | 2007 | 255 | 167 | 129 | 16 | 73 | 115 | 125 | 359 |
| 70 years and over | 2012 | 468 | 273 | 302 | 28 | 175 | 295 | 297 | 626 |
| | 2007 | 473 | 222 | 227 | 24 | 189 | 211 | 235 | 574 |
| Average age | 2012 | 58.6 | 60.1 | 58.9 | 62.2 | 60.0 | 57.4 | 58.7 | 58.7 |
| | 2007 | 57.5 | 58.6 | 56.9 | 58.3 | 57.9 | 55.5 | 56.8 | 56.4 |
| **INTERNET ACCESS (SEE TEXT)** | | | | | | | | | |
| Internet access | 2012 | 2,008 | 821 | 1,139 | 96 | 770 | 1,277 | 915 | 2,359 |
| | 2007 | 1,691 | 827 | 949 | 91 | 673 | 1,044 | 897 | 2,274 |
| Dial-up service | farms, 2012 | 222 | 117 | 57 | 11 | 39 | 120 | 64 | 327 |
| DSL service | farms, 2012 | 562 | 194 | 496 | 52 | 157 | 310 | 250 | 1,027 |
| Cable modem service | farms, 2012 | 207 | 42 | 441 | 17 | 204 | 371 | 120 | 334 |
| Fiber-optic service | farms, 2012 | 19 | 7 | 47 | 3 | 13 | 19 | 126 | 32 |
| Mobile broadband plan for computer or cell phone | farms, 2012 | 541 | 160 | 127 | 8 | 112 | 272 | 158 | 372 |
| Satellite service | farms, 2012 | 523 | 318 | 80 | 10 | 228 | 253 | 274 | 365 |
| Broadband over Power Lines (BPL) | farms, 2012 | 55 | 6 | 25 | - | 60 | 53 | 6 | 58 |
| Other Internet service | farms, 2012 | 96 | 49 | 5 | - | 58 | 29 | 48 | 66 |
| **TYPE OF ORGANIZATION (SEE TEXT)** | | | | | | | | | |
| Operation with over 50 percent ownership interest held by operator and/or persons related to operator by blood/marriage/adoption | farms, 2012 | 2,439 | 1,123 | 1,290 | 105 | 887 | 1,654 | 1,110 | 3,041 |
| | acres, 2012 | 481,012 | 365,916 | 63,760 | 8,977 | 554,802 | 101,257 | 1,163,917 | 440,814 |
| Limited Liability Corporation | farms, 2012 | 145 | 46 | 74 | 5 | 134 | 157 | 70 | 266 |
| | acres, 2012 | 50,538 | 16,576 | 17,663 | 543 | 84,762 | 27,518 | 107,123 | 68,611 |
| **OPERATION'S LEGAL STATUS FOR TAX PURPOSES (SEE TEXT)** | | | | | | | | | |
| Family or individual | farms, 2012 | 2,153 | 1,033 | 1,173 | 100 | 694 | 1,428 | 774 | 2,659 |
| | 2007 | 2,194 | 1,117 | 1,115 | 108 | 709 | 1,229 | 844 | 2,996 |
| | acres, 2012 | 284,687 | (D) | 47,929 | (D) | 227,072 | 63,300 | 446,551 | (D) |
| | 2007 | 367,101 | (D) | 50,945 | 9,310 | 297,482 | 62,400 | 520,220 | (D) |
| Partnership | farms, 2012 | 122 | 46 | 48 | 5 | 131 | 99 | 137 | 237 |
| | 2007 | 148 | 73 | 68 | 8 | 109 | 115 | 159 | 278 |
| | acres, 2012 | 74,193 | 128,380 | 3,807 | 1,020 | 247,482 | 21,443 | 402,029 | 102,261 |
| | 2007 | 125,262 | 62,655 | 9,207 | 1,741 | 202,200 | 17,730 | 361,331 | 118,223 |
| Corporation: | | | | | | | | | |
| Family-held | farms, 2012 | 157 | 42 | 68 | 1 | 92 | 136 | 231 | 187 |
| | 2007 | 131 | 49 | 73 | - | 90 | 114 | 215 | 209 |
| | acres, 2012 | 168,725 | 36,740 | 10,866 | (D) | 142,530 | 20,121 | 396,144 | 94,632 |
| | 2007 | 129,273 | 15,951 | 11,120 | - | 172,667 | 21,159 | 377,373 | 99,937 |
| Other than family held | farms, 2012 | 11 | 3 | 14 | - | 4 | 10 | 4 | 28 |
| | 2007 | 10 | 8 | 9 | - | 11 | 6 | 3 | 42 |
| | acres, 2012 | 363 | 240 | 2,634 | - | (D) | 1,181 | 4,825 | 88,609 |
| | 2007 | 1,036 | 510 | 7,038 | - | 780 | 326 | (D) | 33,400 |
| Other - cooperative, estate or trust, institutional, etc. | farms, 2012 | 58 | 24 | 33 | 3 | 22 | 29 | 49 | 32 |
| | 2007 | 19 | 11 | 23 | 3 | 10 | 19 | 26 | 15 |
| | acres, 2012 | 9,438 | (D) | 11,402 | 130 | (D) | 9,786 | 25,561 | (D) |
| | 2007 | 3,657 | (D) | 2,307 | 974 | 9,221 | 969 | (D) | (D) |

## Table 46. **Women Principal Operators – Selected Farm Characteristics: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Land in farms | | Harvested cropland | | Market value of agricultural products sold ($1,000) | Farms by economic class and primary occupation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Farming | | | Other than farming | | |
| | Farms | Acres | Farms | Acres | | Less than $2,500 | $2,500 to $9,999 | $10,000 or more | Less than $2,500 | $2,500 to $9,999 | $10,000 or more |
| **State Total** | | | | | | | | | | | |
| Washington | 7,519 | 776,047 | 3,085 | 115,568 | 244,433 | 1,547 | 904 | 1,002 | 2,313 | 1,036 | 717 |
| **Counties** | | | | | | | | | | | |
| Adams | 108 | 49,376 | 22 | 6,112 | 9,960 | 6 | 12 | 21 | 13 | 13 | 43 |
| Asotin | 28 | 31,387 | 4 | (D) | 1,009 | 5 | 2 | 7 | 8 | 3 | 3 |
| Benton | 242 | 17,731 | 90 | 1,874 | 6,361 | 28 | 25 | 37 | 72 | 51 | 29 |
| Chelan | 121 | 13,790 | 90 | 1,386 | 12,667 | 16 | 3 | 41 | 21 | 12 | 28 |
| Clallam | 158 | 4,830 | 78 | 904 | 1,590 | 43 | 25 | 12 | 53 | 19 | 6 |
| Clark | 446 | 9,099 | 186 | 1,554 | 2,865 | 86 | 48 | 42 | 176 | 73 | 21 |
| Columbia | 56 | 15,331 | 20 | 2,220 | 1,318 | - | 8 | 7 | 9 | 21 | 11 |
| Cowlitz | 99 | 4,672 | 33 | 2,065 | 2,266 | 31 | 9 | 14 | 35 | 6 | 4 |
| Douglas | 113 | 61,202 | 41 | 7,469 | 20,439 | 17 | 7 | 24 | 20 | 12 | 33 |
| Ferry | 81 | 18,059 | 32 | 1,264 | 626 | 18 | 19 | 17 | 22 | 4 | 1 |
| Franklin | 125 | 25,121 | 35 | 3,185 | 9,469 | 8 | 5 | 16 | 38 | 33 | 25 |
| Garfield | 20 | 7,036 | 3 | (D) | (D) | - | 1 | 1 | 7 | 6 | 5 |
| Grant | 161 | 35,946 | 55 | 8,496 | 13,800 | 23 | 19 | 27 | 35 | 35 | 22 |
| Grays Harbor | 124 | 5,087 | 51 | 1,102 | 1,365 | 34 | 14 | 9 | 45 | 16 | 6 |
| Island | 133 | 2,725 | 53 | 433 | 956 | 32 | 10 | 19 | 51 | 16 | 5 |
| Jefferson | 54 | 3,299 | 27 | 275 | 872 | 7 | 7 | 9 | 21 | 5 | 5 |
| King | 609 | 9,864 | 227 | 1,639 | 9,492 | 145 | 101 | 68 | 188 | 66 | 41 |
| Kitsap | 243 | 3,308 | 108 | 261 | 1,711 | 67 | 23 | 28 | 75 | 38 | 12 |
| Kittitas | 212 | 13,033 | 62 | 1,566 | 2,450 | 68 | 28 | 28 | 51 | 25 | 12 |
| Klickitat | 189 | 81,000 | 61 | 5,076 | 1,487 | 55 | 29 | 29 | 32 | 22 | 22 |
| Lewis | 307 | 15,548 | 168 | 4,887 | 11,965 | 68 | 50 | 39 | 87 | 43 | 20 |
| Lincoln | 111 | 58,171 | 25 | 11,005 | 6,261 | 17 | 9 | 19 | 22 | 12 | 32 |
| Mason | 104 | 1,880 | 46 | 347 | 4,035 | 33 | 7 | 10 | 36 | 10 | 8 |
| Okanogan | 260 | 38,616 | 149 | 4,434 | 29,840 | 32 | 28 | 51 | 85 | 38 | 26 |
| Pacific | 33 | 3,729 | 21 | 518 | 802 | 4 | 5 | 9 | 10 | 5 | - |
| Pend Oreille | 50 | 3,507 | 16 | 536 | 203 | 7 | 7 | 3 | 24 | 9 | - |
| Pierce | 516 | 10,672 | 159 | 1,430 | 3,435 | 194 | 64 | 43 | 145 | 50 | 20 |
| San Juan | 110 | 4,785 | 65 | 760 | 1,031 | 27 | 17 | 22 | 16 | 15 | 13 |
| Skagit | 257 | 9,530 | 131 | 3,051 | 16,929 | 43 | 58 | 36 | 62 | 41 | 17 |
| Skamania | 31 | 354 | 15 | 53 | 70 | 8 | 2 | 1 | 17 | 2 | 1 |
| Snohomish | 477 | 19,129 | 149 | 2,897 | 6,899 | 86 | 47 | 45 | 221 | 46 | 32 |
| Spokane | 406 | 28,123 | 177 | 4,473 | 8,532 | 64 | 67 | 35 | 137 | 66 | 37 |
| Stevens | 201 | 17,464 | 102 | 3,482 | 1,664 | 40 | 26 | 39 | 69 | 17 | 10 |
| Thurston | 353 | 8,201 | 158 | 1,484 | 8,447 | 53 | 27 | 29 | 171 | 47 | 26 |
| Wahkiakum | 6 | 475 | 4 | 119 | (D) | - | 1 | 2 | - | 3 | - |
| Walla Walla | 151 | 61,924 | 53 | 5,080 | 2,875 | 20 | 14 | 28 | 34 | 18 | 37 |
| Whatcom | 320 | 7,427 | 169 | 2,396 | 3,135 | 75 | 42 | 27 | 96 | 52 | 28 |
| Whitman | 187 | 49,403 | 49 | 14,115 | 6,147 | 30 | 12 | 38 | 33 | 38 | 36 |
| Yakima | 317 | 25,213 | 151 | 4,625 | 31,102 | 57 | 26 | 70 | 76 | 48 | 40 |

## Table 47. **Women Operators: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | All farms with a woman operator [1] | | | Farms with a woman principal operator | |
|---|---|---|---|---|---|
| | Farms | Women operators | Land in farms (acres) | Farms | Land in farms (acres) |
| **State Total** | | | | | |
| Washington | 21,251 | 22,376 | 4,854,850 | 7,519 | 776,047 |
| **Counties** | | | | | |
| Adams | 327 | 346 | 472,425 | 108 | 49,376 |
| Asotin | 108 | 111 | 197,720 | 28 | 31,387 |
| Benton | 878 | 921 | 200,005 | 242 | 17,731 |
| Chelan | 391 | 402 | 32,066 | 121 | 13,790 |
| Clallam | 343 | 360 | 13,981 | 158 | 4,830 |
| Clark | 1,200 | 1,265 | 28,561 | 446 | 9,099 |
| Columbia | 168 | 176 | 127,609 | 56 | 15,331 |
| Cowlitz | 256 | 270 | 16,253 | 99 | 4,672 |
| Douglas | 385 | 400 | 323,442 | 113 | 61,202 |
| Ferry | 190 | 200 | 63,689 | 81 | 18,059 |
| Franklin | 414 | 423 | 230,739 | 125 | 25,121 |
| Garfield | 100 | 101 | 128,151 | 20 | 7,036 |
| Grant | 649 | 677 | 259,503 | 161 | 35,946 |
| Grays Harbor | 328 | 347 | 33,452 | 124 | 5,087 |
| Island | 275 | 290 | 9,074 | 133 | 2,725 |
| Jefferson | 137 | 155 | 6,616 | 54 | 3,299 |
| King | 1,300 | 1,417 | 26,865 | 609 | 9,864 |
| Kitsap | 537 | 573 | 6,749 | 243 | 3,308 |
| Kittitas | 579 | 596 | 58,867 | 212 | 13,033 |
| Klickitat | 444 | 464 | 235,891 | 189 | 81,000 |
| Lewis | 1,064 | 1,101 | 69,238 | 307 | 15,548 |
| Lincoln | 488 | 506 | 526,564 | 111 | 58,171 |
| Mason | 232 | 250 | 6,527 | 104 | 1,880 |
| Okanogan | 777 | 808 | 195,857 | 260 | 38,616 |
| Pacific | 175 | 179 | 19,863 | 33 | 3,729 |
| Pend Oreille | 179 | 190 | 17,567 | 50 | 3,507 |
| Pierce | 1,029 | 1,090 | 32,309 | 516 | 10,672 |
| San Juan | 204 | 231 | 9,705 | 110 | 4,785 |
| Skagit | 663 | 708 | 51,047 | 257 | 9,530 |
| Skamania | 86 | 91 | 3,858 | 31 | 354 |
| Snohomish | 1,023 | 1,085 | 39,561 | 477 | 19,129 |
| Spokane | 1,462 | 1,541 | 221,542 | 406 | 28,123 |
| Stevens | 671 | 691 | 146,692 | 201 | 17,464 |
| Thurston | 836 | 895 | 38,023 | 353 | 8,201 |
| Wahkiakum | 55 | 55 | 3,846 | 6 | 475 |
| Walla Walla | 470 | 499 | 305,322 | 151 | 61,924 |
| Whatcom | 875 | 935 | 44,655 | 320 | 7,427 |
| Whitman | 540 | 577 | 473,732 | 187 | 49,403 |
| Yakima | 1,413 | 1,450 | 177,284 | 317 | 25,213 |

[1] Data were collected for a maximum of three operators per farm.

## Table 48. **Women Principal Operators – Tenure: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total farms | Full owners | | | Part owners | | | Tenants | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Farms | Land in farms (acres) | Harvested cropland (acres) | Farms | Land in farms (acres) | Harvested cropland (acres) | Farms | Land in farms (acres) | Harvested cropland (acres) |
| **State Total** | | | | | | | | | | |
| Washington | 7,519 | 6,498 | 489,166 | 47,150 | 653 | 215,255 | 44,066 | 368 | 71,626 | 24,352 |
| **Counties** | | | | | | | | | | |
| Adams | 108 | 98 | 32,491 | (D) | 5 | 7,415 | 3,787 | 5 | 9,470 | (D) |
| Asotin | 28 | 22 | (D) | (D) | 5 | 10,453 | (D) | 1 | (D) | - |
| Benton | 242 | 215 | 12,295 | 1,112 | 16 | 5,066 | 458 | 11 | 370 | 304 |
| Chelan | 121 | 115 | (D) | 1,234 | 4 | (D) | (D) | 2 | (D) | (D) |
| Clallam | 158 | 133 | 3,748 | (D) | 20 | 1,041 | 453 | 5 | 41 | (D) |
| Clark | 446 | 394 | 7,463 | 1,328 | 40 | 1,558 | 220 | 12 | 78 | 6 |
| Columbia | 56 | 52 | (D) | 2,220 | 1 | (D) | - | 3 | (D) | - |
| Cowlitz | 99 | 80 | 2,422 | 257 | 13 | 2,196 | 1,808 | 6 | 54 | - |
| Douglas | 113 | 96 | 18,240 | (D) | 14 | 42,884 | 7,085 | 3 | 78 | (D) |
| Ferry | 81 | 79 | (D) | (D) | 2 | (D) | (D) | - | - | - |
| Franklin | 125 | 105 | 19,284 | 1,093 | 11 | 4,169 | 992 | 9 | 1,668 | 1,100 |
| Garfield | 20 | 18 | (D) | (D) | 2 | (D) | (D) | - | - | - |
| Grant | 161 | 135 | 21,537 | 2,148 | 16 | 10,280 | 2,738 | 10 | 4,129 | 3,610 |
| Grays Harbor | 124 | 115 | 4,434 | (D) | 6 | 477 | (D) | 3 | 176 | (D) |
| Island | 133 | 106 | 2,222 | 327 | 9 | 326 | 91 | 18 | 177 | 15 |
| Jefferson | 54 | 49 | 2,733 | (D) | 2 | (D) | (D) | 3 | (D) | (D) |
| King | 609 | 500 | 7,902 | 1,294 | 43 | 1,466 | 143 | 66 | 496 | 202 |
| Kitsap | 243 | 201 | 2,789 | 220 | 31 | 475 | 33 | 11 | 44 | 8 |
| Kittitas | 212 | 176 | 8,530 | 861 | 34 | (D) | 705 | 2 | (D) | - |
| Klickitat | 189 | 160 | 56,272 | (D) | 26 | 24,721 | 2,936 | 3 | 7 | (D) |
| Lewis | 307 | 261 | 11,227 | 3,045 | 38 | 3,562 | 1,473 | 8 | 759 | 369 |
| Lincoln | 111 | 88 | 30,198 | 2,040 | 13 | 8,296 | 772 | 10 | 19,677 | 8,193 |
| Mason | 104 | 94 | 1,462 | 314 | 7 | 331 | (D) | 3 | 87 | (D) |
| Okanogan | 260 | 206 | 23,337 | 1,617 | 39 | 14,660 | 2,641 | 15 | 619 | 176 |
| Pacific | 33 | 28 | 3,565 | 466 | 2 | (D) | (D) | 3 | (D) | (D) |
| Pend Oreille | 50 | 44 | 2,314 | (D) | 5 | (D) | (D) | 1 | (D) | (D) |
| Pierce | 516 | 473 | 9,618 | 1,276 | 33 | 984 | 143 | 10 | 70 | 11 |
| San Juan | 110 | 89 | 3,749 | 568 | 12 | 651 | 164 | 9 | 385 | 28 |
| Skagit | 257 | 213 | 4,514 | 936 | 24 | (D) | 1,006 | 20 | (D) | 1,109 |
| Skamania | 31 | 29 | (D) | 53 | 2 | (D) | - | - | - | - |
| Snohomish | 477 | 401 | 15,833 | 1,223 | 32 | 2,519 | 1,555 | 44 | 777 | 119 |
| Spokane | 406 | 362 | 24,497 | 2,733 | 32 | 3,340 | (D) | 12 | 286 | (D) |
| Stevens | 201 | 185 | 14,609 | 2,513 | 15 | (D) | (D) | 1 | (D) | (D) |
| Thurston | 353 | 323 | 7,175 | 1,304 | 20 | 776 | (D) | 10 | 250 | (D) |
| Wahkiakum | 6 | 6 | 475 | 119 | - | - | - | - | - | - |
| Walla Walla | 151 | 129 | 37,503 | 2,078 | 12 | 18,502 | 345 | 10 | 5,919 | 2,657 |
| Whatcom | 320 | 278 | 5,034 | 1,202 | 27 | 2,046 | 1,080 | 15 | 347 | 114 |
| Whitman | 187 | 167 | 36,033 | 4,814 | 8 | 8,061 | 6,322 | 12 | 5,309 | 2,979 |
| Yakima | 317 | 273 | 10,075 | 2,106 | 32 | 13,311 | 798 | 12 | 1,827 | 1,721 |

## Table 49. **Spanish, Hispanic, or Latino Origin Operators: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | All farms with a Spanish, Hispanic, or Latino operator [1] | | | Farms with a Spanish, Hispanic, or Latino principal operator | |
|---|---|---|---|---|---|
| | Farms | Spanish, Hispanic, or Latino operators | Land in farms (acres) | Farms | Land in farms (acres) |
| **State Total** | | | | | |
| Washington | 2,381 | 2,981 | 459,256 | 1,874 | 164,360 |
| **Counties** | | | | | |
| Adams | 43 | 51 | 17,026 | 40 | 13,421 |
| Asotin | 1 | 1 | (D) | 1 | (D) |
| Benton | 202 | 280 | 120,802 | 169 | 9,610 |
| Chelan | 107 | 122 | 6,094 | 73 | 1,560 |
| Clallam | 17 | 17 | 366 | 11 | 146 |
| Clark | 62 | 82 | 1,531 | 43 | 1,196 |
| Columbia | 4 | 4 | (D) | 1 | (D) |
| Cowlitz | 5 | 5 | 55 | 5 | 55 |
| Douglas | 99 | 132 | 25,597 | 85 | 2,891 |
| Ferry | 4 | 4 | (D) | 4 | (D) |
| Franklin | 98 | 115 | 27,593 | 64 | 14,774 |
| Garfield | - | - | - | - | - |
| Grant | 143 | 194 | 60,728 | 106 | 26,109 |
| Grays Harbor | 21 | 24 | 692 | 21 | 692 |
| Island | 16 | 16 | 820 | 11 | 375 |
| Jefferson | 11 | 11 | 806 | 6 | 338 |
| King | 59 | 66 | 913 | 43 | 682 |
| Kitsap | 50 | 50 | 323 | 40 | 191 |
| Kittitas | 28 | 33 | 9,368 | 19 | 8,979 |
| Klickitat | 26 | 28 | 35,499 | 16 | 1,430 |
| Lewis | 53 | 64 | 3,809 | 45 | 3,636 |
| Lincoln | 21 | 27 | 16,437 | 18 | (D) |
| Mason | 11 | 14 | 576 | 10 | 545 |
| Okanogan | 113 | 143 | 25,704 | 82 | 7,393 |
| Pacific | 3 | 3 | 1,945 | 1 | (D) |
| Pend Oreille | 2 | 2 | (D) | - | - |
| Pierce | 55 | 65 | 1,085 | 38 | 670 |
| San Juan | 4 | 4 | 190 | 3 | 180 |
| Skagit | 46 | 54 | 1,324 | 26 | 278 |
| Skamania | 15 | 15 | 502 | 8 | 151 |
| Snohomish | 47 | 51 | 1,218 | 32 | 820 |
| Spokane | 71 | 86 | 5,461 | 61 | 5,281 |
| Stevens | 21 | 21 | 2,668 | 9 | 193 |
| Thurston | 78 | 82 | 2,910 | 61 | 2,136 |
| Wahkiakum | - | - | - | - | - |
| Walla Walla | 21 | 27 | 16,245 | 11 | (D) |
| Whatcom | 48 | 59 | 1,432 | 34 | 777 |
| Whitman | 12 | 12 | 5,697 | 7 | (D) |
| Yakima | 764 | 1,017 | 54,931 | 670 | 31,811 |

[1] Data were collected for a maximum of three operators per farm.

## Table 50. **American Indian or Alaska Native Operators: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | All farms with an American Indian or Alaska Native operator [1] | | | Farms with an American Indian or Alaska Native principal operator | |
|---|---|---|---|---|---|
| | Farms | American Indian or Alaska Native operators | Land in farms (acres) | Farms | Land in farms (acres) |
| **State Total** | | | | | |
| Washington | 635 | 732 | 2,910,192 | 458 | 2,886,796 |
| **Counties** | | | | | |
| Asotin | 3 | 3 | (D) | 3 | (D) |
| Benton | 23 | 35 | 391 | 13 | 213 |
| Chelan | 12 | 13 | 280 | 9 | 220 |
| Clallam | 28 | 28 | 2,248 | 24 | 1,528 |
| Clark | 29 | 33 | 621 | 19 | 435 |
| Columbia | 4 | 7 | (D) | 4 | (D) |
| Cowlitz | 13 | 13 | 462 | 10 | (D) |
| Douglas | 10 | 10 | (D) | 9 | (D) |
| Ferry | 22 | 25 | (D) | 10 | (D) |
| Franklin | 7 | 7 | 7,175 | 5 | 211 |
| Grant | 13 | 13 | 2,067 | 9 | (D) |
| Grays Harbor | 10 | 10 | (D) | 8 | (D) |
| Island | 2 | 2 | (D) | 2 | (D) |
| Jefferson | 6 | 8 | 527 | 3 | 361 |
| King | 16 | 17 | 193 | 7 | 71 |
| Kitsap | 8 | 8 | 111 | 8 | 111 |
| Kittitas | 8 | 8 | 3,576 | 6 | 904 |
| Klickitat | 12 | 12 | 1,342 | 7 | 1,062 |
| Lewis | 29 | 34 | 719 | 20 | 511 |
| Lincoln | 1 | 1 | (D) | 1 | (D) |
| Mason | 13 | 14 | 596 | 11 | 435 |
| Okanogan | 45 | 50 | (D) | 36 | (D) |
| Pacific | 12 | 17 | 133 | 11 | (D) |
| Pend Oreille | 3 | 3 | 120 | 2 | (D) |
| Pierce | 32 | 43 | 930 | 23 | 806 |
| San Juan | 4 | 4 | 50 | - | - |
| Skagit | 3 | 3 | (D) | 3 | (D) |
| Skamania | 2 | 2 | (D) | 2 | (D) |
| Snohomish | 23 | 30 | 2,118 | 18 | 1,981 |
| Spokane | 42 | 47 | 1,507 | 27 | 773 |
| Stevens | 72 | 78 | (D) | 64 | (D) |
| Thurston | 24 | 25 | 714 | 12 | 203 |
| Walla Walla | 3 | 4 | 150 | 2 | (D) |
| Whatcom | 17 | 17 | (D) | 12 | (D) |
| Whitman | 9 | 10 | 17,464 | 8 | (D) |
| Yakima | 75 | 98 | (D) | 50 | (D) |

[1] Data were collected for a maximum of three operators per farm.

## Table 51. **Asian Operators: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | All farms with an Asian operator [1] | | | Farms with an Asian principal operator | |
|---|---|---|---|---|---|
| | Farms | Asian operators | Land in farms (acres) | Farms | Land in farms (acres) |
| **State Total** | | | | | |
| Washington | 599 | 804 | 74,940 | 436 | 39,771 |
| **Counties** | | | | | |
| Adams | 17 | 17 | 5,183 | 15 | (D) |
| Asotin | 4 | 4 | 440 | 3 | 255 |
| Benton | 11 | 11 | 80 | 9 | (D) |
| Chelan | 5 | 5 | 232 | - | - |
| Clallam | 9 | 12 | 39 | 5 | 14 |
| Clark | 33 | 33 | 440 | 22 | 381 |
| Cowlitz | 3 | 5 | (D) | 2 | (D) |
| Douglas | 1 | 1 | (D) | 1 | (D) |
| Ferry | 6 | 6 | 258 | 6 | 258 |
| Franklin | 7 | 7 | 5,391 | 5 | 1,722 |
| Grant | 18 | 24 | 9,604 | 15 | 7,656 |
| Grays Harbor | 1 | 1 | (D) | - | - |
| Island | 2 | 2 | (D) | 2 | (D) |
| Jefferson | 5 | 5 | (D) | 4 | (D) |
| King | 105 | 192 | 946 | 96 | 704 |
| Kitsap | 11 | 18 | 56 | 9 | 49 |
| Kittitas | 7 | 7 | (D) | 7 | (D) |
| Klickitat | 31 | 37 | 19,259 | 10 | 1,206 |
| Lewis | 5 | 5 | 374 | 2 | (D) |
| Lincoln | 1 | 1 | (D) | - | - |
| Mason | 30 | 30 | 324 | 4 | (D) |
| Okanogan | 19 | 19 | 8,820 | 10 | 7,860 |
| Pacific | 2 | 2 | (D) | - | - |
| Pierce | 31 | 37 | 693 | 24 | 653 |
| San Juan | 3 | 3 | 89 | 2 | (D) |
| Skagit | 12 | 17 | 1,935 | 10 | 1,445 |
| Snohomish | 41 | 69 | 465 | 31 | 343 |
| Spokane | 14 | 14 | 794 | 6 | 605 |
| Thurston | 30 | 34 | 227 | 21 | 176 |
| Walla Walla | 10 | 12 | 830 | 6 | 777 |
| Whatcom | 88 | 124 | 8,924 | 83 | 8,849 |
| Whitman | 2 | 2 | (D) | - | - |
| Yakima | 35 | 48 | 5,012 | 26 | 3,803 |

[1] Data were collected for a maximum of three operators per farm.

## Table 52. **Black or African American Operators: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | All farms with a Black or African American operator [1] | | | Farms with a Black or African American principal operator | |
|---|---|---|---|---|---|
| | Farms | Black or African American operators | Land in farms (acres) | Farms | Land in farms (acres) |
| **State Total** | | | | | |
| Washington | 83 | 96 | 16,197 | 60 | 5,744 |
| **Counties** | | | | | |
| Adams | 1 | 1 | (D) | - | - |
| Asotin | 1 | 1 | (D) | 1 | (D) |
| Benton | 1 | 1 | (D) | 1 | (D) |
| Chelan | 1 | 1 | (D) | 1 | (D) |
| Clallam | 1 | 1 | (D) | - | - |
| Cowlitz | 2 | 2 | (D) | - | - |
| Grant | 2 | 2 | (D) | 2 | (D) |
| Grays Harbor | 1 | 1 | (D) | 1 | (D) |
| King | 2 | 4 | (D) | 1 | (D) |
| Kitsap | 5 | 5 | 19 | 3 | 17 |
| Klickitat | 2 | 4 | (D) | 2 | (D) |
| Lewis | 6 | 6 | 101 | 5 | (D) |
| Lincoln | 1 | 1 | (D) | - | - |
| Mason | 1 | 1 | (D) | 1 | (D) |
| Pend Oreille | 7 | 7 | 733 | 6 | 642 |
| Pierce | 17 | 18 | 294 | 13 | (D) |
| San Juan | 1 | 1 | (D) | - | - |
| Skagit | 3 | 6 | (D) | 3 | (D) |
| Snohomish | 1 | 1 | (D) | 1 | (D) |
| Spokane | 2 | 2 | (D) | - | - |
| Stevens | 4 | 7 | 62 | 3 | 60 |
| Thurston | 6 | 8 | 231 | 1 | (D) |
| Walla Walla | 1 | 1 | (D) | 1 | (D) |
| Whatcom | 3 | 3 | (D) | 3 | (D) |
| Yakima | 11 | 11 | 4,008 | 11 | 4,008 |

[1] Data were collected for a maximum of three operators per farm.

## Table 53. **Native Hawaiian or Other Pacific Islander Operators: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | All farms with a Native Hawaiian or Other Pacific Islander operator [1] | | | Farms with a Native Hawaiian or Other Pacific Islander principal operator | |
|---|---|---|---|---|---|
| | Farms | Native Hawaiian or Other Pacific Islander operators | Land in farms (acres) | Farms | Land in farms (acres) |
| **State Total** | | | | | |
| Washington | 69 | 70 | 1,554 | 49 | 1,034 |
| **Counties** | | | | | |
| Benton | 8 | 8 | 126 | 8 | 126 |
| Chelan | 5 | 5 | 36 | 5 | 36 |
| Clallam | 1 | 1 | (D) | - | - |
| Clark | 5 | 5 | 93 | 4 | 80 |
| Garfield | 1 | 1 | (D) | - | - |
| King | 7 | 7 | 54 | 5 | (D) |
| Kitsap | 1 | 1 | (D) | - | - |
| Lewis | 3 | 3 | 75 | - | - |
| Mason | 1 | 1 | (D) | - | - |
| Okanogan | 2 | 2 | (D) | - | - |
| Pierce | 8 | 8 | 135 | 5 | (D) |
| Skagit | 1 | 1 | (D) | 1 | (D) |
| Spokane | 3 | 3 | 54 | 3 | 54 |
| Thurston | 2 | 2 | (D) | - | - |
| Whatcom | 12 | 13 | 355 | 9 | (D) |
| Yakima | 9 | 9 | (D) | 9 | (D) |

[1] Data were collected for a maximum of three operators per farm.

## Table 54. **White Operators: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | All farms with a White operator [1] | | | Farms with a White principal operator | |
|---|---|---|---|---|---|
| | Farms | White operators | Land in farms (acres) | Farms | Land in farms (acres) |
| **State Total** | | | | | |
| Washington | 36,331 | 57,631 | 11,813,062 | 35,958 | 11,778,717 |
| **Counties** | | | | | |
| Adams | 698 | 1,093 | 1,034,693 | 697 | 1,034,088 |
| Asotin | 183 | 304 | 263,155 | 178 | 262,896 |
| Benton | 1,484 | 2,443 | 701,800 | 1,464 | 701,372 |
| Chelan | 877 | 1,338 | 75,449 | 873 | 75,439 |
| Clallam | 519 | 805 | 22,173 | 499 | 21,994 |
| Clark | 1,883 | 2,953 | 73,539 | 1,866 | 73,297 |
| Columbia | 304 | 458 | (D) | 304 | (D) |
| Cowlitz | 484 | 760 | 38,482 | 480 | 38,468 |
| Douglas | 841 | 1,307 | 810,443 | 834 | (D) |
| Ferry | 247 | 400 | (D) | 234 | (D) |
| Franklin | 873 | 1,455 | 623,721 | 869 | 622,870 |
| Garfield | 211 | 351 | 308,486 | 211 | 308,486 |
| Grant | 1,529 | 2,430 | 954,716 | 1,518 | 953,496 |
| Grays Harbor | 547 | 872 | (D) | 542 | (D) |
| Island | 374 | 630 | 14,969 | 371 | 14,946 |
| Jefferson | 214 | 364 | 15,446 | 212 | 15,086 |
| King | 1,727 | 2,856 | 45,711 | 1,720 | 45,645 |
| Kitsap | 689 | 1,153 | 9,998 | 678 | 9,831 |
| Kittitas | 1,000 | 1,588 | 182,231 | 992 | 182,065 |
| Klickitat | 744 | 1,141 | 549,222 | 736 | 548,363 |
| Lewis | 1,622 | 2,615 | 131,643 | 1,607 | 131,135 |
| Lincoln | 896 | 1,495 | 1,112,140 | 894 | (D) |
| Mason | 364 | 566 | 23,606 | 357 | 23,231 |
| Okanogan | 1,427 | 2,211 | (D) | 1,398 | (D) |
| Pacific | 318 | 501 | 49,563 | 314 | 49,485 |
| Pend Oreille | 281 | 454 | 42,740 | 278 | 42,660 |
| Pierce | 1,358 | 2,239 | 47,207 | 1,333 | 46,675 |
| San Juan | 272 | 435 | 15,629 | 271 | 15,516 |
| Skagit | 1,059 | 1,723 | 105,883 | 1,055 | 104,787 |
| Skamania | 142 | 234 | 6,397 | 139 | 6,359 |
| Snohomish | 1,394 | 2,212 | 68,616 | 1,376 | 68,341 |
| Spokane | 2,477 | 3,906 | 535,902 | 2,454 | 535,027 |
| Stevens | 1,080 | 1,694 | (D) | 1,069 | (D) |
| Thurston | 1,310 | 2,046 | 76,228 | 1,294 | 76,047 |
| Wahkiakum | 109 | 166 | 9,557 | 109 | 9,557 |
| Walla Walla | 934 | 1,469 | 644,119 | 931 | 643,869 |
| Whatcom | 1,606 | 2,478 | 101,832 | 1,585 | 100,956 |
| Whitman | 1,190 | 1,855 | 1,260,939 | 1,186 | 1,260,855 |
| Yakima | 3,064 | 4,631 | (D) | 3,030 | (D) |

[1] Data were collected for a maximum of three operators per farm.

## Table 55. **Operators Reporting More Than One Race: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | All farms with an operator reporting more than one race [1] | | | Farms with a principal operator reporting more than one race | |
|---|---|---|---|---|---|
| | Farms | Operators reporting more than one race | Land in farms (acres) | Farms | Land in farms (acres) |
| **State Total** | | | | | |
| Washington | 409 | 451 | 54,903 | 288 | 36,045 |
| **Counties** | | | | | |
| Adams | 1 | 1 | (D) | 1 | (D) |
| Asotin | 1 | 1 | (D) | - | - |
| Benton | 16 | 21 | 5,736 | 14 | 1,716 |
| Chelan | 3 | 4 | 238 | 2 | (D) |
| Clallam | 12 | 12 | 170 | 8 | 104 |
| Clark | 26 | 29 | 615 | 18 | 565 |
| Douglas | 6 | 8 | (D) | 5 | 50 |
| Ferry | 6 | 6 | 4,287 | 5 | 4,277 |
| Franklin | 5 | 6 | (D) | 4 | 244 |
| Grant | 9 | 11 | 1,351 | 8 | 1,303 |
| Grays Harbor | 6 | 6 | 441 | 6 | 441 |
| Island | 3 | 3 | (D) | 2 | (D) |
| Jefferson | 6 | 7 | 115 | 2 | (D) |
| King | 23 | 23 | 533 | 8 | 242 |
| Kitsap | 11 | 11 | 83 | 8 | 62 |
| Kittitas | 7 | 7 | 671 | 1 | (D) |
| Klickitat | 8 | 9 | 614 | 5 | (D) |
| Lewis | 28 | 37 | 3,372 | 13 | 846 |
| Lincoln | 2 | 2 | (D) | 2 | (D) |
| Mason | 4 | 4 | 70 | 4 | 70 |
| Okanogan | 8 | 8 | 8,184 | 5 | 8,070 |
| Pacific | 5 | 6 | (D) | 5 | (D) |
| Pend Oreille | 4 | 5 | 597 | 2 | (D) |
| Pierce | 85 | 87 | 1,189 | 80 | 1,060 |
| San Juan | 1 | 1 | (D) | 1 | (D) |
| Skagit | 9 | 9 | 396 | 2 | (D) |
| Skamania | 3 | 3 | (D) | 3 | (D) |
| Snohomish | 14 | 14 | 239 | 12 | (D) |
| Spokane | 18 | 22 | 1,692 | 11 | 947 |
| Stevens | 19 | 21 | 6,099 | 12 | 4,903 |
| Thurston | 15 | 15 | 225 | 8 | (D) |
| Walla Walla | 5 | 6 | 229 | 3 | 225 |
| Whatcom | 13 | 13 | 275 | 10 | 140 |
| Whitman | 2 | 3 | (D) | 1 | (D) |
| Yakima | 25 | 30 | 2,537 | 17 | (D) |

[1] Data were collected for a maximum of three operators per farm.

# Appendix A.
# Census of Agriculture Methodology

The purpose of a census is to enumerate all objects with a defined characteristic. For the census of agriculture, that goal is to account for "any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year." To do this, NASS creates a Census Mail List (CML) of agricultural operations that potentially meet the farm definition, collects agricultural information from those operations, reviews the data, corrects or completes the requested information, and combines the data to provide information on the characteristics of farm operations and farm operators at the national, State, and county levels. In this appendix, these census processes are described.

## THE CENSUS POPULATION

### The Census Mail List

The National Agricultural Statistics Service (NASS) maintains a list of farmers and ranchers from which the Census Mail List (CML) is compiled. The goal is to build as complete a list as possible of agricultural places that meet the farm definition. The CML compilation begins with the list used to define sampling populations for NASS surveys conducted for the agricultural estimates program. Each record on the list includes name, address, and telephone number plus additional information that is used to efficiently administer the census of agriculture and agricultural estimates programs.

NASS builds and improves the list on an ongoing basis by obtaining outside source lists. Sources include State and federal government lists, producer association lists, seed grower lists, pesticide applicator lists, veterinarian lists, marketing association lists, and a variety of other agriculture-related lists. NASS also obtains special commodity lists to address specific list deficiencies. These outside source lists are matched to the NASS list using record linkage programs. Most names on newly acquired lists are already on the NASS list. Records not on the NASS list are treated as potential farms until NASS can confirm their existence as a qualifying farm. Staff in NASS field offices routinely contact these potential farms to determine whether they meet the farm definition. For the 2012 Census of Agriculture, NASS made a concerted effort to work with Community-Based Organizations not only to improve list coverage for minorities but also to increase census awareness and participation.

List building activities for developing the 2012 CML started in 2009 by updating list information from respondents to the 2007 Census of Agriculture. Between 2010 and 2012, NASS conducted a series of National Agricultural Classification Surveys (NACS) on approximately 1.7 million records, which included nonrespondents from the 2007 census and newly added records from outside list sources. The NACS report forms collected information that was used to determine whether an operation met the farm definition. If the definition was met, the operation was added to the NASS list and subsequently to the CML. Addressees that were nonrespondents to a NACS were also added to the CML and identified with a special status code.

Measures were taken to improve name and address quality. Additional record linkage programs were run to detect and remove duplicate records both within each State and across States. List addresses were processed through the United States Postal Service's National Change of Address Registry and the Locatable Address Conversion System to ensure they were correct and complete. Records on the list with missing or invalid phone numbers were matched against a nationally available telephone database to obtain as many phone numbers as possible. To reduce costs, operations with characteristics that indicated they were unlikely to be farms, according to the farm definition, were

removed from the list.

The official CML for the 2012 Census of Agriculture was established on September 1, 2012. The list contained 3,009,641 records. There were 2,387,326 records that were thought to meet the NASS farm definition and 622,315 potential farm records, which included NACS nonrespondents, other records added to the CML by the NASS field offices after the record linkage process, and late adds to the CML that were not included in any previous NACS or State screening survey.

## Not on the Mail List (NML)

Extensive efforts are directed toward developing a CML that includes all farms in the U.S. However, some farms are not on the list, and some agricultural operations on the list are not farms. NASS uses its June Agricultural Survey (JAS) to quantify the number and types of farms not on the CML. The tracts in the JAS that are not on the CML are said to be in the Not on the Mail List (NML) domain. If a tract in the NML domain is determined to be a farm during the census, it is an NML farm. The NML farms are used to estimate the undercoverage associated with the census.

The NASS area frame, which is used for the JAS, covers all land in the U.S. and includes all farms. The land in the U.S. is stratified by characteristics of the land. A probability sample of segments is drawn within each stratum for the JAS. Segments of approximately equal size are delineated within each stratum and designated on aerial photographs. The JAS sample of segments is allocated to strata to provide accurate measures of acres planted to widely grown crops, farm numbers, and inventories of cattle. Sampled segments in the JAS are personally enumerated. Each operation identified within a segment boundary is known as a tract.

The 2012 JAS sample was increased to improve the farm counts for operations that produced specialty commodities or had socially disadvantaged or minority operators. The total sample consisted of 14,376 segments of which 3,291 were additional segments added to facilitate the use of the JAS as an Agricultural Coverage Evaluation Survey (ACES). The additional segments were added based upon multivariate sample allocations to target specific items at the U.S. level. The 2012 JAS consisted of sample segments from all States, with the exception of Alaska where NASS does not maintain an area frame.

During the JAS prescreening operation, each tract is identified as either agricultural or non-agricultural. Each JAS agricultural tract is identified as a farm or non-farm in June based on the farm definition. Non-agricultural tracts are further classified into categories; with farm potential, with unknown farm potential, or with no farm potential. The names and addresses collected in the 2012 JAS were matched to the CML. Those from the JAS 2012 survey that did not match were determined to be in the NML domain and sent a yellow census report form so that they could be differentiated from the green report form sent to those addressees on the CML. Instructions on the census report form directed any respondent who received duplicate forms to complete the CML form and to mail all duplicate forms back together. Those who returned a CML and an NML form had been misclassified as NML and were removed from the NML domain.

The initial NML mailout consisted of 36,021 records. An additional 403 June area tracts linked to Census records that were Undeliverable as Addressed (UAA) were later added to the NML domain. A total of 36,424 NML records were summarized of which 5,565 records were truly NML and in-scope.

The farm/nonfarm status of each NML domain operation was determined based on the reported data in the census form. An operation in the NML domain that was determined to be a farm is referred to as an NML farm. Characteristics of NML farms and their operators provided a measure of the undercoverage of farms on the CML. The percentage of farms not represented on the CML varied considerably by State. In general, NML farms tended to be small in acreage, production, and sales of agricultural products. Farm operations were missing from the CML for various reasons, including the possibility that the operation started after development of the CML, the operation was so small that it did not appear in any agriculture-related source list, or the operation was misclassified as a nonfarm prior to census mailout. The CML was used with the NML in

a capture-recapture framework to represent all farming operations across all States in the JAS sample.

## DATA COLLECTION OUTREACH AND PROMOTIONAL EFFORTS

NASS planned and executed a multi-phase strategic communications campaign for the 2012 Census of Agriculture, to increase the level of awareness and response among all U.S. agricultural producers.

- Phase 1 ran from October 2011 − July 2012. It raised awareness about the census and list building, encouraged producers to sign up in response to NASS mailings and at community, association, and other stakeholder meetings where NASS partners reached out.
- Phase 2 ran from July 2012 − December 2012. It notified farm operators and agricultural organizations that the census would be mailed in December, and encouraged communications regarding the census.
- Phase 3 ran from December 2012 – July 2013. It focused on census data collection with messaging urging response, reminding operators that it's-not-too-late-to-respond, and thank-you messaging.
- Phase 4 began in February 2014. It communicated information about the data release plan, which has four phases:

    - Phase A (November 2012 − December 2013) focused on thanking farmers for their participation in the census and partners for their leadership.
    - Phase B (January 2014 – February 2014) drew attention to the preliminary census release.
    - Phase C (February 2014 through May 2014) focused on the final census release.
    - Phase D (ongoing) continues to focus on the census findings as they are released.

As part of the plan, NASS targeted selective communications and outreach efforts on beginning and minority farm operators. All of these efforts were accomplished through an integrated communications program that focused on four primary areas: partnership building, local-level outreach, public relations, and paid media. External support was provided by a private agricultural communications agency.

The unifying force behind the 2012 communications campaign was the theme "There's Strength in Numbers." This was accompanied by supporting messages and artwork that created a consistent look and feel for all census communications. All messages and materials served the purpose of inspiring action: *Grow Your Farm Future - Shape Your Farm Programs - Boost Your Rural Services - Fill out your Census of Agriculture - Do your part to be counted - There's strength in numbers.*

### Partnership and Local-Level Outreach

At the national level, NASS officials met with leaders from dozens of key agricultural organizations, State departments of agriculture, and other USDA agencies, to successfully secure their support in promoting the census among their constituencies. Stakeholders partnered with NASS to promote the 2012 Census of Agriculture through publications, special mailings, speeches, social media, websites, and other communications. In addition, through grassroots-level outreach and efforts, NASS partnered with a number of community-based organizations to reach minority and limited-resource farmers and ranchers. All national-level outreach was encouraged and mirrored at the regional, State, and local levels. Among the highlights of these partnership efforts was the production of more than 40 television and radio public service announcements (PSAs) featuring the U.S. Secretary of Agriculture, State secretaries, directors, and commissioners of agriculture and leaders from community-based organizations. The PSAs, available in both English and Spanish, encouraged farmers and ranchers to respond to the 2012 Census of Agriculture.

### Coverage of American Indian and Alaska Native Farm Operators

To maximize coverage of American Indian and Alaska Native farm operators, special procedures were followed in the census. A concerted effort was made to get individual reports from every American Indian and Alaska Native farm operator in the country. If this was not possible within some reservations, a single reservation-level census report was obtained from knowledgeable reservation officials. These reports covered agricultural activity

on the entire reservation. NASS reviewed these data and removed duplication with any data reported by American Indian or Alaska Native farm operators who responded on an individual census report form. Additionally NASS obtained, from knowledgeable reservation officials, the count of American Indian and Alaska Native farm operators (on reservations) who were not counted through individual census report forms, but whose agricultural activity was included in the reservation-level report form.

This information is summarized in Table D, **American Indian and Alaska Native Operators: 2012**, providing the number of farm operators (for up to three operators per farm) reported as American Indian or Alaska Native in the race category, either as a single race or in combination with other races, on the individual census report forms, plus the total number of American Indian or Alaska Native operators farming on reservations as reported by reservation officials. The count from the individual report forms is summarized in the "Individually reported" column. It includes operators on or off reservations. The "Other" column provides counts of operators on reservations as reported by a reservation or tribal official. The "Total" column is simply a sum of the "Individually reported" and the "Other" columns. Tables in other parts of the publication count the reservation-level reports as single farms.

### Public Relations

In the public relations arena, NASS and the contractor worked with internal and external stakeholders to equip them with communications tools and resources to deliver the census communications message to their audiences. NASS utilized its Intranet to deliver materials to the 12 regional and 46 field offices and created a "Partner to Promote the Census" portal on the census website to deliver public relations materials and tools to external stakeholders. The materials included, but were not limited to: customizable news releases, feature stories, newsletter articles, blogs; drop-in advertisements; website buttons and banners; PowerPoint templates; brochures; and more. In addition, at the national level NASS issued a dozen news releases citing department and agency spokespeople and published timely and relevant pieces to the USDA blog highlighting the census. These public relations efforts at the national, State, and local levels helped ensure that NASS's message about the census was continually in the media, including print and online publications, a variety of social media, radio, and some television programs. Media outlets included both those specializing in agriculture and more general outlets.

### Paid Media

For the 2012 Census of Agriculture, NASS placed special emphasis on reaching new and beginning farmers, while continuing efforts to improve its reach within previously under-represented populations. Even with increasingly limited budgets and resources, NASS was able to apply a portion of funds towards paid media. Strategically, NASS purchased limited print and online advertising in areas where there was the potential for high concentrations of under-represented populations and new and beginning farmers and ranchers.

## DATA COLLECTION

### Method of Enumeration

Data collection was accomplished primarily by mailout/mailback, but supplemented with Electronic Data Reporting (EDR) on the Internet, and personal enumeration for special classes of records in the census operations. Personal enumeration (interviewing) involved the use of both Computer-Assisted Telephone Interviewing (CATI) and Computer-Assisted Personal Interviewing (CAPI). Enumerators at the NASS National Operations Center in St. Louis, MO conducted CATI data collection. In addition, enumerators under contract with NASS through the National Association of State Departments of Agriculture (NASDA) conducted phone and personal interviews with respondents. For the 2012 Census of Agriculture, NASS implemented a pre-notification strategy in an effort to increase awareness, improve overall responses, and encourage respondents to report early to avoid continued correspondence. All records in the initial mailout received either a postcard or pre-recorded voice message announcing the census mail packets were coming.

## Report Forms

There were seven regionalized versions of the report forms used for the 2012 Census of Agriculture. The report form versions were designed to facilitate reporting crops most commonly grown within each report form region. Additionally, an American Indian report form was developed to facilitate reporting for operations on reservations in Arizona, New Mexico, and Utah. The regional report form numbers are: 12-A101, 12-A102, 12-A103, 12-A104, 12-A105, 12-A106 and 12-A107 (HI). The American Indian report form is 12-A200. All of the forms allowed respondents to write in specific commodities that were not listed on their form.

## Report Form Mailings

Pre-notification by postcard or pre-recorded message began December 10, 2012. Approximately 3.0 million mail packets were mailed in December 2012. Each packet contained a cover letter, instruction sheet, a labeled report form, and a return envelope. The Census Bureau's National Processing Center (NPC) in Jeffersonville, IN was contracted to perform mail packet preparation, initial mailout, and two follow-up mailings to nonrespondents.

The initial mailout was followed by a thank-you reminder postcard that was delivered in January 2013 to all operations that received mail packets. First follow-up mail packets were mailed in mid-February 2013 to approximately 1.0 million nonrespondents. Second follow-up mail packets were mailed in mid-March 2013 to approximately 750,000 nonrespondents.

## Personal Follow-up

Operating concurrently with NPC's mail data collection efforts, NASS telephone call centers targeted selected groups of census nonrespondents for telephone enumeration. NASS field offices targeted selected groups of census records for in-person enumeration. These efforts were referred to as:

- Suspicious Out of Scope Follow-up
- Criteria Record Follow-up
- Must Case Follow-up
- American Indian and Alaska Native Farm Operator Follow-up
- Low Response County Follow-up
- Last Call Nonresponse Follow-up
- Not on Mail List (NML) Follow-up

**Suspicious Out-of-Scope Follow-up.** The Suspicious Out-of-Scope Follow-up was a phone follow-up that began in February 2013 and was conducted through May 2013. It included records that mailed their form back with a response that they were no longer farming. These operations had reported agricultural information in another survey during 2012. The operations were re-contacted with a CATI instrument to either verify the respondent was not farming or complete a census report form.

**Criteria Record Follow-up.** Nonrespondents and refusals to the National Agricultural Classification Surveys received unique coding on the CML and are referred to collectively as Criteria Records for follow-up data collection. These Criteria Records typically had a lower probability of meeting the farm definition and were less likely to respond. It was critical to identify those records in this group that represented farms to provide coverage of the small farm population. Small farms make up a significant portion of the overall U.S. farm population.

For the 2012 Census of Agriculture, 276,043 Criteria Records were included in the Census Mail List (CML). A sample of 23,739 Criteria Records was selected for targeted data collection efforts. The sampled records were first contacted by telephone using the census CATI instrument beginning in February 2013 after the initial mail returns were processed. Certified mail to 18,831 respondents was used for those who could not be contacted by telephone. Data collection resulted in 10,887 returns from both telephone and certified mail. The in-scope rate from the returns was applied to the remaining criteria records during replication, which is described in the next sub-section.

**Must Case Follow-up.** Must cases were known large operations, the absence of which could have significantly affected the accuracy of census results. For the 2012 Census of Agriculture, 118,533 records were categorized as Must cases. Each active Must operation was accounted for by mail receipt, phone interview, or personal enumeration; if an operation was no longer in operation, its nonfarm status was

documented. CATI calling of nonrespondent Must cases was undertaken by call centers from March 2013 through May 2013, after the initial and first follow-up mailing. Following the CATI calling, the remaining nonresponse Must cases were assigned to field offices for personal enumeration. Because of the potential importance of Must cases, they were all accounted for and therefore not eligible for nonresponse weighting adjustment.

**American Indian and Alaska Native Farm Operator Follow-up.** The American Indian report form (12-A200) was mailed to all operations in Arizona, New Mexico and Utah thought to have an American Indian or Alaska Native operator. It was included in the initial mailout, but due to poor mail response a personal enumeration data collection strategy was utilized with no additional mail follow-up. A concerted effort was made to get individual reports from every American Indian and Alaska Native farm operator in the country. If this was not possible within a reservation, a single reservation-level census report was obtained from knowledgeable reservation officials. These reports covered agricultural activity on the entire reservation. The NASS reviewed these data and removed any duplicate data reported by American Indian or Alaska Native farm operators from that reservation who responded on an individual census report form. Additionally NASS obtained, from knowledgeable reservation officials, the count of American Indian and Alaska Native farm operators (on the reservations) who were not counted through individual census report forms, but whose agricultural activity was included in the reservation-level report form.

**Low Response County Follow-up.** The Low Response County (LRC) follow-up activity was used to increase the response rate in all counties to at least 75 percent. CATI was used for this follow-up activity. NASS utilized an adaptive design technique to identify particular records for telephone contact, in an effort to increase coverage on minority operations and operations known to produce specialty commodities. In early April 2013, NASS identified nonresponse cases in counties with a response rate of less than 75 percent. Nonresponse records in these counties were then prioritized so that minority operations and specialty commodity producers were the primary records delivered to phone enumerators. Nonrespondent telephone contact information was transmitted electronically to NASS call centers and incorporated into their CATI instrument. CATI follow-up activities began in mid-April 2013 and continued through mid-June 2012. Automated procedures were employed biweekly to ensure that the record selection procedures were targeting counties that would meet the goals of increasing minority operation coverage and to monitor the number of respondents needed to reach the 75 percent county response rate. When the required number of completions was achieved for a given county, LRC activity was suspended in that county.

**Last Call Nonresponse Follow-up.** The Last Call Nonresponse Follow-up activity was utilized to increase the national response rate to 80 percent. All remaining nonresponse records with an expected value of sales greater than $50,000 in counties that had not achieved a 75-percent response rate were eligible for this phone follow-up activity. CATI was used for this activity and began in mid-July 2013 and lasted until August 1, 2013. Automated procedures were employed to monitor the number of respondents needed and completed. When a 75 percent response rate was achieved for a given county, follow-up in that county was suspended. NASS achieved its goal of an 80-percent national response rate utilizing Last Call Nonresponse Follow-up.

**Not on the Mail List (NML) Follow-up.** To account for farming operations not on the CML, NASS used its 2012 JAS supplemented sample from the NASS area frame. The NASS area frame covers all land in the U.S. with the exception of Alaska and includes all farms. As previously described, the NASS conducted a record linkage operation between the CML records and the records from the 2012 JAS. Those 2012 JAS records that did not match records on the CML were designated as “Not on the Mail List (NML)” records. These records were mailed a yellow census form so that it could be differentiated from the green forms mailed to CML records. The NML records were mailed at the same time as the census mailing and received the same follow-up procedures as the census mailing through the first follow-up in mid-February 2013. Beginning in March 2013, CATI was used for nonresponse follow-up for NML nonrespondents.

## Replication

Replication is utilized to improve efficiency and reduce respondent burden. To adjust for nonresponse associated with criteria records in the 2007 Census of Agriculture, NASS replicated a set of respondents determined to be in-scope from the last mailing of the Agricultural Identification Survey (AIS), conducted in December 2006. The replicated records represented operations that were relatively small in size and homogeneous in nature. Replicated records were assumed to be in-scope, based on their AIS reported data.

For the 2012 Census of Agriculture, a first mailing was sent to the criteria records, a subpopulation consisting of all of the approximately 74,000 respondents to the 2011 NACS mailing. This included pre-notification using a pre-recorded message, the first mailing, and the thank-you reminder post card. No further follow-up efforts were conducted on this subpopulation. As in 2007, the agricultural operations in this subpopulation were relatively small in size and homogeneous in nature. The responses from the criteria records were used to estimate the in-scope rate for the 20,168 nonrespondents from this subpopulation.

Records were selected randomly for replication or coding as out-of-scope based on the estimated in-scope rate. The use of the in-scope rate after one mailing is supported by analysis of 2007 census data, which indicated the early in-scope rate was a reasonable proxy for the in-scope rate for the subpopulation of criteria records that did not respond to the NACS immediately preceding the census mailing. Of the 20,168 NACS records with no response, 16,762 records were selected to be in-scope.

Data relationships between the 2012 responses and their respective NACS data were applied to the NACS data for the nonrespondents selected to be in-scope to derive values to seed replication. Then replication was conducted through imputation.

Criteria records with no response to the December 2011 NACS were excluded in the capture-recapture adjustments for coverage, response, or correct classification. The in-scope records were each given an initial weight of one. However, for calibration, the replicated in-scope records were eligible for a coverage adjustment.

# REPORT FORM PROCESSING

## Data Capture

The Census Bureau's National Processing Center (NPC) in Jeffersonville, IN was contracted to process returned mail packets. NASS staff on site at the NPC provided technical guidance and monitored NPC processing activities. All report forms returned to the NPC were immediately checked in, using bar codes printed on the mailing label, and removed from follow-up report form mailings. All forms with any data were scanned and an image was made of each page of a report form. Optical Mark Recognition (OMR) was used to capture categorical responses and to identify the other answer zones in which some type of mark was present.

Data entry operators keyed data from the scanned images using OMR results that highlighted the areas of the report forms with respondent entries. The keyer evaluated the contents and captured pertinent responses. Ten percent of the captured data were keyed a second time for quality control. If differences existed between the first keyed value and the second, an adjudicator handled resolution. The decision of the adjudicator was used to grade the performance of the keyers, who were required to maintain a certain accuracy level.

The images and the captured data were transferred to NASS's centralized network and became available to field offices and headquarters on a flow basis. The images were available for use in all stages of review. Images were computer generated for reports obtained from the telephone interviews and the Internet.

## Editing Data

Captured data were processed through a computer formatting program, which verified that records were valid – that the record identification number was on the list of census records, that the reported counties of operation and production were valid, and other related criteria. Rejected records were referred to

analysts for correction. Accepted records were sent to a complex computer batch edit process. Each execution of the computer edit in batch mode consisted of records from only one State and flowed as the data were received from the NPC, the NASS Electronic Data Reporting (EDR) web utility, or the Computer-Assisted Telephone Interview (CATI) applications.

The computer edit determined whether a reporting operation met the qualifying criteria to be counted as a farm (in-scope). The edit examined each in-scope record for reasonableness and completeness and determined whether to accept the recorded value for each data item or to take corrective action. Such corrective actions included removing erroneously reported values, replacing an unreasonable value with one consistent with other reported data, or providing a value for an overlooked item. To the extent possible, the computer edit determined a replacement value. Strategies for determining replacement values are discussed in the next section. Operations failing to meet the qualifying criteria were categorized as out-of-scope for the census; that is, they were classified as being a nonfarm. Out-of-scope records that NASS had reason to believe might be in-scope (indications of recent and/or significant agricultural activity reported on NASS surveys, for example) were referred to analysts for verification.

The edit systematically checked reported data section-by-section with the overall objective of achieving an internally consistent and complete report. NASS subject-matter experts had previously defined the criteria for acceptable data. Problems that could not be resolved within the edit were referred to an analyst for intervention. Prior to the census mailout, NASS established a group of 90 analysts in a Census Editing Unit in the National Operations Center in St. Louis, MO who examined the scanned images, consulted additional sources of information, and determined an appropriate action. Field office analysts also participated using an interactive version of the edit program to submit corrected data and immediately re-edit the record to ensure a satisfactory solution.

## Imputing Data

The edit determined the best value to impute for reported responses that were deemed unreasonable and for required responses that were absent. If an item could not be calculated directly from other current responses, the edit determined whether acreage, production or inventory items had been reported for that farm on a recent NASS crop or livestock survey. For operators who had not changed in five years, demographic variables such as race and sex were taken from the previous census. Administrative data from the Farm Service Agency were used for a few items, such as Conservation Reserve Program acreage. When deterministic edit logic and previously-reported data sources proved inadequate, data from a reporting farm of similar type, size, and location (a donor farm) were considered. In cases where automated imputation was unable to provide a consistent report, the record was referred to an analyst for resolution.

Separate system processes were established to efficiently provide data from a similar farm to the edit when donor imputation was required. The farm characteristics used to define similarity between a recipient record and its donor record were determined dynamically by the edit logic. Euclidean distance was used for similarity computations, with each contributing similarity characteristic scaled appropriately. The most similar farm based on this criterion (the “nearest neighbor”) was identified and returned to the edit for use as a donor. The calculated distance between the centroids of the principal counties of production of the donor and recipient was always included as one of the measures of similarity.

To provide donors to the automated edit, a pool of successfully edited records was maintained for each section of the report form. These donor pools began with 2007 census data, reconfigured to emulate 2012 data and then edited using 2012 logic. Data from the 2010 Census Content Test were similarly remapped and edited before being added to the original donor pools. As 2012 records were successfully processed, they were added to the donor pools, which maintained the most recent data for each farm. Donor pools were updated approximately every other week, as determined by edit processing schedules. After several updates, all initial data records were dropped, leaving only 2012 records in the donor pools. After each update, donor pool records were grouped into strata containing farms in the same state of similar type and size, using a data-

driven algorithm to define strata. Certain American Indian farms were treated as a separate group, effectively having their own donor pool.

In response to each donor request issued by the edit, a dedicated system process would search the appropriate stratum and respond with the most similar donor, while giving preference to more recent donors. In relatively rare instances where it was unable to provide a donor, the donor selection process issued an appropriate failure message to the edit. Imputation failures occurred for several different reasons. The requirement that an imputed value be positive could have ruled out all available donors, as could have the necessity for the donor record to satisfy a particular constraint – say, that the donor record has cattle, but no milk cows. In general, an imputation failure occurred if there was no satisfactory donor in the same profile as the report being edited. Records with imputation failures were either held until more records were available in the donor pool or referred to an analyst. In addition, when such a failure occurred in finding a donor for expenditure data, a program provided values from a table of donor pool averages in lieu of values from an individual donor, wherever possible. This 'failover' utility was new for the 2012 census imputation process, and significantly reduced the number of imputation failures among the expenditure and labor variables. During the early stages of editing, records requiring imputation for production (and hence yields) of field crops or hay, land values, or certain expenditure variables were set aside or "parked." These records were edited when the donor pools contained only 2012 records, ensuring that 2012 data were used in imputations for these variables.

After receiving a donor's data, the edit substituted the values into the edited record. In many cases, the donor record's data value was scaled using another data field specified in the edit logic. In such cases, the size of the auxiliary field's value in the edited record, relative to its value in the donor record, was used to inflate or reduce the donor record's value for the imputed field. The imputed data were then validated by the same edit logic to which reported data were subject. Since imputation was conducted independently for each occurrence, reports requiring multiple imputations may have drawn from multiple donors.

### Data Analysis

The complex edit ensured the full internal consistency of the record. Successfully completing the edit did not provide insight as to whether the report was reasonable compared to other reports in the county. Analysts were provided an additional set of tools, in the form of listings and graphs, to review record-level data across farms. These examinations revealed extreme outliers, large and small, or unique data distribution patterns that were possibly a result of reporting, recording, or handling errors. Potential problems were researched and, when necessary, corrections were made and the record interactively edited again.

When NASS summarizes the census of agriculture, it assigns the data from an individual report to the "principal" county. The principal county is based on the operator's response to a census question and is the one county in which the majority of agricultural products are produced. Because some large operations have significant production in multiple counties, some reports were broken up into multiple source counties, to more accurately allocate the data. Similarly, large farms operating in more than one State were treated as distinct, state-specific operations. A separate report form was completed for each county or State and a separate record was added.

## ACCOUNTING FOR UNDERCOVERAGE, NONRESPONSE, AND MISCLASSIFICATION

Although much effort was expended making the CML as complete as possible, the CML did not include all U.S. farms, resulting in list undercoverage. Some farm operators who were on the CML did not respond to the census, despite numerous attempts to contact them. In addition, although each operation was classified as a farm or a nonfarm based on the responses to the census report form, some were misclassified; that is, some nonfarms were classified as farms and some farms were classified as nonfarms. NASS's goal was to produce agricultural census totals for publication that were fully adjusted for list undercoverage, nonresponse and misclassification at the county level.

In the 2007 Census of Agriculture, adjustments for undercoverage and nonresponse were estimated independently. In 2007, as in earlier censuses, the NASS area frame was used to adjust for undercoverage. This process assumed that the area frame provided complete coverage and that all operations were correctly classified as farm/nonfarm. To determine the extent of undercoverage in 2007, the CML records were matched to the area-frame tracts designated as agricultural, non-agricultural with potential, or non-agricultural with potential unknown in June. The area-frame tracts that did not match a CML record were designated as being in the Not on the Mail List (NML) domain. In 2007, tracts that were determined to be non-agricultural without potential during the pre-screening phase of the June Agricultural Survey (JAS) were not considered in the NML domain construction. The NML domain tracts were sent a census form and, if a tract was associated with a farm, then that farm contributed to the correction for undercoverage.

To adjust for nonresponse in 2007, each responding CML record was given a probability of being a farm using a classification tree. The inverse of this probability became the nonresponse weight for that record. For undercoverage, the adjustment provided State-level values. A State-level estimate was based on the weighted sum of the responders with an adjustment for the non-responders within that State plus the State-level undercoverage adjustment. Because State-level farm count estimates based on this two-step process sometimes had high standard errors and apparent biases, the national-level adjusted estimates were smoothed across States, producing initial State-level farm operation coverage targets.

Research following the 2007 Census of Agriculture led to the realization that some area-frame operations were misclassified as farm/nonfarm, which was in conflict with the previous assumption that the JAS farm classification was the accurate classification. Further, because nonresponse could only occur if the operation was on the CML, undercoverage and nonresponse were dependent. Thus in 2012, NASS used capture-recapture methodology to adjust for undercoverage, nonresponse, and misclassification. To implement capture-recapture methods, two independent surveys were required. The 2012 Census of Agriculture (based on the CML) and the 2012 JAS (based on the area frame) were those two surveys. Historically, NASS has been careful to maintain the independence of these two surveys.

A second assumption was that the proportion of JAS farms with a given set of characteristics captured by the census was equal to the proportion of U.S. farms with those same characteristics captured by the census.

For a farm to be identified as a farm, and thus captured by the census, it must be on the CML, respond to the census report form and, based on the census response, be classified as a farm; that is, the capture probability $\pi_C$ is of interest:

$$\pi_C = \pi(\text{CML, Responded, Farm on Census}|\text{Farm})$$

Two types of classification error can occur. First, a farm can be misclassified as a nonfarm. This type of misclassification is accounted for in determining the probability of capture $\pi_C$. The second type of classification error results when a response to the census is classified as a farm operation when it does not meet the definition of a farm. That is, some farms on the CML may be misclassified from their census report response and may be nonfarms. To account for the misclassification of nonfarms as farms, the probability of a farm on the census being classified correctly must be estimated; that is,

$$\pi_{CCFC} = \pi(\text{Farm} \mid \text{Farm on Census})$$

where *CCFC* represents Correct Census Farm Classification. To adjust for undercoverage, nonresponse, and misclassification, each CML record classified as a farm based on its response to the census report form was given a weight of the ratio of the estimated probability of correct classification of a farm on the census and the estimated probability of capture ($\hat{\pi}_{CCFC} / \hat{\pi}_C$ where the hat symbol (^) denotes an estimate). To estimate the number of farms with a given set of characteristics, the weights of CML records responding as farms on the census and having that set of characteristics were summed. This estimator is

referred to as the capture-recapture estimator *(CR)*:

$$CR = \sum_{i \in F} \frac{\hat{\pi}_{CCFC,i}}{\hat{\pi}_{C,i}}$$

where $F$ is the set of all CML records classified as farms based on their responses to the census questionnaire.

To estimate the capture and correct census farm classification probabilities, a matched dataset consisting of JAS records and census records was created. Records in the 2012 JAS sample were matched to the 2012 census using probabilistic record linkage. The CML records that matched with JAS tracts represent the Census sample. Note: The Census Sample is a subset of the CML records and includes only those records matching a JAS tract. Both agricultural and non-agricultural tracts were included in the matched dataset. (This differs from the 2007 processes, which considered only the agricultural tracts and non-agricultural tracts with potential or with potential unknown. It also included CML records that responded to the census as a farm or nonfarm and CML records that did not respond to the census.)

## Resolving Farm Status

The farm status based on census responses to either the CML or NML census data collection and the JAS agreed in most cases; these records are referred to as having resolved farm status. However, in other cases, a record was identified as a farm (nonfarm) on the JAS and as a nonfarm (farm) by the census through either the CML or the NML. Such records are said to have conflicting or unresolved farm status. An operation identified as a farm is referred to as in-scope; one identified as a nonfarm is referred to as out-of-scope. From the set of matched records, three groups with conflicting farm status were identified: 1) in-scope JAS records that were out-of-scope on the census and 2) census in-scope and JAS out-of-scope records, and 3) in-scope JAS records that did not have a census response. The records with conflicting farm status were sent to regional field offices for review. In each case, efforts were made to determine whether (1) the status had changed between June and December when the census was conducted, (2) the JAS farm status was correct, (3) the census farm status was correct, (4) the records were incorrectly matched, or (5) the farm status could not be resolved. Not all of the records with conflicting farm status could be resolved. In 2012, 11.6 percent of the records in the Census Sample had unresolved farm status. Of these, 18.9 percent were from nonresponse to the census report form.

The probability an operation is a farm was estimated for the records with unresolved farm status. Using the 2012 matched dataset, a logistic model of the probability an operation is a farm based on the records with resolved farm status was developed; that is, the operations where the farm (or nonfarm) status agreed between the JAS and the census were used to develop a missing data model, which was then used to resolve farm status. The final missing data model was used to impute the probability that each of the agricultural operations with unresolved farm status is a farm. For the resolved farms and nonfarms, the probability of the operation being a farm was 1 and 0, respectively. Five-fold cross-validation was used to develop and to compare competing models. The accuracy of the model was thereby not overstated due to fitting and evaluating the model on the same set of data. To ensure that each of the cross-validation samples covered the U.S., the five cross-validation samples of JAS segments were drawn within State-stratum combinations. Characteristics of the JAS tracts were considered as potential covariates in the model. Because limited information is available for JAS nonfarm tracts, county-level socio-demographic variables from the most recent U.S. population census were also considered. The sample weight associated with each JAS tract was multiplied by the probability of being a farm. This adjusted weight was used in all subsequent modeling.

## Capture Probabilities

Recall that, for a farm to be identified as a farm, and thus captured, by the census, it must be on the CML, respond to the census report form and, based on the census response, be classified as a farm. These adjustments are dependent so that the probability of capture $\pi_C$ may be written as

$\pi_C = \pi$(CML, Responded, Farm on Census|Farm)= $\pi$(CML|Farm)$\pi$(Responded|CML, Farm)$\pi$(Farm on Census|CML, Responded, Farm)

The probability of capturing a farm depends on the characteristics of the farm. Using five-fold cross-validation, three logistic models were developed based on the matched dataset. The first model estimated the probability of a farm being on the CML. The second model estimated the probability that a farm on the CML responded to the census report form. The final model estimated the probability that a farm that was on the CML and responded to the census was identified as a farm based on its response. The probability that a farm is captured by the census of agriculture is then the product of the three conditional probabilities that a farm is on the CML, responds, and is identified as a farm.

Note 1: Responses were required for Must cases. These operations were only included in modeling the probability of a farm being on the CML. Consequently, the weight associated with a Must record was the reciprocal of the probability of a farm being on the CML.

Note 2: Two sets of models were created. One set estimated the probability of capture for Texas farms. The other set provided estimated capture probabilities for farms in the remaining States, except for Alaska.

Note 3: Because Alaska is not included in the JAS and thus has no area frame, the Alaskan agricultural operations were not included in the capture-recapture process. No adjustments were made for undercoverage or misclassification. To account for nonresponse, the CML records were divided into three groups: (1) the Must records, (2) the Criteria Records, and (3) the remaining CML records. The must records received a weight of one, thereby receiving no adjustment for nonresponse. The probability of response for each of the other two groups was the proportion of responders within the group. Each record within the group was then given a weight equal to the reciprocal of the probability of response.

## Misclassification

An operation is misclassified if (1) it meets the definition of a farm, but is classified as a nonfarm on the census or (2) it does not meet the definition of a farm, but is classified as a farm on the census. The first type of misclassification is accounted for when modeling the probability of capture. An adjustment is still needed for the misclassification of nonfarms as farms. As with farm status and capture, the probability of this misclassification depends on an operation's characteristics. Thus, a final logistic model was developed. Given that an operation was classified as a farm on the CML, the probability of its being a farm was modeled based on its characteristics. Five-fold cross-validation was used to ensure that the model was not over-fitted.

## CALIBRATION

Each operation identified as being in-scope on the CML was given a weight equal to the probability of misclassification divided by the probability of capture. This weight accounted for undercoverage, nonresponse, and both types of misclassification.

The record weighting processes were initially applied at the State level to produce adjusted estimates of farm numbers and land in farms for 63 different categories of 8 characteristics of the farm operation or the farm operator -- value of agricultural sales (8); age (2); female; race (4); Hispanic origin of principal farm operator ; 4 sales categories for each of 10 major commodities (40); and farm type groups (7). The State-level number of farms and land in farms were two additional adjusted estimates, resulting in 65 categories. To reduce the intercensal variation at the State level, the State targets were smoothed by averaging the 2012 estimates from capture-recapture and the published 2007 state estimates with the restrictions that the smoothed targets were within one standard error of the capture-recapture estimates. The smoothed State targets were rescaled so that they summed to the national capture-recapture estimates.

These State estimates were general purpose in that they did not provide any control over expected levels of commodity production of the individual farm operation. As a result of this limitation, the

procedures could have over-adjusted or under-adjusted for commodity production. To address this, a second set of variables, known as commodity targets, was added to the calibration algorithm. These targets were commodity totals from administrative sources or from NASS surveys of nonfarm populations (e.g. USDA Farm Service Agency program data, Agricultural Marketing Service market orders, livestock slaughter data, cotton ginning data). The introduction of these commodity coverage targets strengthened the overall adjustment procedure by ensuring that major commodity totals remained within reasonable bounds of established benchmarks. Commodity coverage targets with acceptable ranges were established by subject-matter experts for each State, with New England treated as a State.

Each State was calibrated separately. The calibration algorithm addressed commodity coverage. The algorithm was controlled by the 65 State farm operation coverage targets and the State commodity coverage targets. To ensure that the calibration process converged with so many constraints, it was desirable to provide some tolerance ranges for each target. Although full calibration to a single point estimate would assure that the weighted total among census respondents equaled its target for each calibration variable in either set, it was not always possible to calibrate to such a large number of target values while ensuring that farm weights were within a reasonable range and not less than one. Because of this and because calibration targets are estimates themselves subject to uncertainty, NASS allowed some tolerance in the determination of the adjusted weights. Rather than forcing the total for each calibration variable computed using the adjusted weights to equal a specific amount, NASS allowed the estimated total to fall within a tolerance range. This tolerance strategy made it possible for the calibration algorithm to produce a set of satisfactory, adjusted weights.

Ranges for the farm operation coverage targets were determined differently from the commodity targets. The State target for number of farms had no tolerance range. The tolerance range for the 64 other State farm operation coverage targets was the estimated smoothed State total for the variable plus or minus one-half of the standard error of the capture-recapture estimate. This choice limited the cumulative deviation from the estimated total for a variable when State totals were summed to a U.S. level total. The commodity target tolerance ranges were determined by subject-matter experts, based on the amount of confidence in the source, and usually were less than plus or minus two percent of the target. Ranges were not necessarily symmetric around the target value.

Census data collection was assumed to be complete for very large and unique farms with their weight being controlled to 1 during the calibration adjustment process. For all other farms, adjustment weights were obtained using truncated linear calibration which forced the final census record weights to fall in the interval [1,6]. Adjustments began with the nonresponse and misclassification adjusted weights. Through calibration, a second stage weight that simultaneously satisfied all farm operation coverage and commodity coverage calibration targets was obtained. Calibration was seldom able to adjust weights so that all State targets were met. Within the calibration process, the highest priority for meeting a target was given to the number of farms, total land in farms, and top cash-receipt commodities accounting for 80 percent of the State's production. All remaining targets associated with commodities and characteristics of farms and farm operators had equal priority. If a value within the tolerance range of any variable could not be achieved in a given State, the variable was removed as a target in that State and the calibration algorithm was rerun.

Weight computations in the final algorithms were performed to several decimals. Thus, the fully-adjusted weights were non-integer numbers. To ensure that all subdomains for which NASS publishes summed to their grand total, fully-adjusted weights were integerized. This eliminated the need for rounding individual cell values and ensured that marginal totals always added correctly to the grand total. As an example of how the integerization process worked, assume there were five census records in a county with final noninteger coverage weights of 2.2, for a total of 11. The integerization process randomly selected four of these records and rounded their final weight down to 2.0 and rounded the fifth record up to 3.0, for a total of 11.

The proportions of selected census data items that

are due to coverage, response, and classification adjustments are displayed in Tables A and C.

## DISCLOSURE REVIEW

After tabulation and review of the aggregates, a comprehensive disclosure review was conducted. NASS is obligated to withhold, under Title 7, U.S. Code, any total that would reveal an individual's information or allow it to be closely estimated by the public. Cell suppression was used to protect the cells that were determined to be sensitive to a disclosure of information. Farm counts are not considered sensitive and are not subject to disclosure controls.

Based on agency standards, data cells were determined to be sensitive to a disclosure of information if they violated either of two criteria rules. The threshold rule was violated if the data cell contained less than three operations. For example, if only one farmer produced turkeys in a county, NASS could not publish the county total for turkey inventory without disclosing that individual's information. The dominance rule was violated if the distribution of the data within the cell allowed a data user to estimate any respondent's data too closely. For example, if there are many farmers producing turkeys in a county and some of them were large enough to dominate the cell total, NASS could not publish the county total for turkey inventory without risking disclosing an individual respondent's data. In both of these situations, the data were suppressed and a "(D)" was placed in the cell in the census publication table. These data cells were referred to as primary suppressions.

Since most items were summed to marginal totals, primary suppressions within these summation relationships were protected by ensuring that there were additional suppressions within the linear relationship that provided adequate protection for the primary. A detailed computer routine selected additional data cells for suppression to ensure all primary suppressions were properly protected in all linear relationships in all tables. These data cells were referred to as complementary suppressions. These cells were not themselves sensitive to a disclosure of information but were suppressed to protect other primary suppressions. A "(D)" was also placed in the cell of the census publication table to indicate a complementary suppression. A data user could not determine whether a cell with a (D) represented a primary or a complementary suppression.

Field office analysts reviewed all complementary suppressions to ensure no cells had been withheld that were vital to the data users. In instances where complimentary suppressions were deemed critically important to a State or county, analysts requested an override and a different complementary cell was chosen.

## CENSUS QUALITY

The purpose of the census of agriculture is to account for "any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year." To accomplish this, NASS develops a CML that contains identifying information for operations that have an indication of meeting the census definition, develops procedures to collect agricultural information from those records, establishes criteria for analyst review of the data, creates computer routines to correct or complete the requested information, and provides census estimates of the characteristics of farms and farm operators with associated measures of uncertainty.

It is not likely that either the CML includes all operations that meet the definition of a farm or that all those that do meet the definition of a farm respond to the census inquiry. The goal is to publish data with a high level of quality. There are many ways to measure the quality of a census.

One of the first indicators used is a measure of the response to the census data collection as it has generally been thought that a high response rate indicates more complete coverage of the population of interest. This is a valid assumption if the enumeration list, the CML here, has complete coverage of the population of interest. In the case of the census of agriculture, the definition requiring advance knowledge of sales makes achieving a high level of coverage difficult. To ensure that the census of agriculture is as complete as possible, records are included that might not meet the census definition of a farm – in fact, almost 50 percent more records than the anticipated number of qualifying farm operations

were included in the 2012 CML. A second indicator of quality then is the coverage of the farm population by the CML. Other indicators of quality relate to the accuracy and completeness of the data, and the validity of the procedures used in processing the data.

In some cases, NASS was able to produce measures of quality – such as the response rate to the data collection, the coverage of the census mail list, and the variability of the final adjusted estimates. In other cases, measures were not produced but descriptions of procedures that NASS used to reduce errors from the procedures were subsequently provided.

## Census Response Rate

The response rate is one indicator of the quality of a data collection. It is generally assumed that if a response rate is close to a full participation level of 100 percent, the potential for nonresponse bias is small, although this has been questioned recently in the literature. Because the CML contains both farm and nonfarm records, the response rate is an indicator of replying to the census data collection effort, but does not reflect whether those responding met the farm definition. The response rate for the 2012 Census of Agriculture CML is 80.1 percent as compared with a response rate of 85.2 percent for the 2007 Census of Agriculture and 88.0 for the 2002 Census of Agriculture.

The 2012 Census of Agriculture response rate used the fourth response rate formula from the American Association of Public Opinion Research Response Rate Standard Definitions manual:

$$RR4 = \frac{C_{adj}}{C_{adj} + R + NC + O + Replicated + e(U)}(100)$$

where

$C_{adj}$ = number of fully and partially completed records, excluding replicated records
$R$ = number of explicit refusals
$NC$ = number of non-contacted operations
$O$ = number of other types of nonrespondents
*Replicated* = number of replicated records
$U$ = number of operations of unknown eligibility
$e(U)$ = estimated number of operations of unknown eligibility assumed to be eligible

Records were classified into the above variables based on the combination of their active status (AS) codes, in-scope status, and replication status. Active status refers to the eligibility status of records for selection on the CML. All replicated records were considered to be a form of nonresponse and were classified into other nonrespondents; in-scope status was considered immaterial.

Certain active status classifications indicated records of unknown agricultural status. These classifications included records to be removed from the CML but had data from outside sources indicating agricultural activity, new records from outside data sources, nonrespondents and refusals to the NACS, records for regional office handling only, and records with Farm Service Agency or Conservation Reserve Program data on operations that are not owned by the principal operator. These records were stratified (grouped) based on their probabilities of being in-scope had they responded. The estimated number of in-scope nonrespondents was calculated for the hth stratum (group) by the following formula:

$$e(U_h) = \left(\frac{C_{in-scope,h}}{C_h}\right)U_h$$

where

$e(U_h)$ = estimated number of operations of unknown eligibility assumed to be eligible in the $h$th group
$C_{in\text{-}scope,h}$ = the number of completed and in-scope census records in the $h$th group
$C_h$ = the number of completed census records in the $h$th group
$U_h$ = number of operations of unknown eligibility in the $h$th group

## Census Coverage

As a side-product of the statistical adjustment used to account for undercoverage, nonresponse of farms on the CML, and misclassification of responses to the census, the proportion of the adjustments due to each of those factors can be derived. The percentages of final census estimates due to adjustments for

undercoverage, nonresponse, and misclassification as well as the total percent adjustment for selected items are displayed in Tables A and C.

## MEASURED ERRORS IN THE CENSUS PROCESS

Although the census of agriculture does not inherently rely on a sample, it uses statistical procedures in compiling the CML, in its data collection procedures, in data editing and processing, and in compiling the final data. Additionally, it uses statistical procedures to both measure errors in the various processes and in making adjustments for those errors in the final data. One example is the statistical process used to account for undercoverage, nonresponse of farms on the CML, and misclassification of responses to the census. The basis of the undercoverage adjustment is the capture-recapture procedure that uses the area sample enumeration from the June Agricultural Survey. The largest contribution to error in the census estimates is due to the adjustments for nonresponse, undercoverage, misclassification, calibration and integerization.

### Variability in Census Estimates due to Statistical Adjustment

In conducting the 2012 Census of Agriculture, efforts were initiated to measure error associated with the adjustments for farm operations that were not on the CML, for farm operations that were on the CML but did not respond to the census report form , for farms and nonfarms that were misclassified as nonfarms and farms, respectively, for calibration, and for integerization. These error measurements were developed from the standard error of the estimates at the national, State, and county levels and were expressed as coefficients of variation (CVs) at the national and State levels and as generalized coefficients of variation (GCVs) at the county levels.

The standard error of an estimate is an estimate of the standard deviation of the sampling distribution of the estimator. Because Texas and Alaska were modeled separately from the other States, the variances of a national-level data item for these two States were computed separately and added to the variance of that data item for the rest of the U.S. The standard error was then the square root of the total variance. In each case, standard errors were computed using the group jackknife approach. To conduct the jackknifing, $k$ mutually exclusive and exhaustive groups of JAS segments were formed. The groups were selected using a stratified random design so that each group reflected the survey design, including State and agricultural strata within a State. In turn, each group, $j = 1, 2, \ldots, k$, was deleted and the capture-recapture estimate $CR_i^{(j)}$ was computed for each data item i at the specified geographical level, such as nation, State, or county, using the remaining $(k - 1)$ groups. Estimates of the variance and standard error associated with the capture-recapture estimate $CR_i$ are then, respectively,

$$\sigma_i^2 = \frac{k-1}{k}\sum_{j=1}^{k}(CR_i^{(j)} - CR_i)^2 ; \qquad SE(CR_i) = \sqrt{\sigma_i^2}$$

Increasing $k$ improves the estimate of the variance but, as $k$ increases, the observations become too sparse to reflect the survey design and to provide country-wide coverage. Based on 2007 data, $k = 10$ was determined to be the largest number of groups that could be formed and still have each group provide adequate coverage within all States and agricultural strata. Thus, 10 jackknife groups were used to provide standard errors for 2012 State and national estimates. To capture the additional variability from calibration and integerization, the standard errors were computed using the calibrated, integerized capture-recapture estimates from the jackknife groups. For the estimate of the number of farms with a given set of characteristics, only the CML records with those characteristics were used to obtain the overall estimate as well as the estimates from each jackknife group.

When the constraints of the calibration process produced an artificially small standard error, the more conservative capture-recapture standard error was used. Note that the jackknife groups must only be constructed once, and different subsets of the records were used to compute estimates and standard errors for the data items.

The CV is a measure of the relative amount of error

associated with the sample estimate:

$$CV = \frac{SE\ (CR_i)}{CR_i} 100\ \%$$

where *SE(CRi)* is the standard error of the capture-recapture estimate for data item *i*. This relative measure allows the reliability of a range of estimates to be compared. For example, the standard error is often larger for large population estimates than for small population estimates, but the large population estimates may have a smaller CV, indicating a more reliable estimate. For county-level estimates, a generalized coefficient of variation (GCVs) was determined for each estimate within a State. A generalized variance function relates a function of the variance of an estimator to a function of the estimator. Within a State, the standard error of an estimate for a data item was often found to be linearly related to the estimate of that item with an intercept of zero. Based on this modeled relationship, the GCV is the slope of the line relating the standard error to the estimate, multiplied times 100 to represent the GCV as a percentage.

The standard error is the product of the CV (or GCV for county estimates) and the estimate divided by 100. As an example, if the GCV for a State is 25 percent and a county's estimate is 4, then the standard error is 25(4)/100 = 1. The standard error of an estimated data item from the census provides a measure of the error variation in the value of that estimated data item based on the possible outcomes of the census collection, including variants as to who was on the CML, who returned a census form, who was misclassified either as a farm or as a nonfarm, and the uncertainty associated with calibration and integerization. With 95 percent confidence, an estimate is within two standard errors of the true value being estimated. For this example, with 95 percent confidence, the estimate of 4 is within 2(1) = 2 of the true county value.

Table B presents the fully adjusted estimates with the coefficient of variation for selected items.

## NONMEASURED ERRORS IN THE CENSUS PROCESS

As noted in the previous section, sampling errors can be introduced from the coverage, nonresponse and misclassification adjustment procedures. This error is measureable. However, nonsampling errors are imbedded in the census process that cannot be directly measured as part of the design of the census but must be contained to ensure an accurate count. Extensive efforts were made to compile a complete and accurate mail list for the census, to elicit response to the census, to design an understandable report form with clear instructions, to minimize processing errors through the use of quality control measures, to reduce matching error associated with the capture-recapture estimation process, and to minimize error associated with identification of a respondent as a farm operation (referred to as classification error). The weight adjustment and tabulation processes recognize the presence of nonsampling errors; however, it is assumed that these errors are small and that, in total, the net effect is zero. In other words, the positive errors cancel the negative errors.

### Respondent and Enumerator Error

Incorrect or incomplete responses to the census report form or to the questions posed by an enumerator can introduce error into the census data. Steps were taken in the design and execution of the census of agriculture to reduce errors from respondent reporting. Poor instructions and ambiguous definitions lead to misreporting. Respondents may not remember accurately, may give rounded numbers, or may record an item in the wrong cell. To reduce reporting and recording errors, the report form was tested prior to the census using industry accepted cognitive testing procedures. Detailed instructions for completing the report form were provided to each respondent. Questions were phrased as clearly as possible based on previous tests of the report form. Computer-assisted telephone interviewing software included immediate integrity checks of recorded responses so suspect data could be verified or corrected. In addition, each respondent's answers were checked for completeness and consistency by the complex edit and imputation system.

### Processing Error

Processing of each census report form was another potential source of nonsampling error. All mail

returns that included multiple reports, respondent remarks, or that were marked out of business and report forms with no reported data were sent to an analyst for verification and appropriate action. Integrity checks were performed by the imaging system and data transfer functions. Standard quality control procedures were in place that required that randomly selected batches of data keyed from image be re-entered by a different operator to verify the work and evaluate key entry operators. All systems and programs were thoroughly tested before going on-line and were monitored throughout the processing period.

Developing accurate processing methods is complicated by the complex structure of agriculture. Among the complexities are the many places to be included, the variety of arrangements under which farms are operated, the continuing changes in the relationship of operators to the farm operated, the expiration of leases and the initiation or renewal of leases, the problem of obtaining a complete list of agriculture operations, the difficulty of contacting and identifying some types of contractor/contractee relationships, the operator's absence from the farm during the data collection period, and the operator's opinion that part or all of the operation does not qualify and should not be included in the census. During data collection and processing of the census, all operations underwent a number of quality control checks to ensure results were as accurate as possible.

## Item Nonresponse

All item nonresponse actions provide another opportunity to introduce measurement errors. Regardless of whether it was previously reported data, administrative data, the nearest neighbor algorithm, or manually imputed by an analyst, some risk exists that the imputed value does not equal the actual value. Previously reported and administrative data were used only when they related to the census reference period. A new nearest neighbor was randomly selected for each incident to eliminate the chance of a consistent bias.

## Record Matching Error

The process of building and expanding the CML involves finding new list sources and checking for names not on the list. An automated processing system compared each new name to the existing CML names and "linked" like records for the purpose of preventing duplication. New names with strong links to a CML name were discarded and those with no links were added as potential farms. Names with weak links, possible matches, were reviewed by staff to determine whether the new name should be added. Despite this thorough review, some new names may have been erroneously added or deleted. Additions could contribute to duplication (overcoverage) whereas deletions could contribute to undercoverage. As a result, some names received more than one report form, and some farm operators did not receive a report form. Respondents were instructed to complete one form and return all forms so the duplication could be removed.

Another chance for error came when comparing June Agricultural Survey tract operator names to the CML. Area operators whose names were not found on the CML were part of the measure of list incompleteness, or NML. Mistakes in determining overlap status resulted in overcounts (including a tract whose operator was on the CML) or undercounts (excluding a tract whose operator was not on the CML). All tracts determined to not be on the list were triple checked to eliminate, or at least minimize, any error. NML tract operators were mailed a report form printed in a different color. In order to attempt to identify duplication, all respondents who received multiple report forms were instructed to complete the CML version and return all forms so duplication could be removed.

Records in the 2012 JAS were matched to the 2012 census using probabilistic record linkage. The records of operations with unresolved farm status were reviewed by the field offices. If farm status could not be resolved, the probability of an operation being a farm was imputed using a missing data model. The uncertainty associated with this estimate, with the exception of model uncertainty, was accounted for, but errors not found through this process were not.

## Model Uncertainty Error

Five logistic models were developed in the process of adjusting the farm numbers for undercoverage,

nonresponse, and misclassification. One model estimated the probability of an agricultural operation with unresolved farm status being a farm. The remaining four models estimated the probability of coverage, response, and correct classification of farms and of nonfarms. Each model was fit independently by two people. For some models, both statisticians obtained the same model. Although the covariates in the two selected models differed some for the other logistic models, the estimated probabilities were similar, but not identical. The reported standard errors account for the variability in the parameter estimates of the selected models, but not for the additional variation due to model uncertainty. They also do not account for any bias associated with a model.

## Table A. **Summary of State Coverage, Nonresponse, and Misclassification Adjustments: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Total | Standard error | Adjustment as percent of total | Percent of total adjustment from coverage | Percent of total adjustment from nonresponse | Percent of total adjustment from misclassification |
|---|---|---|---|---|---|---|---|
| Farms | number | 37,249 | 3,543 | 32.0 | 17.7 | 12.2 | 2.1 |
| Land in farms | acres | 14,748,107 | 302,364 | 9.6 | 2.3 | 6.3 | 1.0 |
| Farms by size: | | | | | | | |
| 1 to 9 acres | farms | 10,559 | 1,920 | 37.0 | 25.8 | 10.9 | 0.3 |
| | acres | 48,650 | 8,480 | 36.9 | 25.3 | 10.7 | 0.9 |
| 10 to 49 acres | farms | 12,980 | 1,067 | 32.7 | 18.8 | 10.8 | 3.1 |
| | acres | 294,392 | 22,618 | 32.2 | 18.0 | 10.9 | 3.3 |
| 50 to 69 acres | farms | 1,826 | 125 | 34.4 | 11.8 | 18.7 | 4.0 |
| | acres | 105,323 | 7,198 | 34.4 | 11.8 | 18.6 | 4.0 |
| 70 to 99 acres | farms | 2,018 | 145 | 35.2 | 11.0 | 20.1 | 4.1 |
| | acres | 164,501 | 11,797 | 35.3 | 11.0 | 20.1 | 4.2 |
| 100 to 139 acres | farms | 1,513 | 101 | 34.1 | 11.2 | 19.1 | 3.9 |
| | acres | 174,267 | 11,766 | 34.2 | 11.2 | 19.1 | 3.9 |
| 140 to 179 acres | farms | 1,180 | 68 | 31.9 | 10.0 | 17.9 | 4.1 |
| | acres | 186,465 | 10,774 | 32.0 | 10.0 | 17.9 | 4.1 |
| 180 to 219 acres | farms | 739 | 39 | 28.6 | 7.8 | 17.1 | 3.6 |
| | acres | 146,175 | 7,775 | 28.5 | 7.8 | 17.1 | 3.6 |
| 220 to 259 acres | farms | 527 | 26 | 28.8 | 7.6 | 18.0 | 3.2 |
| | acres | 125,101 | 6,073 | 28.9 | 7.6 | 18.0 | 3.2 |
| 260 to 499 acres | farms | 1,805 | 90 | 27.0 | 6.9 | 16.4 | 3.8 |
| | acres | 650,461 | 34,638 | 26.8 | 6.8 | 16.2 | 3.8 |
| 500 to 999 acres | farms | 1,508 | 108 | 26.3 | 4.9 | 17.6 | 3.8 |
| | acres | 1,056,164 | 79,540 | 26.1 | 4.9 | 17.4 | 3.8 |
| 1,000 to 1,999 acres | farms | 1,123 | 48 | 19.0 | 3.0 | 13.5 | 2.4 |
| | acres | 1,575,863 | 66,631 | 18.6 | 2.9 | 13.3 | 2.4 |
| 2,000 acres or more | farms | 1,471 | 40 | 6.1 | 0.7 | 4.9 | 0.5 |
| | acres | 10,220,745 | 179,961 | 2.7 | 0.5 | 2.0 | 0.2 |
| Irrigated land use: | | | | | | | |
| Harvested cropland | farms | 12,021 | 991 | 27.4 | 13.4 | 13.3 | 0.7 |
| | acres | 1,550,138 | 42,182 | 10.6 | 2.1 | 7.4 | 1.2 |
| Pastureland and other land | farms | 4,269 | 463 | 36.0 | 20.0 | 12.9 | 3.0 |
| | acres | 83,433 | 4,854 | 25.2 | 8.0 | 14.5 | 2.7 |
| Market value of agricultural products sold | $1,000 | 9,120,749 | 575,298 | 5.8 | 1.3 | 4.2 | 0.3 |
| Farms by value of sales: | | | | | | | |
| Less than $1,000 | farms | 12,513 | 1,886 | 43.3 | 29.0 | 11.8 | 2.5 |
| | $1,000 | 1,587 | 347 | 46.8 | 34.5 | 12.6 | -0.2 |
| $1,000 to $2,499 | farms | 4,387 | 462 | 30.9 | 17.4 | 11.1 | 2.4 |
| | $1,000 | 7,364 | 752 | 30.9 | 17.2 | 11.2 | 2.5 |
| $2,500 to $4,999 | farms | 4,084 | 394 | 31.3 | 16.8 | 11.5 | 3.0 |
| | $1,000 | 14,710 | 1,411 | 31.4 | 16.9 | 11.5 | 3.0 |
| $5,000 to $9,999 | farms | 3,542 | 325 | 31.9 | 16.1 | 12.5 | 3.2 |
| | $1,000 | 24,770 | 2,282 | 31.9 | 16.1 | 12.6 | 3.2 |
| $10,000 to $19,999 | farms | 2,658 | 265 | 23.9 | 10.1 | 15.5 | -1.7 |
| | $1,000 | 37,074 | 3,712 | 24.1 | 10.1 | 15.5 | -1.5 |
| $20,000 to $24,999 | farms | 740 | 83 | 28.2 | 10.9 | 18.0 | -0.6 |
| | 1,000 | 16,377 | 1,853 | 28.2 | 10.9 | 18.0 | -0.6 |
| $25,000 to $39,999 | farms | 1,220 | 89 | 25.7 | 8.3 | 13.5 | 3.9 |
| | $1,000 | 38,505 | 2,825 | 25.6 | 8.2 | 13.5 | 3.9 |
| $40,000 to $49,999 | farms | 623 | 65 | 27.8 | 8.0 | 15.8 | 3.9 |
| | $1,000 | 27,652 | 2,772 | 27.7 | 8.0 | 15.8 | 3.9 |
| $50,000 to $99,999 | farms | 1,380 | 86 | 24.3 | 7.3 | 14.3 | 2.8 |
| | $1,000 | 98,071 | 5,987 | 24.6 | 7.3 | 14.5 | 2.8 |
| $100,000 to $249,999 | farms | 2,081 | 830 | 33.5 | 5.6 | 27.0 | 0.9 |
| | $1,000 | 343,351 | 140,149 | 33.8 | 5.6 | 27.3 | 0.9 |
| $250,000 to $499,999 | farms | 1,286 | 87 | 14.5 | 2.0 | 11.8 | 0.6 |
| | $1,000 | 462,745 | 31,856 | 14.8 | 2.0 | 12.2 | 0.7 |
| $500,000 to $999,999 | farms | 1,149 | 72 | 11.1 | 0.9 | 9.3 | 0.9 |
| | $1,000 | 821,011 | 57,107 | 11.6 | 1.0 | 9.7 | 0.9 |
| $1,000,000 or more | farms | 1,586 | 141 | 5.2 | 1.0 | 3.8 | 0.4 |
| | $1,000 | 7,227,533 | 742,771 | 2.5 | 0.7 | 1.7 | 0.1 |
| Net cash farm income of operations (see text): | | | | | | | |
| Farms with gains of [1] - | | | | | | | |
| Less than $1,000 | farms | 1,185 | 122 | 33.3 | 17.7 | 12.8 | 2.8 |
| | $1,000 | 562 | 56 | 33.8 | 17.8 | 13.0 | 3.0 |
| $1,000 to $4,999 | farms | 2,685 | 267 | 31.5 | 15.6 | 13.4 | 2.5 |
| | $1,000 | 7,239 | 719 | 31.4 | 15.2 | 13.7 | 2.5 |
| $5,000 to $9,999 | farms | 1,578 | 136 | 31.2 | 14.3 | 16.2 | 0.7 |
| | $1,000 | 11,525 | 975 | 31.0 | 14.2 | 16.2 | 0.6 |
| $10,000 to $24,999 | farms | 2,246 | 157 | 28.4 | 11.5 | 15.8 | 1.1 |
| | $1,000 | 36,494 | 2,511 | 28.3 | 11.2 | 15.8 | 1.2 |
| $25,000 to $49,999 | farms | 1,528 | 100 | 28.4 | 9.0 | 15.9 | 3.5 |
| | $1,000 | 54,856 | 3,917 | 28.4 | 8.9 | 15.9 | 3.5 |
| $50,000 or more | farms | 4,770 | 197 | 16.1 | 3.0 | 11.8 | 1.3 |
| | $1,000 | 2,341,437 | 164,025 | 5.6 | 1.1 | 4.1 | 0.4 |
| Farms with losses of - | | | | | | | |
| Less than $1,000 | farms | 1,441 | 159 | 32.1 | 19.1 | 11.3 | 1.7 |
| | 1,000 | 746 | 81 | 31.7 | 19.0 | 11.1 | 1.6 |
| $1,000 to $4,999 | farms | 7,022 | 937 | 36.7 | 23.2 | 11.4 | 2.1 |
| | 1,000 | 20,764 | 2,873 | 37.3 | 23.9 | 11.3 | 2.1 |
| $5,000 to $9,999 | farms | 5,519 | 736 | 38.1 | 24.0 | 11.8 | 2.3 |
| | 1,000 | 39,912 | 5,329 | 38.3 | 24.0 | 11.9 | 2.4 |
| $10,000 to $24,999 | farms | 5,451 | 640 | 37.6 | 22.7 | 12.4 | 2.5 |
| | 1,000 | 84,481 | 9,747 | 37.5 | 22.5 | 12.5 | 2.5 |
| $25,000 to $49,999 | farms | 1,891 | 168 | 33.8 | 18.2 | 13.0 | 2.7 |
| | 1,000 | 65,126 | 5,787 | 33.7 | 17.9 | 13.0 | 2.7 |
| $50,000 or more | farms | 1,933 | 204 | 27.6 | 10.8 | 14.3 | 2.5 |
| | 1,000 | 488,624 | 12,493 | 18.6 | 6.4 | 10.7 | 1.6 |
| Farms by legal status for tax purposes: | | | | | | | |
| Family or individual | farms | 30,167 | 3,133 | 34.1 | 19.3 | 12.6 | 2.2 |
| | acres | 5,140,660 | 179,520 | 19.0 | 4.8 | 11.9 | 2.2 |
| Partnership | farms | 2,685 | 170 | 26.1 | 12.1 | 12.1 | 1.9 |
| | acres | 2,733,462 | 40,225 | 6.4 | 1.4 | 4.4 | 0.6 |

See footnote(s) at end of table.

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Table A. **Summary of State Coverage, Nonresponse, and Misclassification Adjustments: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Total | Standard error | Adjustment as percent of total | Percent of total adjustment from coverage | Percent of total adjustment from nonresponse | Percent of total adjustment from misclassification |
|---|---|---|---|---|---|---|---|
| Farms by legal status for tax purposes: - Con. | | | | | | | |
| Corporation: | | | | | | | |
| Family held | farms | 3,157 | 157 | 20.3 | 7.9 | 11.1 | 1.3 |
| | acres | 3,466,028 | 73,969 | 6.5 | 1.0 | 4.9 | 0.5 |
| Other than family held | farms | 306 | 36 | 25.5 | 11.5 | 13.0 | 1.0 |
| | acres | 324,534 | 18,951 | 4.0 | 0.7 | 2.9 | 0.4 |
| Other - cooperative, estate or trust, institutional, etc. | farms | 934 | 145 | 24.0 | 14.0 | 8.2 | 1.7 |
| | acres | 3,083,423 | 39,665 | 1.2 | 0.5 | 0.5 | 0.1 |
| Tenure: | | | | | | | |
| Full owners | farms | 29,070 | 3,095 | 33.8 | 19.8 | 11.9 | 2.1 |
| | acres | 6,486,223 | 140,104 | 12.2 | 3.9 | 6.6 | 1.6 |
| Part owners | farms | 5,927 | 294 | 24.7 | 8.5 | 13.9 | 2.2 |
| | acres | 6,043,663 | 125,285 | 7.4 | 1.2 | 5.6 | 0.7 |
| Tenants | farms | 2,252 | 177 | 28.8 | 13.3 | 13.5 | 2.1 |
| | acres | 2,218,221 | 62,833 | 8.2 | 1.3 | 6.2 | 0.7 |
| Principal operator characteristics by- | | | | | | | |
| Sex of operator: | | | | | | | |
| Male | farms | 29,730 | 2,516 | 31.6 | 16.2 | 12.5 | 2.8 |
| | acres | 13,972,060 | 267,363 | 9.0 | 2.0 | 6.1 | 1.0 |
| Female | farms | 7,519 | 1,060 | 34.0 | 23.2 | 11.3 | -0.4 |
| | acres | 776,047 | 41,847 | 21.5 | 7.9 | 10.9 | 2.7 |
| Primary occupation: | | | | | | | |
| Farming | farms | 17,650 | 1,307 | 28.2 | 13.9 | 12.2 | 2.1 |
| Other | farms | 19,599 | 2,246 | 35.5 | 20.9 | 12.5 | 2.1 |
| Spanish, Hispanic, or Latino origin (see text) | farms | 1,874 | 269 | 58.5 | 19.4 | 27.9 | 11.3 |
| | acres | 164,360 | 31,842 | 26.4 | 4.3 | 17.7 | 4.4 |
| Race: | | | | | | | |
| American Indian or Alaska Native | farms | 458 | 61 | 44.1 | 15.0 | 22.0 | 7.1 |
| | acres | 2,886,796 | 9,362 | 0.7 | 0.3 | 0.4 | 0.1 |
| Asian | farms | 436 | 111 | 46.3 | 12.6 | 19.2 | 14.6 |
| | acres | 39,771 | 3,553 | 22.7 | 3.6 | 13.2 | 5.8 |
| Black or African American | farms | 60 | 14 | 43.3 | 15.2 | 23.0 | 5.1 |
| | acres | 5,744 | 5,396 | 48.1 | 7.3 | 31.3 | 9.5 |
| Native Hawaiian or Other Pacific Islander | farms | 49 | 11 | 55.1 | 17.6 | 19.0 | 18.5 |
| | acres | 1,034 | 174 | 48.6 | 12.4 | 20.7 | 15.6 |
| White | farms | 35,958 | 3,351 | 31.7 | 17.7 | 12.0 | 2.1 |
| | acres | 11,778,717 | 290,239 | 11.8 | 2.7 | 7.8 | 1.3 |
| More than one race reported | farms | 288 | 69 | 24.7 | 40.7 | 16.2 | -32.3 |
| | acres | 36,045 | 3,943 | 9.0 | 6.6 | 4.7 | -2.2 |
| Reporting primary occupation as farming by age group: | | | | | | | |
| Under 25 years | farms | 120 | 28 | 50.0 | 28.7 | 15.8 | 5.5 |
| 25 to 34 years | farms | 732 | 108 | 57.0 | 28.2 | 21.8 | 7.0 |
| 35 to 44 years | farms | 1,415 | 183 | 33.1 | 13.5 | 15.6 | 4.0 |
| 45 to 54 years | farms | 2,976 | 242 | 28.4 | 13.1 | 15.5 | -0.2 |
| 55 to 64 years | farms | 5,226 | 297 | 24.5 | 12.0 | 11.5 | 0.9 |
| 65 years and over | farms | 7,181 | 485 | 26.5 | 14.5 | 9.0 | 3.0 |
| Reporting primary occupation as other than farming by age group: | | | | | | | |
| Under 25 years | farms | 61 | (H) | 57.4 | 32.9 | 16.1 | 8.4 |
| 25 to 34 years | farms | 794 | 188 | 60.8 | 37.8 | 15.4 | 7.6 |
| 35 to 44 years | farms | 2,087 | 426 | 43.7 | 22.7 | 15.9 | 5.0 |
| 45 to 54 years | farms | 4,911 | 630 | 36.9 | 22.2 | 15.3 | -0.6 |
| 55 to 64 years | farms | 6,538 | 585 | 32.7 | 19.7 | 11.5 | 1.5 |
| 65 years and over | farms | 5,208 | 447 | 30.4 | 18.2 | 8.5 | 3.7 |
| All operators by age group [2]: | | | | | | | |
| Under 25 years | farms | 757 | 144 | 40.6 | 23.7 | 14.0 | 2.9 |
| 25 to 34 years | farms | 3,317 | 551 | 48.8 | 27.6 | 15.6 | 5.6 |
| 35 to 44 years | farms | 6,724 | 1,028 | 37.2 | 18.7 | 14.6 | 3.9 |
| 45 to 54 years | farms | 13,441 | 1,447 | 33.0 | 18.7 | 14.2 | 0.1 |
| 55 to 64 years | farms | 18,459 | 1,428 | 29.4 | 16.6 | 11.4 | 1.4 |
| 65 to 74 years | farms | 11,927 | 939 | 28.5 | 16.7 | 8.6 | 3.1 |
| 75 years and over | farms | 5,159 | 358 | 28.9 | 14.9 | 10.8 | 3.2 |
| Livestock and poultry: | | | | | | | |
| Cattle and calves inventory | farms | 11,861 | 1,268 | 34.9 | 18.9 | 12.6 | 3.4 |
| | number | 1,162,792 | 41,227 | 8.3 | 2.3 | 5.4 | 0.6 |
| Beef cows inventory | farms | 9,285 | 898 | 34.3 | 18.2 | 12.6 | 3.5 |
| | number | 211,852 | 8,607 | 15.2 | 4.7 | 9.0 | 1.5 |
| Milk cows inventory | frams | 798 | 296 | 27.3 | 10.2 | 14.5 | 2.6 |
| | number | 266,989 | 7,179 | 0.4 | (Z) | 0.3 | (Z) |
| Hog and pigs inventory | farms | 934 | 251 | 21.3 | 14.2 | 6.7 | 0.5 |
| | number | 19,861 | 2,360 | 1.6 | 0.9 | 0.7 | 0.0 |
| Layers inventory | farms | 6,276 | 1,069 | 41.4 | 27.8 | 12.1 | 1.5 |
| | number | 7,236,128 | 784,672 | 0.7 | 0.6 | (Z) | (Z) |
| Broilers sold | farms | 527 | 83 | 42.7 | 28.2 | 12.5 | 2.0 |
| | number | 28,252,490 | 7,640,429 | 39.6 | 38.3 | 1.5 | -0.2 |
| Aquaculture sold | farms | 381 | 104 | 10.8 | 8.5 | 2.3 | -0.1 |
| | $1,000 | 187,222 | 30,603 | 0.6 | 0.4 | 0.1 | (Z) |
| Selected crops harvested: | | | | | | | |
| Corn for grain | farms | 575 | 41 | 20.0 | 4.5 | 13.5 | 2.0 |
| | acres | 114,516 | 2,598 | 7.4 | 0.9 | 6.0 | 0.6 |
| Wheat, winter | farms | 2,415 | 185 | 17.7 | 2.3 | 13.9 | 1.5 |
| | acres | 1,669,175 | 34,531 | 5.8 | 0.6 | 4.9 | 0.3 |
| Wheat, durum | farms | 3 | 1 | (Z) | (Z) | (Z) | (Z) |
| | acres | 3,264 | 269 | (Z) | (Z) | (Z) | (Z) |

See footnote(s) at end of table.

--continued

Table A. **Summary of State Coverage, Nonresponse, and Misclassification Adjustments: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Total | Standard error | Adjustment as percent of total | Percent of total adjustment from coverage | Percent of total adjustment from nonresponse | Percent of total adjustment from misclassification |
|---|---|---|---|---|---|---|---|
| Selected crops harvested: - Con. | | | | | | | |
| Wheat, spring | farms | 1,408 | 126 | 15.2 | 2.0 | 11.9 | 1.3 |
| | acres | 514,374 | 19,067 | 4.8 | 0.5 | 4.1 | 0.3 |
| Soybeans for beans | farms | 2 | 1 | (Z) | (Z) | (Z) | (Z) |
| | acres | (D) | (D) | (D) | (D) | (D) | (D) |
| Sorghum for grain | farms | 2 | (H) | (Z) | (Z) | (Z) | (Z) |
| | acres | (D) | (D) | (D) | (D) | (D) | (D) |
| Rice | farms | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - |
| Cotton | farms | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - |
| Peanuts | farms | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - |
| Barley | farms | 817 | 81 | 19.7 | 3.0 | 15.0 | 1.6 |
| | acres | 175,074 | 9,107 | 13.9 | 1.2 | 11.9 | 0.8 |
| Oats | farms | 139 | 12 | 31.7 | 7.8 | 20.1 | 3.8 |
| | acres | 6,129 | 801 | 29.3 | 3.5 | 22.6 | 3.2 |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) | farms | 10,396 | 762 | 26.6 | 11.3 | 12.7 | 2.6 |
| | acres | 748,909 | 26,908 | 13.8 | 3.0 | 9.1 | 1.7 |
| Land in vegetables (see text) | farms | 2,836 | 483 | 43.3 | 24.6 | 15.7 | 3.0 |
| | acres | 337,859 | 10,998 | 17.7 | 7.8 | 8.7 | 1.1 |
| Potatoes | farms | 1,205 | 223 | 42.9 | 24.5 | 15.5 | 2.9 |
| | acres | 163,925 | 4,395 | 13.3 | 5.9 | 6.8 | 0.7 |
| Tomatoes in the open | farms | 1,032 | 256 | 47.7 | 26.9 | 16.8 | 4.0 |
| | acres | 407 | 72 | 30.5 | 16.3 | 11.9 | 2.4 |
| Sweet corn | farms | 1,068 | 167 | 45.0 | 24.8 | 16.5 | 3.8 |
| | acres | 90,671 | 8,862 | 22.3 | 11.1 | 10.2 | 1.1 |
| Lettuce | farms | 222 | 43 | 41.9 | 24.4 | 15.7 | 1.8 |
| | acres | 206 | 25 | 19.0 | 8.6 | 9.3 | 1.1 |
| Land in orchards | farms | 4,846 | 413 | 26.0 | 13.0 | 13.3 | -0.3 |
| | acres | 315,456 | 6,634 | 13.0 | 3.6 | 8.9 | 0.5 |
| Apples | farms | 2,839 | 388 | 26.7 | 13.2 | 13.9 | -0.5 |
| | acres | 174,152 | 3,516 | 14.6 | 3.8 | 10.2 | 0.6 |
| Grapes | farms | 1,355 | 110 | 27.2 | 15.4 | 11.9 | 0.0 |
| | acres | 71,494 | 1,781 | 10.8 | 3.6 | 6.9 | 0.4 |
| Oranges | farms | - | - | - | - | - | - |
| | acres | - | - | - | - | - | - |
| Almonds | farms | 6 | 2 | 33.3 | 21.9 | 10.6 | 0.9 |
| | acres | 5 | 4 | 46.7 | 32.2 | 15.5 | -1.0 |
| Land in berries | farms | 1,828 | 242 | 32.1 | 19.5 | 12.5 | 0.1 |
| | acres | 24,076 | 4,413 | 8.7 | 2.8 | 5.3 | 0.6 |

[1] Farms with total production expenses equal to market value of agricultural products sold, government payments, and farm-related income are included as farms with gains of less than $1,000.
[2] Data were collected for a maximum of three operators per farm.

## Table B. **Reliability Estimates of State Totals: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Total | Coefficient of variation (percent) |
|---|---|---|---|
| Farms | number | 37,249 | 9.5 |
| Land in farms | acres | 14,748,107 | 2.1 |
| Farms by size: | | | |
| 1 to 9 acres | farms | 10,559 | 18.2 |
| | acres | 48,650 | 17.4 |
| 10 to 49 acres | farms | 12,980 | 8.2 |
| | acres | 294,392 | 7.7 |
| 50 to 69 acres | farms | 1,826 | 6.8 |
| | acres | 105,323 | 6.8 |
| 70 to 99 acres | farms | 2,018 | 7.2 |
| | acres | 164,501 | 7.2 |
| 100 to 139 acres | farms | 1,513 | 6.7 |
| | acres | 174,267 | 6.8 |
| 140 to 179 acres | farms | 1,180 | 5.8 |
| | acres | 186,465 | 5.8 |
| 180 to 219 acres | farms | 739 | 5.3 |
| | acres | 146,175 | 5.3 |
| 220 to 259 acres | farms | 527 | 4.8 |
| | acres | 125,101 | 4.9 |
| 260 to 499 acres | farms | 1,805 | 5.0 |
| | acres | 650,461 | 5.3 |
| 500 to 999 acres | farms | 1,508 | 7.2 |
| | acres | 1,056,164 | 7.5 |
| 1,000 to 1,999 acres | farms | 1,123 | 4.2 |
| | acres | 1,575,863 | 4.2 |
| 2,000 acres or more | farms | 1,471 | 2.7 |
| | acres | 10,220,745 | 1.8 |
| Irrigated land use: | | | |
| Harvested cropland | farms | 12,021 | 8.2 |
| | acres | 1,550,138 | 2.7 |
| Pastureland and other land | farms | 4,269 | 10.9 |
| | acres | 83,433 | 5.8 |
| Market value of agricultural products sold | $1,000 | 9,120,749 | 6.3 |
| Farms by value of sales: | | | |
| Less than $1,000 | farms | 12,513 | 15.1 |
| | $1,000 | 1,587 | 21.8 |
| $1,000 to $2,499 | farms | 4,387 | 10.5 |
| | $1,000 | 7,364 | 10.2 |
| $2,500 to $4,999 | farms | 4,084 | 9.7 |
| | $1,000 | 14,710 | 9.6 |
| $5,000 to $9,999 | farms | 3,542 | 9.2 |
| | $1,000 | 24,770 | 9.2 |
| $10,000 to $19,999 | farms | 2,658 | 10.0 |
| | $1,000 | 37,074 | 10.0 |
| $20,000 to $24,999 | farms | 740 | 11.2 |
| | 1,000 | 16,377 | 11.3 |
| $25,000 to $39,999 | farms | 1,220 | 7.3 |
| | $1,000 | 38,505 | 7.3 |
| $40,000 to $49,999 | farms | 623 | 10.4 |
| | $1,000 | 27,652 | 10.0 |
| $50,000 to $99,999 | farms | 1,380 | 6.2 |
| | $1,000 | 98,071 | 6.1 |
| $100,000 to $249,999 | farms | 2,081 | 39.9 |
| | $1,000 | 343,351 | 40.8 |
| $250,000 to $499,999 | farms | 1,286 | 6.8 |
| | $1,000 | 462,745 | 6.9 |
| $500,000 to $999,999 | farms | 1,149 | 6.3 |
| | $1,000 | 821,011 | 7.0 |
| $1,000,000 or more | farms | 1,586 | 8.9 |
| | $1,000 | 7,227,533 | 10.3 |
| Net cash farm income of operations (see text): | | | |
| Farms with gains of [1] - | | | |
| Less than $1,000 | farms | 1,185 | 10.3 |
| | $1,000 | 562 | 10.0 |
| $1,000 to $4,999 | farms | 2,685 | 9.9 |
| | $1,000 | 7,239 | 9.9 |
| $5,000 to $9,999 | farms | 1,578 | 8.6 |
| | $1,000 | 11,525 | 8.5 |
| $10,000 to $24,999 | farms | 2,246 | 7.0 |
| | $1,000 | 36,494 | 6.9 |
| $25,000 to $49,999 | farms | 1,528 | 6.6 |
| | $1,000 | 54,856 | 7.1 |
| $50,000 or more | farms | 4,770 | 4.1 |
| | $1,000 | 2,341,437 | 7.0 |
| Farms with losses of - | | | |
| Less than $1,000 | farms | 1,441 | 11.0 |
| | 1,000 | 746 | 10.8 |
| $1,000 to $4,999 | farms | 7,022 | 13.4 |
| | 1,000 | 20,764 | 13.8 |
| $5,000 to $9,999 | farms | 5,519 | 13.3 |
| | 1,000 | 39,912 | 13.4 |
| $10,000 to $24,999 | farms | 5,451 | 11.7 |
| | 1,000 | 84,481 | 11.5 |
| $25,000 to $49,999 | farms | 1,891 | 8.9 |
| | 1,000 | 65,126 | 8.9 |
| $50,000 or more | farms | 1,933 | 10.5 |
| | 1,000 | 488,624 | 2.6 |
| Farms by legal status for tax purposes: | | | |
| Family or individual | farms | 30,167 | 10.4 |
| | acres | 5,140,660 | 3.5 |

| Item | | Total | Coefficient of variation (percent) |
|---|---|---|---|
| Farms by legal status for tax purposes: - Con. | | | |
| Partnership | farms | 2,685 | 6.3 |
| | acres | 2,733,462 | 1.5 |
| Corporation: | | | |
| Family held | farms | 3,157 | 5.0 |
| | acres | 3,466,028 | 2.1 |
| Other than family held | farms | 306 | 11.6 |
| | acres | 324,534 | 5.8 |
| Other - cooperative, estate or trust, institutional, etc. | farms | 934 | 15.5 |
| | acres | 3,083,423 | 1.3 |
| Tenure: | | | |
| Full owners | farms | 29,070 | 10.6 |
| | acres | 6,486,223 | 2.2 |
| Part owners | farms | 5,927 | 5.0 |
| | acres | 6,043,663 | 2.1 |
| Tenants | farms | 2,252 | 7.8 |
| | acres | 2,218,221 | 2.8 |
| Principal operator characteristics by- | | | |
| Sex of operator: | | | |
| Male | farms | 29,730 | 8.5 |
| | acres | 13,972,060 | 1.9 |
| Female | farms | 7,519 | 14.1 |
| | acres | 776,047 | 5.4 |
| Primary occupation: | | | |
| Farming | farms | 17,650 | 7.4 |
| Other | farms | 19,599 | 11.5 |
| Spanish, Hispanic, or Latino origin (see text) | farms | 1,874 | 14.4 |
| | acres | 164,360 | 19.4 |
| Race: | | | |
| American Indian or Alaska Native | farms | 458 | 13.3 |
| | acres | 2,886,796 | 0.3 |
| Asian | farms | 436 | 25.4 |
| | acres | 39,771 | 8.9 |
| Black or African American | farms | 60 | 23.9 |
| | acres | 5,744 | 93.9 |
| Native Hawaiian or Other Pacific Islander | farms | 49 | 23.1 |
| | acres | 1,034 | 16.8 |
| White | farms | 35,958 | 9.3 |
| | acres | 11,778,717 | 2.5 |
| More than one race reported | farms | 288 | 24.0 |
| | acres | 36,045 | 10.9 |
| Reporting primary occupation as farming by age group: | | | |
| Under 25 years | farms | 120 | 23.6 |
| 25 to 34 years | farms | 732 | 14.7 |
| 35 to 44 years | farms | 1,415 | 13.0 |
| 45 to 54 years | farms | 2,976 | 8.1 |
| 55 to 64 years | farms | 5,226 | 5.7 |
| 65 years and over | farms | 7,181 | 6.8 |
| Reporting primary occupation as other than farming by age group: | | | |
| Under 25 years | farms | 61 | (H) |
| 25 to 34 years | farms | 794 | 23.7 |
| 35 to 44 years | farms | 2,087 | 20.4 |
| 45 to 54 years | farms | 4,911 | 12.8 |
| 55 to 64 years | farms | 6,538 | 8.9 |
| 65 years and over | farms | 5,208 | 8.6 |
| All operators by age group [2]: | | | |
| Under 25 years | farms | 757 | 19.0 |
| 25 to 34 years | farms | 3,317 | 16.6 |
| 35 to 44 years | farms | 6,724 | 15.3 |
| 45 to 54 years | farms | 13,441 | 10.8 |
| 55 to 64 years | farms | 18,459 | 7.7 |
| 65 to 74 years | farms | 11,927 | 7.9 |
| 75 years and over | farms | 5,159 | 6.9 |
| Livestock and poultry: | | | |
| Cattle and calves inventory | farms | 11,861 | 10.7 |
| | number | 1,162,792 | 3.5 |
| Beef cows inventory | farms | 9,285 | 9.7 |
| | number | 211,852 | 4.1 |
| Milk cows inventory | frams | 798 | 37.1 |
| | number | 266,989 | 2.7 |
| Hog and pigs inventory | farms | 934 | 26.9 |
| | number | 19,861 | 11.9 |
| Layers inventory | farms | 6,276 | 17.0 |
| | number | 7,236,128 | 10.8 |
| Broilers sold | farms | 527 | 15.7 |
| | number | 28,252,490 | 27.0 |
| Aquaculture sold | farms | 381 | 27.4 |
| | $1,000 | 187,222 | 16.3 |
| Selected crops harvested: | | | |
| Corn for grain | farms | 575 | 7.1 |
| | acres | 114,516 | 2.3 |

See footnote(s) at end of table.

--continued

Table B. **Reliability Estimates of State Totals: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Total | Coefficient of variation (percent) |
|---|---|---|---|
| Selected crops harvested: - Con. | | | |
| Wheat, winter | farms | 2,415 | 7.7 |
| | acres | 1,669,175 | 2.1 |
| Wheat, durum | farms | 3 | 31.6 |
| | acres | 3,264 | 8.3 |
| Wheat, spring | farms | 1,408 | 9.0 |
| | acres | 514,374 | 3.7 |
| Soybeans for beans | farms | 2 | 2.2 |
| | acres | (D) | (D) |
| Sorghum for grain | farms | 2 | (H) |
| | acres | (D) | (D) |
| Rice | farms | - | - |
| | acres | - | - |
| Cotton | farms | - | - |
| | acres | - | - |
| Peanuts | farms | - | - |
| | acres | - | - |
| Barley | farms | 817 | 9.9 |
| | acres | 175,074 | 5.2 |
| Oats | farms | 139 | 8.7 |
| | acres | 6,129 | 13.1 |
| Forage - land used for all hay and all haylage, grass silage, and greenchop (see text) | farms | 10,396 | 7.3 |
| | acres | 748,909 | 3.6 |
| Selected crops harvested: - Con. | | | |
| Land in vegetables (see text) | farms | 2,836 | 17.0 |
| | acres | 337,859 | 3.3 |
| Potatoes | farms | 1,205 | 18.5 |
| | acres | 163,925 | 2.7 |
| Tomatoes in the open | farms | 1,032 | 24.8 |
| | acres | 407 | 17.6 |
| Sweet corn | farms | 1,068 | 15.7 |
| | acres | 90,671 | 9.8 |
| Lettuce | farms | 222 | 19.6 |
| | acres | 206 | 12.3 |
| Land in orchards | farms | 4,846 | 8.5 |
| | acres | 315,456 | 2.1 |
| Apples | farms | 2,839 | 13.7 |
| | acres | 174,152 | 2.0 |
| Grapes | farms | 1,355 | 8.1 |
| | acres | 71,494 | 2.5 |
| Oranges | farms | - | - |
| | acres | - | - |
| Almonds | farms | 6 | 38.7 |
| | acres | 5 | 90.9 |
| Land in berries | farms | 1,828 | 13.2 |
| | acres | 24,076 | 18.3 |

[1] Farms with production expenses equal to market value of agricultural products sold, government payments, and farm-related income are included as farms with gains of less than $1,000.
[2] Data were collected for a maximum of three operators per farm.

## Table C. **Summary of Coverage, Nonresponse, and Misclassification Adjustments by County: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total (number) | Standard error | Adjustment as percent of total | Percent of total adjustment from coverage | Percent of total adjustment from nonresponse | Percent of total adjustment from misclassification |
|---|---|---|---|---|---|---|
| **ALL FARMS** | | | | | | |
| **State Total** | | | | | | |
| Washington | 37,249 | 3,543 | 32.0 | 17.7 | 12.2 | 2.1 |
| **Counties** | | | | | | |
| Adams | 713 | 38 | 30.2 | 9.8 | 16.1 | 4.3 |
| Asotin | 185 | 18 | 28.7 | 15.5 | 10.8 | 2.3 |
| Benton | 1,509 | 157 | 34.7 | 20.1 | 11.8 | 2.7 |
| Chelan | 890 | 68 | 22.4 | 11.7 | 10.6 | 0.1 |
| Clallam | 536 | 65 | 33.5 | 22.6 | 10.5 | 0.4 |
| Clark | 1,929 | 240 | 34.1 | 21.0 | 11.4 | 1.8 |
| Columbia | 308 | 20 | 32.8 | 10.5 | 17.8 | 4.5 |
| Cowlitz | 492 | 59 | 35.6 | 23.3 | 11.1 | 1.2 |
| Douglas | 849 | 84 | 32.3 | 13.1 | 16.9 | 2.3 |
| Ferry | 255 | 22 | 32.0 | 13.9 | 15.0 | 3.1 |
| Franklin | 883 | 51 | 28.7 | 12.8 | 13.5 | 2.4 |
| Garfield | 211 | 8 | 24.2 | 9.4 | 12.1 | 2.7 |
| Grant | 1,552 | 103 | 29.3 | 12.1 | 14.4 | 2.7 |
| Grays Harbor | 557 | 60 | 32.3 | 18.0 | 12.0 | 2.4 |
| Island | 377 | 44 | 33.7 | 21.7 | 10.5 | 1.5 |
| Jefferson | 221 | 20 | 29.8 | 17.8 | 10.2 | 1.8 |
| King | 1,837 | 268 | 34.8 | 22.9 | 10.3 | 1.6 |
| Kitsap | 706 | 116 | 38.2 | 26.4 | 11.6 | 0.1 |
| Kittitas | 1,006 | 85 | 30.7 | 15.2 | 12.7 | 2.8 |
| Klickitat | 760 | 58 | 31.2 | 15.0 | 13.4 | 2.8 |
| Lewis | 1,647 | 163 | 32.7 | 17.9 | 12.3 | 2.5 |
| Lincoln | 897 | 46 | 26.2 | 8.5 | 14.8 | 2.9 |
| Mason | 377 | 47 | 31.6 | 21.5 | 9.8 | 0.3 |
| Okanogan | 1,449 | 116 | 33.3 | 16.6 | 13.9 | 2.8 |
| Pacific | 330 | 27 | 28.8 | 15.2 | 12.0 | 1.6 |
| Pend Oreille | 288 | 26 | 33.0 | 15.3 | 14.5 | 3.2 |
| Pierce | 1,478 | 214 | 35.4 | 23.7 | 11.3 | 0.3 |
| San Juan | 274 | 29 | 29.4 | 17.6 | 11.8 | (Z) |
| Skagit | 1,074 | 107 | 32.5 | 19.4 | 10.6 | 2.5 |
| Skamania | 144 | 17 | 34.7 | 21.0 | 11.8 | 1.9 |
| Snohomish | 1,438 | 186 | 31.8 | 21.7 | 9.4 | 0.7 |
| Spokane | 2,501 | 231 | 33.2 | 17.3 | 13.0 | 3.0 |
| Stevens | 1,148 | 97 | 31.8 | 14.7 | 13.8 | 3.3 |
| Thurston | 1,336 | 179 | 35.1 | 21.6 | 11.8 | 1.7 |
| Wahkiakum | 109 | 11 | 32.4 | 17.2 | 12.4 | 2.9 |
| Walla Walla | 943 | 65 | 30.0 | 15.5 | 12.0 | 2.5 |
| Whatcom | 1,702 | 165 | 31.7 | 18.0 | 11.9 | 1.8 |
| Whitman | 1,195 | 56 | 29.4 | 11.2 | 15.2 | 3.1 |
| Yakima | 3,143 | 297 | 31.9 | 15.4 | 13.6 | 2.9 |
| **LAND IN FARMS** | | | | | | |
| **State Total** | | | | | | |
| Washington | 14,748,107 | 302,364 | 9.6 | 2.3 | 6.3 | 1.0 |
| **Counties** | | | | | | |
| Adams | 1,036,975 | 17,913 | 9.1 | 1.8 | 6.3 | 1.0 |
| Asotin | 263,166 | 23,194 | 11.5 | 2.1 | 8.0 | 1.4 |
| Benton | 703,505 | 45,137 | 10.0 | 3.0 | 5.8 | 1.2 |
| Chelan | 75,820 | 3,667 | 13.9 | 3.7 | 9.0 | 1.3 |
| Clallam | 23,640 | 2,336 | 33.7 | 15.1 | 15.6 | 3.1 |
| Clark | 74,758 | 4,161 | 23.3 | 9.7 | 11.1 | 2.5 |
| Columbia | 297,412 | 9,116 | 10.4 | 1.8 | 7.5 | 1.1 |
| Cowlitz | 39,009 | 18,049 | 46.0 | 17.9 | 23.3 | 4.8 |
| Douglas | 814,109 | 45,287 | 11.8 | 2.1 | 8.6 | 1.2 |
| Ferry | 792,250 | 6,999 | 2.3 | 0.6 | 1.5 | 0.2 |
| Franklin | 625,047 | 19,443 | 9.9 | 1.8 | 6.9 | 1.2 |
| Garfield | 308,486 | 6,766 | 6.7 | 1.4 | 4.6 | 0.7 |
| Grant | 963,784 | 58,882 | 10.5 | 1.9 | 7.2 | 1.3 |
| Grays Harbor | 119,440 | 11,097 | 15.9 | 6.1 | 8.2 | 1.6 |
| Island | 15,249 | 1,268 | 21.9 | 9.2 | 10.9 | 1.8 |
| Jefferson | 15,556 | 1,772 | 31.2 | 13.2 | 14.9 | 3.2 |
| King | 46,717 | 3,300 | 26.4 | 12.4 | 11.5 | 2.5 |
| Kitsap | 10,070 | 1,278 | 32.1 | 18.2 | 11.9 | 2.0 |
| Kittitas | 183,124 | 10,587 | 12.1 | 2.3 | 8.4 | 1.3 |
| Klickitat | 551,097 | 52,873 | 9.6 | 2.7 | 5.8 | 1.1 |
| Lewis | 132,839 | 13,444 | 30.8 | 10.3 | 16.8 | 3.6 |
| Lincoln | 1,114,940 | 32,992 | 8.5 | 1.2 | 6.6 | 0.8 |
| Mason | 23,743 | 1,746 | 15.4 | 7.4 | 6.4 | 1.5 |
| Okanogan | 1,205,285 | 18,941 | 5.7 | 1.5 | 3.7 | 0.6 |
| Pacific | 52,157 | 5,021 | 12.1 | 3.5 | 7.3 | 1.3 |
| Pend Oreille | 43,619 | 3,359 | 16.2 | 4.1 | 10.0 | 2.1 |
| Pierce | 49,483 | 3,276 | 25.0 | 10.8 | 11.6 | 2.5 |
| San Juan | 15,669 | 2,764 | 19.0 | 6.7 | 10.9 | 1.4 |
| Skagit | 106,538 | 5,118 | 19.6 | 7.0 | 10.4 | 2.2 |
| Skamania | 6,473 | 919 | 32.5 | 16.2 | 13.8 | 2.5 |
| Snohomish | 70,863 | 13,177 | 17.8 | 6.5 | 9.2 | 2.1 |
| Spokane | 537,406 | 17,429 | 15.8 | 3.8 | 10.3 | 1.7 |
| Stevens | 527,123 | 13,863 | 11.9 | 3.3 | 7.3 | 1.3 |
| Thurston | 76,638 | 4,436 | 24.0 | 8.1 | 13.1 | 2.8 |
| Wahkiakum | 9,557 | 2,598 | 20.2 | 5.6 | 12.5 | 2.1 |
| Walla Walla | 645,121 | 17,043 | 9.5 | 2.0 | 6.2 | 1.4 |
| Whatcom | 115,831 | 5,185 | 19.2 | 6.1 | 11.3 | 1.8 |

--continued

Table C. **Summary of Coverage, Nonresponse, and Misclassification Adjustments by County: 2012** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | Total (number) | Standard error | Adjustment as percent of total | Percent of total adjustment from coverage | Percent of total adjustment from nonresponse | Percent of total adjustment from misclassification |
|---|---|---|---|---|---|---|
| **LAND IN FARMS** - Con. | | | | | | |
| **Counties** - Con. | | | | | | |
| Whitman | 1,275,110 | 30,620 | 12.3 | 1.7 | 9.3 | 1.2 |
| Yakima | 1,780,498 | 25,868 | 2.5 | 0.8 | 1.5 | 0.3 |
| **SALES** | | | | | | |
| **State Total** | | | | | | |
| Washington | 9,120,749 | 575,298 | 5.8 | 1.3 | 4.2 | 0.3 |
| **Counties** | | | | | | |
| Adams | 430,155 | 39,171 | 8.7 | 2.5 | 5.6 | 0.6 |
| Asotin | 20,508 | 1,844 | 8.4 | 0.9 | 7.1 | 0.4 |
| Benton | 923,163 | 83,725 | 2.4 | 1.0 | 1.2 | 0.1 |
| Chelan | 206,479 | 20,006 | 3.7 | 0.9 | 2.7 | 0.1 |
| Clallam | 10,648 | 639 | 8.8 | 2.2 | 6.1 | 0.5 |
| Clark | 50,861 | 5,697 | 13.8 | 4.5 | 8.5 | 0.7 |
| Columbia | 57,732 | 2,324 | 3.8 | 0.4 | 3.2 | 0.2 |
| Cowlitz | 28,773 | 17,955 | 41.1 | 21.0 | 19.3 | 0.9 |
| Douglas | 199,041 | 16,144 | 13.4 | 2.7 | 10.1 | 0.7 |
| Ferry | 5,331 | 956 | 17.0 | 3.7 | 12.5 | 0.8 |
| Franklin | 740,014 | 111,393 | 8.0 | 1.4 | 5.8 | 0.7 |
| Garfield | 48,208 | 2,586 | 5.1 | 0.6 | 4.3 | 0.3 |
| Grant | 1,762,295 | 201,455 | 6.0 | 2.2 | 3.3 | 0.5 |
| Grays Harbor | 31,353 | 6,090 | 17.1 | 4.7 | 11.8 | 0.6 |
| Island | 11,467 | 937 | 11.0 | 4.8 | 5.5 | 0.7 |
| Jefferson | 7,657 | 706 | 14.6 | 6.0 | 8.2 | 0.4 |
| King | 120,749 | 11,062 | 4.5 | 2.3 | 2.0 | 0.2 |
| Kitsap | 5,304 | 616 | 20.8 | 11.5 | 11.4 | -2.1 |
| Kittitas | 68,911 | 4,859 | 9.9 | 1.6 | 6.9 | 1.3 |
| Klickitat | 72,387 | 6,321 | 3.2 | 1.0 | 2.0 | 0.2 |
| Lewis | 132,328 | 17,837 | 21.5 | 5.9 | 14.5 | 1.1 |
| Lincoln | 183,244 | 5,536 | 4.1 | 0.3 | 3.5 | 0.2 |
| Mason | 40,809 | 3,499 | 1.8 | 1.3 | 0.4 | 0.1 |
| Okanogan | 287,120 | 24,222 | 16.8 | 3.7 | 12.2 | 0.9 |
| Pacific | 36,782 | 3,403 | 4.9 | 1.6 | 3.2 | 0.1 |
| Pend Oreille | 3,954 | 308 | 7.8 | 1.3 | 5.7 | 0.8 |
| Pierce | 90,933 | 10,016 | 5.2 | 2.4 | 2.8 | (Z) |
| San Juan | 4,245 | 369 | 21.2 | 7.7 | 13.1 | 0.5 |
| Skagit | 272,275 | 11,459 | 6.8 | 3.0 | 3.5 | 0.3 |
| Skamania | 5,538 | 672 | 6.5 | 3.7 | 2.7 | 0.1 |
| Snohomish | 139,486 | 11,622 | 2.4 | 0.3 | 2.1 | (Z) |
| Spokane | 149,760 | 6,035 | 9.1 | 1.6 | 7.0 | 0.6 |
| Stevens | 36,346 | 2,551 | 15.9 | 2.7 | 11.6 | 1.6 |
| Thurston | 122,423 | 26,236 | 3.2 | 1.5 | 1.5 | 0.2 |
| Wahkiakum | 3,487 | 478 | 18.2 | 2.0 | 15.8 | 0.4 |
| Walla Walla | 437,359 | 31,479 | 1.9 | 0.6 | 1.1 | 0.1 |
| Whatcom | 357,312 | 17,124 | 5.0 | 0.9 | 3.9 | 0.2 |
| Whitman | 370,801 | 11,495 | 7.2 | 0.7 | 6.2 | 0.3 |
| Yakima | 1,645,510 | 52,315 | 1.8 | 0.3 | 1.5 | 0.1 |

## Table D. **American Indian or Alaska Native Operators: 2012**

[For meaning of abbreviations and symbols, see introductory text.]

| Geographic area | American Indian or Alaska Native farm operators | | | Geographic area | American Indian or Alaska Native farm operators | | |
|---|---|---|---|---|---|---|---|
| | Total | Individually reported [1] | Other [2] | | Total | Individually reported [1] | Other [2] |
| **State Total** | | | | **Counties** - Con. | | | |
| Washington | 1,115 | 1,115 | - | Kittitas | 15 | 15 | - |
| | | | | Klickitat | 20 | 20 | - |
| **Counties** | | | | Lewis | 69 | 69 | - |
| | | | | Lincoln | 3 | 3 | - |
| Adams | 1 | 1 | - | Mason | 14 | 14 | - |
| Asotin | 4 | 4 | - | Okanogan | 56 | 56 | - |
| Benton | 53 | 53 | - | Pacific | 23 | 23 | - |
| Chelan | 17 | 17 | - | Pend Oreille | 6 | 6 | - |
| Clallam | 40 | 40 | - | Pierce | 129 | 129 | - |
| Clark | 54 | 54 | - | San Juan | 4 | 4 | - |
| Columbia | 7 | 7 | - | | | | |
| Cowlitz | 13 | 13 | - | Skagit | 11 | 11 | - |
| Douglas | 17 | 17 | - | Skamania | 5 | 5 | - |
| Ferry | 31 | 31 | - | Snohomish | 41 | 41 | - |
| | | | | Spokane | 62 | 62 | - |
| Franklin | 13 | 13 | - | Stevens | 94 | 94 | - |
| Grant | 23 | 23 | - | Thurston | 38 | 38 | - |
| Grays Harbor | 16 | 16 | - | Walla Walla | 10 | 10 | - |
| Island | 5 | 5 | - | Whatcom | 25 | 25 | - |
| Jefferson | 14 | 14 | - | Whitman | 13 | 13 | - |
| King | 28 | 28 | - | Yakima | 128 | 128 | - |
| Kitsap | 13 | 13 | - | | | | |

[1] Data were collected for a maximum of three operators per farm.
[2] Data represent American Indian or Alaska Native farm or ranch operators on reservations who did not report individually. Data obtained by reservation officials.

# Appendix B.
# General Explanation and Census of Agriculture Report Form

## DEVELOPMENT OF THE CENSUS REPORT FORMS

Prior to release of the results from the 2007 Census of Agriculture, NASS was preparing for the 2012 Census of Agriculture. The first team established was the 2012 Census Content Team. This team was tasked with content determination and report form development. They reviewed the 2007 report form content, solicited input from internal and external customers, developed criteria for determining acceptance and/or rejection of content for the 2012 Census of Agriculture report forms, tested the effectiveness of the report forms for various modes of data collection (mail, telephone, personal interview, and electronic data reporting), and made recommendations to NASS senior executives for final determination.

Throughout development NASS sought advice and input from the data user community. Integral partners included the Advisory Committee on Agriculture Statistics, State departments of agriculture and other State government officials, Federal agency officials, land grant universities, agricultural trade associations, media, and various Community Based Organizations.

NASS conducted the 2010 Census of Agriculture Content Test in early 2011. The test consisted of three phases: cognitive pretesting, national mail-out, and follow-up interviews. Results from the testing produced one final report form type -- a 24-page regionalized form with 7 versions (12-A101 thru 12-A107). The regionalized report forms include crop sections designed to facilitate reporting crops most commonly grown within a report form region. Many items in these sections are either prelisted in the tables or listed below the tables. A sample copy of the report form and instruction sheet is included in this appendix.

## DATA CHANGES

Following are descriptions of the report form changes and their effect on the publication tables.

### Crop Data Changes

Added items include:

- Miscanthus harvested
- Switchgrass harvested
- Camelina harvested
- Mint for tea leaves harvested
- Total square feet under protection and acres in the open for nursery, greenhouse, floriculture, sod, mushrooms, vegetable seeds, and propagative materials.
- Cropland acres planted to a cover crop

Items listed separately on the 2012 report form that were reported in conjunction with similar crop items on the 2007 report form include:

- Hay and forage crops sales
- Fruit and nuts sales
- Berries sales
- Cut Christmas Tree value of sales
- Short rotation woody crops value of sales
- Maple syrup sales

### Livestock and Poultry Data Changes

Deleted items include:

- Aquaculture pounds and number sold
- Bee colonies sold
- Layers and pullets combined sold
- Mink, including pelts
- Rabbits, including pelts
- Total horses sold

Added items include:

- Chukars inventory and number sold or moved
- Guineas inventory and number sold or moved
- Hungarian partridge inventory and number sold or moved
- Peacocks or peahens inventory and number sold or moved
- Rheas inventory and number sold or moved
- Roosters inventory and number sold or moved
- Type of poultry hatched
- Largest number of bee colonies owned for all purposes
- Largest number of honey producing bee colonies owned
- Owned horses sold
- Value of owned horses sold
- Type of equine operation, including race track, boarding, training, riding facility, breeding service place, not a boarding facility but horses kept for others' personal use, or other

Items listed individually in the 2012 report form that were reported in conjunction with similar livestock or poultry items on the 2007 report form include:

- Milk from cows, value of sales
- Sheep and lambs value of sales
- Angora goats and kids value of sales
- Milk goats and kids value of sales
- Meat goats and kids and other goats and kids value of sales
- Wool shorn value of sales
- Mohair clipped value of sales
- Milk from sheep and goats value of sales
- Horses and ponies owned value of sales
- Horses and ponies not owned value of sales
- Horse breeding and stud fees, including semen and other equine products
- Mules, burros, and donkeys value of sales
- Alpacas value of sales
- Llamas value of sales
- Bison value of sales
- Deer in captivity value of sales
- Elk in captivity value of sales
- Live mink and their value of sales
- Live rabbits and their value of sales
- Honey value of sales
- Bantams
- Turkeys raised for meat production and turkey brooders

### Economic, Energy, Land Use Practices, Selected Practices, Organic, Operator Characteristics, and Type of Organization/Legal Status Data Changes

Deleted items include:

- Use of more than 500 gallons of water in any one day for any purpose
- Barns built before 1960
- Organic cropland harvested
- Sales for organic crops
- Acres used for organic production

Added items include:

- USDA NOP certified or exempt organic commodities value of sales
- Number of unpaid workers
- Layers moved under production contracts and amount received
- Replacement dairy heifers moved under production contracts and amount received
- Renewable energy producing systems, including solar panels, wind turbines, methane digesters, geoexchange systems, small hydro systems, biodiesel, and ethanol
- Wind rights leased to others
- Acres drained by tile
- Acres artificially drained by ditches
- Acres under a conservation easement
- Cropland acres on which no-till practices were used
- Cropland acres on which conservation tillage, excluding no-till, practices were used
- Cropland acres on which conventional tillage practices were used
- Cropland acres planted to cover crop (excluding CRP)
- More than 50 percent ownership interest held by operator and/or persons related by blood, marriage, and/or adoption
- Limited Liability Corporation
- Type of internet service, including dial up, DSL, Cable modem, fiber optic, mobile broadband plan for computer or cell phone, satellite services, Broadband over Power Lines (BPL), or other
- Acres transitioning into USDA National Organic Program organic production

## DEFINITIONS AND EXPLANATIONS

The following definitions and explanations provide a detailed description of specific terms and phrases used in this publication. Items in the publication tables which carry the note ‘‘See text’’ also are explained. Report form section number references refer to the regional version. Many of the definitions and explanations are the same as those used in earlier censuses.

**Acres and quantity harvested.** Crops were reported in whole acres, except for the following crops that were reported in tenths of acres: tobacco, nursery and greenhouse crops in the open, vegetables including potatoes and sweet potatoes, fruit and nut crops including land in orchards, and berries; and in Hawaii, coffee. Totals for crops reported in tenths of acres were rounded to whole acres at the aggregate level during the tabulation process. Nursery and greenhouse crops grown under glass or other protection were reported in square feet and are published in square feet.

If two or more crops were harvested from the same land during the year (double cropping), the acres were counted for each crop. Therefore, the total acres of all crops harvested could exceed the acres of cropland harvested. An exception to this procedure was hay.

When more than one cutting of hay was taken from the same acres, the acres were counted only once. If there were multiple cuttings of one type of hay production, e.g. two cuttings of alfalfa for dry hay, acreage was reported once but the quantity harvested includes all cuttings. Acreage cut and tons harvested for both dry hay and haylage, silage, or greenchop was reported for each crop. For interplanted crops or ‘‘skip-row’’ crops, acres were reported according to the portion of the field occupied, whether by a crop or whether it was idle land. If a crop was interplanted in an orchard or vineyard and harvested, then the entire orchard or vineyard acreage was reported under the appropriate fruit crop and the interplanted estimated crop acreage was reported under the appropriate crop.

If a crop was planted but not harvested, the acres were not reported as harvested. These acres were reported in the ‘‘land’’ section on the report form under the appropriate cropland items – cropland on which all crops failed or were abandoned, cropland in cultivated summer fallow, cropland idle or used for cover crops or soil-improvement but not harvested and not pastured or grazed, or other pasture and grazing land that could have been used for crops without additional improvements. This does not include fruit and nut orchards, vineyards, berries, acres in production for cut Christmas trees, and acres in production for short rotation woody crops that were not harvested. Acreage in these commodities were included in cropland harvested whether the crop was harvested or not. Abandoned orchards were reported as cropland idle, not as harvested cropland, and the individual abandoned orchard crop acres were not reported.

Crops that were only hogged or grazed were reported as “Other pasture and grazing land that could have been used for crops without additional improvements.” Crop residue left in fields after the 2012 harvest and later hogged or grazed was reported as cropland harvested and not as other pasture and grazing land that could have been used for crops.

Quantity harvested was not obtained for crops such as fruits and nuts, berries, vegetables and melons, and nursery and greenhouse crops.

**Age of operator.** See Farms by age and primary occupation of operator.

**Agri-tourism and recreational services.** See Total income from farm-related sources, gross before taxes and expenses.

**Agricultural products sold directly to individuals for human consumption.** See Value of agricultural products sold directly to individuals for human consumption.

**All (multiple) operators.** See Operator.

**All haylage, grass silage, and greenchop (tons).** See Haylage, grass silage, and greenchop, all.

**All other production expenses.** See Total farm production expenses.

**American Indian and Alaska Native farm operators, total.** Data are reported in Chapter 1, tables 60 through 70, and Chapter 2, table 50. In Chapter 1, table 60 data include farm characteristics for principal operator reporting one race only, table 61 data include farm characteristics reported for a maximum of three operators reporting American Indian or Alaska Native alone or in combination with other races, table 62 data are reported for principal operator only, table 63 include data for a maximum of three operators for those operators that reported only one race.

In Chapter 2, table 50 data are reported for a maximum of three operators reported in the operator characteristics section. The individual operators were added to the census mail list for most reservations. Those reservations that did not include all the individual operators on the census mail list were identified and the data for the entire reservation, including the data for the operators that would have met the definition of a farm, were collected on one report form. The count of reservations and the number of operators that were reported on these reservations are included in Appendix A, Table D.

**Amount from State and local government agricultural program payments.** See Total income from farm-related sources, gross before taxes and expenses.

**Amount from Conservation Reserve, Wetlands Reserve, Farmable Wetlands, and Conservation Reserve Enhancement Programs.** See Land enrolled in the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Farmable Wetlands Program (FWP), or Conservation Reserve Enhancement Program (CREP).

**Amount spent to repay CCC loans.** This is a new item for 2012. Farming operations that receive a CCC loan can use cash to repay the loan, purchase certificates for use in the repayment, or deliver the pledged collateral as full payment at maturity. If a farmer uses cash instead of certificates to repay the loan, the farmer and the IRS receive an information return showing the market gain realized. The farmer can repay the loan to the CCC and then sell the grain, feed the grain, or store it. These provisions only apply until the maturity date of the loan. After the maturity date of the loan, the entire original loan principal and all accrued interest must be repaid or, as an alternative choice, the crop may be forfeited to CCC.

**Any poultry sold.** The number of farms with any poultry sold includes all farms with sales of poultry, poultry hatched, or eggs.

**Aquaculture.** Aquaculture is defined as the farming of fish, crustaceans, mollusks, and other aquaculture products. The aquaculture production reported in the census requires some form of intervention in the rearing process and requires inputs such as seeding, stocking, feeding, protection from predators, etc. It also requires ownership of the stock being cultivated and harvesting that is conducted in a controlled environment by the operation. The value of sales include all sizes and eggs by species and includes aquaculture distributed for restoration, conservation, or recreational purposes, such as State and Federal hatcheries. Distributed fish with unknown values were assigned a value based on sales of farm-raised fish.

**Aquaculture value.** See Aquaculture.

**Bantams.** This is a new item for 2012. In 2007 bantams were reported as other poultry. See layers.

**Bees**. See Colonies of bees and Honey collected.

**Berries.** In 2012, the value of sales was collected; in 2007 it was combined with fruits and nuts.

**Biodiesel.** See Renewable energy producing systems.

**Breeding livestock.** See Total farm production expenses.

**By economic class.** See Economic class of farms.

**Camelina.** This is a new item for 2012. In 2007 and previous censuses, data were included in other field crops. Other field crops data are comparable.

**Cattle on feed.** Cattle on feed is defined as cattle and calves that were fed a ration of grain or other concentrates that will be shipped directly from the feedlot to the slaughter market and are expected to

produce a carcass that will grade select or better. This category excludes cattle that were pastured only, background feeder cattle, and veal calves.

**Cattle on feed sold.** Data are for cattle on feed sold that weighed 500 pounds or more and were shipped directly from the feedlot to the slaughter market. This category excludes cattle that were pastured only, owned cattle that were shipped from feedlots operated by others, background feeder cattle, and veal calves.

**Chemicals applied**. For each type of chemical used, the acres treated were reported only once even if the acres were treated more than once. If multi-purpose chemicals were used, the acres treated for each purpose were reported. See Total farm production expenses; Chemicals.

**Cherries**. Cherries were reported as either sweet cherries or tart cherries. Combined crops or non-specified cherry acres were not options for the respondent. Total acres, bearing age acres, and nonbearing age acres were reported for each crop.

**Christmas trees, cut.** Data are for acres of Christmas trees in production, either cut or to be cut, the number of these acres that were irrigated, and the number of trees cut along with the value of sales of the harvested trees.

**Christmas trees, live.** These data were reported as nursery stock. They are generally sold as balled and burlapped trees from the operation.

**Chukars. (Chukkars)** This is a new item for 2012. In 2007, chukars were reported as other poultry.

**Coffee.** Data were collected only in Hawaii.

**Colonies of bees.** Colonies of bees were tabulated in the county where the bees' owner had the largest value of all agricultural products raised or produced. Colonies are often moved from farm-to-farm over a wide geographic area. Package bees are not included as separate colonies. Colonies of bees were collected in their own section to clarify to respondents that only "owned" colonies were to be reported versus any colonies on the operation. Published colonies inventory is the total number of colonies owned on December 31, 2012.

**Commodities raised and delivered under production contracts**. A production contract is an agreement between a producer or grower and a contractor (integrator) setting terms, conditions, and fees to be paid by the contractor to the operation for the production of crops, livestock, or poultry. The grower receives a payment or fee from the contractor, generally after delivery, which is less than the full market price of the commodity. A production contract involves the shifting of some risk and control from the grower to the contractor. Marketing contracts, futures contracts, forward contracts, or other contracts based strictly on price are not considered production contracts. Commodities sold to a co-op where some of the input items were purchased from the same co-op at a discount price were also excluded. Many operations produce commodities only under production contracts or only independently. Some operations may produce a commodity under production contract and also produce more of the same commodity that they sell independently. The production contract data are totals for the portion of agriculture production raised and delivered under production contract. Crops and livestock inventory, production, and value of sales are the total of all production, both independent and raised under production contract.

*Custom fed cattle shipped directly for slaughter under a production contract.* Cattle under production contract which were not shipped directly to slaughter were reported in either replacement dairy heifers under production contract or in the Other cattle, sheep, livestock, or poultry under production contract category.

*Layers under production contract.* The production contract is based on eggs, but the layers are owned by the contractor and are also under contract. The layers are 'produced' at the pullet farm, which may have a separate production contract. This is a new item for 2012.

*Replacement dairy heifers under production contract.* This is a new item for 2012. In 2007, replacement dairy heifers were included in "Other cattle, livestock, poultry, or aquaculture under production contract."

*Other cattle, sheep, livestock, or poultry under production contract.* The data for commodities raised and delivered under a production contract include cattle which were not shipped directly to slaughter (backgrounding), sheep, livestock, and poultry not listed separately. Layers and replacement dairy heifers were included in 2007, but were reported individually on the 2012 report form. Data are not comparable to 2007.

*Vegetables, melons, and potatoes under production contract.* This category is the number of farms that produced and delivered vegetables, melons, and potatoes grown under a production contract.

*Other crops under production contract.* Data are for the total number of farms that have production contracts for other crops. This category includes all crops except grains, oilseeds, vegetables, melons, and potatoes.

**Commodity Credit Corporation loans.** This category includes nonrecourse marketing loans for wheat, corn, sorghum, barley, oats, cotton, rice, soybeans, Austrian winter peas, honey, dry edible peas, lentils, small chickpeas, peanuts, sunflower seed, flaxseed, canola and other rapeseed, safflower, mustard seed, crambe, sesame seed, wool and mohair. These commodities differ from those included in the 2007 census due to changes created by the 2008 Farm Bill.

**Crop and livestock insurance payments received.** See Total income from farm-related sources, gross before taxes and expenses.

**Crop units of measure.** The regional report forms allowed the operator to report the quantity of field crops harvested in a unit of measure commonly used in the region. When the operator reported in units different than the unit of measure published, the quantity harvested was converted to the published unit of measure.

**Crop year or season covered.** Acres and quantity harvested are for the calendar year 2012 except for citrus crops and sugarcane for sugar; limes in region three States; avocados in Florida and California; olives in California and Arizona; and pineapples and coffee in Hawaii.

1. Avocados. The data for Florida relate to the quantity in the April 2012 through March 2013 harvest season; for California and Arizona, the November 2011 through November 2012 harvest season.
2. Citrus crops. The data for region three relate to the quantity harvested in the September 2011 through August 2012 harvest season, except limes that were harvested in the April 2012 through March 2013 harvest season. The data for California and Arizona relate to the 2011 through 2012 harvest season.
3. Olives. The data for California and Arizona relate to the September 2011 through March 2012 harvest season.
4. Pineapples. The data for Hawaii relate to the quantity harvested in the year ending May 31, 2012.
5. Sugarcane for sugar. The data for Florida, Louisiana, and Texas relate to the cuttings from September 2012 through April 2013.

**Cropland, harvested.** See Harvested cropland.

**Cropland idle or used for cover crops or soil improvement, but not harvested and not pastured or grazed.** Cropland idle includes any other acreage which could have been used for crops without any additional improvement and which was not reported as cropland harvested, cropland on which all crops failed, cropland in summer fallow, or other pasture or grazing land that could have been used for crops without additional improvements. This category includes:

1. Land used for cover crops or soil improvement but not harvested or grazed.

2. Land in Federal or State conservation programs that was not hayed or grazed in 2012.

3. Land occupied with growing crops for harvest in 2013 or later years but not harvested or summer fallowed in 2012 (except fruit or nuts in an orchard, grove, or vineyard or berries being maintained for production). Examples are acreage planted in winter wheat, strawberries, etc., for harvest in 2013 and no crop was harvested from these acres in 2012.

4. Land in "skipped" rows between rows of crops or field strips.

**Cropland, irrigated**. See Irrigated land.

**Cropland, other.** See Other cropland.

**Cropland, total.** See Total cropland.

**Cropland used only for pasture or grazing.** See Other pasture and grazing land that could have been used for crops without additional improvements.

**Crustaceans**. These are invertebrate animals with jointed legs and a hard shelled segmented body. Examples include crawfish, lobster, prawns, shrimp, and softshell crabs.

**Custom fed cattle shipped directly for slaughter.** See Commodities raised and delivered under production contract.

**Customwork and custom hauling.** See Total farm production expenses.

**Customwork and other agricultural services**. See Total income from farm-related sources, gross before taxes and expenses.

**Cuttings, seedlings, liners, and plugs.** See Nursery, greenhouse, floriculture, sod, mushrooms, vegetable seeds, and propagative materials.

**Cut Christmas trees.** See Christmas trees, cut.

**Depreciation expenses claimed.** The calculation of total farm production expenses does not include depreciation because it is a capital expense. Depreciation allows the expensing of capital purchases over multiple years. It is not included in the calculation of Net cash farm income of the operation and operator.

**Ducks, geese, and other miscellaneous poultry.** See Miscellaneous poultry.

**Economic class of farms.** Economic class data are the classification of farms by the sum of market value of agricultural products sold and federal farm program payments. See Total market value of agricultural products sold and government payments.

**Energy.** See Renewable energy producing systems.

**Ethanol.** See Renewable energy producing systems.

**Expenses**. See Total farm production expenses.

**Farm or ranch operator**. See Operator characteristics.

**Farms by age and primary occupation of operator.** Data on age and primary occupation were obtained from up to three operators per farm. When compared with 2007 results, the average age of farmers increased slightly. Older operators may be "retired" (with little if any sales) and still report farming as their primary occupation since they often have limited opportunity for off-farm jobs. See Primary occupation of the operator.

**Farms by combined government payments and market value of agricultural products sold.** This category represents the value of products sold plus government payments. Total value of products sold combines total sales not under production contract and total sales under production contract. Government payments consist of government payments received from the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Farmable Wetlands Program (FWP), or Conservation Reserve Enhancement Program (CREP) plus government payments received from Federal, State, and local programs other than the CRP, WRP, FWP, and CREP, and Commodity Credit Corporation loans. See Total market value of agricultural products sold and government payments. The Average Crop Revenue Election (ACRE) program allows producers to enroll a farm in the program based upon an agreement to forgo counter-cyclical payments, receive a 20 percent reduction in their direct payments, and a reduction in their marketing assistance loan (MAL) rates by 30 percent for all commodities produced on the farm. The ACRE program provides eligible producers with state level revenue guarantees based on the 5-year state average yield and the 2-year national average price. The program is designed to provide revenue support to farmers as an alternative to the price support that farmers are use to receiving from commodity programs.

**Farms by economic class.** See Economic class of

farms and Total market value of agricultural products sold and government payments

**Farms by legal status.** All farms were classified by legal status in the 2012 census. In 2007 this category was referred to as Farms by type of organization. This section collects information for federal tax purposes to determine an operation's legal status. The classifications used were:

1. Family or individual (sole proprietorship), excluding partnership and corporation.

2. Partnership, including family partnership – in selected tables, partnership was further subclassified into:

   a. Registered under State law.
   b. Not registered under State law.

3. Corporation, including family corporations - in selected tables, partnership was further subclassified into:

   a. Family held or other than family held.
   b. More than 10 stockholders.

4. Other, cooperative, estate or trust, institutional, etc.

**Farms by North American Industry Classification System (NAICS).** The NAICS classifies economic activities. It was jointly developed by Mexico, Canada, and the U.S. NAICS makes it possible to produce comparable industrial statistics for Mexico, Canada, and the U.S. For the 2012 census, all agricultural production establishments (farms, ranches, nurseries, greenhouses, etc.) were classified by type of activity or activities using the NAICS code. The 2012 census is the fourth census to use NAICS. Censuses prior to the 1997 census used the old Standard Industrial Classification (SIC) system to classify farms.

NAICS was developed to provide a consistent framework for the collection, analysis, and dissemination of industrial statistics used by government policy analysts, academia and researchers, the business community, and the public. It is the first industry classification system developed in accordance with a single principle of aggregation that production units using similar production processes should be grouped together. Though NAICS differs from other industry classification systems, statistics compiled on NAICS are comparable with statistics compiled according to the latest revision of the United Nations' International Standard Industrial Classification, Revision Three, (ISIC, Revision 3) for some sixty high level groupings. Following are explanations of the major classifications used in 2012.

*Oilseed and grain farming (1111).* Comprises establishments primarily engaged in (1) growing oilseed and/or grain crops and/or (2) producing oilseed and grain seeds. These crops have an annual life cycle and are typically grown in open fields. This category includes corn silage and grain silage.

*Vegetable and melon farming (11121).* Comprises establishments primarily engaged in one or more of the following: (1) growing vegetables and/or melon crops, (2) producing vegetable and melon seeds, and (3) growing vegetable and/or melon bedding plants.

*Fruit and tree nut farming (1113).* Comprises establishments primarily engaged in growing fruit and/or tree nut crops. These crops are generally not grown from seeds and have a perennial life cycle.

*Greenhouse, nursery, and floriculture production (1114).* Comprises establishments primarily engaged in growing crops of any kind under cover and/or growing nursery stock and flowers. ''Under cover'' is generally defined as greenhouses, cold frames, cloth houses, and lath houses. Crops grown are removed at various stages of maturity and have annual and perennial life cycles. The category includes short rotation woody crops and Christmas trees that have a growing and harvesting cycle of 10 years or less.

*Other crop farming (1119).* Comprises establishments primarily engaged in (1) growing crops such as tobacco, cotton, sugarcane, hay, sugarbeets, peanuts, agave, herbs and spices, and hay and grass seeds, or (2) growing a combination of the valid crops with no one crop or family of crops accounting for one-half of the establishment's agricultural production (value of crops for market).

Crops not included in this category are oilseeds, grains, vegetables and melons, fruits, tree nuts, greenhouse, nursery and floriculture products.

*All other crop farming (11199).* Comprises establishments primarily engaged in (1) growing crops (except oilseeds and/or grains; vegetables and/or melons; fruits and/or tree nuts; greenhouse, nursery, and/or floriculture products; tobacco; cotton; sugarcane; or hay) or (2) growing a combination of crops (except a combination of oilseed(s) and grain(s)); and a combination of fruit(s) and tree nut(s) with no one crop or family of crops accounting for one-half of the establishment's agricultural production.

*Beef cattle ranching and farming (112111).* Comprises establishments primarily engaged in raising cattle (including cattle for dairy herd replacements). Pastureland-only farms, those with only 100 or more acres of pastureland, were classified as "All other animal production farming (11299)."

*Cattle feedlots (112112).* Comprises establishments primarily engaged in feeding cattle for fattening.

*Dairy cattle and milk production (112120).* This industry comprises establishments primarily engaged in milking dairy cattle.

*Poultry and egg production (1123).* This industry group comprises establishments primarily engaged in breeding, hatching, and raising poultry for meat or egg production.

*Sheep and goat farming (1124).* This industry group comprises establish-
ments primarily engaged in raising sheep, lambs, and goats, or feeding lambs for fattening.

*Animal aquaculture (1125).* Comprises establishments primarily engaged in the farm raising of finfish, shellfish, or any other kind of animal aquaculture. These establishments use some form of intervention in the rearing process to enhance production, such as holding in captivity, regular stocking, feeding, and protecting from predators.

*Other animal production (1129).* Comprises establishments primarily engaged in raising animals and insects (except cattle, hogs and pigs, poultry, sheep and goats, and aquaculture) for sale or product production. These establishments are primarily engaged in one of the following: bees, horses and other equine, rabbits and other fur-bearing animals, etc, and producing products such as honey and other bee products. Establishments primarily engaged in raising a combination of animals with no one animal or family of animals accounting for one-half of the establishment's agricultural production are included in this industry group. Farms with only 100 acres or more of pastureland were classified as "All other animal production farming (11299)".

**Farms by number of households sharing in net income of farm.** Data were reported by the principal operator only. Households that received funds because they were only landlords, custom equipment operators, or provided other production services were not included. Published data can exceed the number of operators listed under Operators, all.

**Farms by size.** All farms were classified into size groups according to the total land area in the farm. The land area of a farm is an operating unit concept and includes land owned and operated as well as land rented from others. Land rented to or assigned to a tenant was considered part of the tenant's farm and not part of the owner's.

**Farms by tenure of operator.** All farms were classified by tenure of operators. The classifications used were:

- Full owners operated only land they owned.
- Part owners operated land they owned and also land they rented from others.
- Tenants operated only land they rented from others or worked on shares for others.

Farms with hired managers are classified according to the land ownership characteristics reported. For example, a corporation owns all the land used on the farm and hires a manager to run the farm. The hired manager is considered the farm operator, and the farm is classified with a tenure type of "full owner" even though the hired manager owns none of the land he/she operates.

**Farms by type of organization.** This is a new item for 2012. The data categorizes an operation's ownership and legal farming status.

*Operation with 50 percent or more ownership interest held by operator and/or persons related by blood, marriage, or adoption.* The data are used to measure the principal operator ownership interest in the organization.

*Limited Liability Corporation.* This type of farm structure combines the pass-through taxation of a partnership or sole proprietorship with the limited liability of a corporation.

**Farms by value of sales.** See Market value of agricultural products sold.

**Farms or farms reporting.** The terms ''farms'' and ''farms reporting'' in the presentation of data are equivalent. Both represent the number of farms reporting the item. For example, if there are 3,710 farms in a State and 842 of them had 28,594 cattle and calves, the data for those farms reporting cattle and calves would appear as:

Cattle and calves farms . . . . . 842
number . . . 28,594

**Farms with sales and government payments of less than $1,000.** This category includes farms with combined sales and government payments of less than $1,000 but having the potential for sales of $1,000 or more. It provides information on all items for farms that normally would be expected to sell agricultural products of $1,000.

**Farms with sales of less than $1,000.** This category includes farms with sales of less than $1,000 but having the potential for sales of $1,000 or more. Some of these farms had no sales in the census year. It provides information on all report form items for farms that normally would be expected to sell agricultural products of $1,000 or more.

**Fertilizer**. See Total farm production expenses; Fertilizer, lime, and soil conditioners.

**Field and grass seed crops, all.** Data are for all the field and grass seed crops not published as field crops and include field seed crops which did not have a specific code on the 2012 report form.

**Foliage plants, indoor (including hanging baskets).** For 2012, (including hanging baskets) was added to the description for clarity. Data are comparable.

**Forage - land used for all hay and all haylage, grass silage, and greenchop.** Data shown represent the area harvested with each acre counted only once if dry hay, haylage, grass silage, or greenchop were cut from the same acreage or if there were multiple cuttings of dry hay, haylage, grass silage, or greenchop. Data exclude corn silage and sorghum silage. Quantity produced is the sum of the quantity harvested of all hay including alfalfa, other tame, small grain, and wild hay and all haylage, grass silage and greenchop after converting the all haylage, grass silage, and greenchop quantity harvested to a dry equivalent basis (13-percent moisture). The green tons of all haylage, grass silage, and greenchop harvested were multiplied by a factor of 0.4943 to convert to a dry equivalent. This conversion factor is based on the assumption that one ton of dry hay is 0.87 ton of dry matter, one ton of haylage or grass silage is 0.45 ton dry matter, and one ton of greenchop is 0.25 ton dry matter. The all haylage, grass silage, and greenchop quantity harvested is assumed to be comprised of 90-percent haylage and grass silage and 10-percent greenchop. Therefore, the conversion factor used to adjust all haylage, grass silage, and greenchop quantity harvested to a dry equivalent basis =
$[(0.45*0.9)+(0.25*0.1)]/0.87 = 0.4943$.

**Fruits and nuts tree.** Total acres, bearing age acres, and nonbearing age acres were collected. In 2012, the value of sales was collected; in 2007, it was combined with berries.

**Geoexchange system.** See Renewable energy producing systems

**Government payments.** This category consists of direct payments as defined by the 2008 Farm Bill; payments from Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Farmable Wetlands Program (FWP), and Conservation Reserve Enhancement Program (CREP); loan deficiency payments; disaster payments; other conservation programs; and all other federal farm programs under which payments were made directly to farm operators. Commodity Credit Corporation

(CCC) proceeds, amount from State and local government agricultural program payments, and federal crop insurance payments were not tabulated in this category. The Average Crop Revenue Election (ACRE) Program is a program administered by USDA's Farm Service Agency (FSA). Producers can sign up for this optional, revenue-based counter-cyclical program, which is an alternative to receiving counter-cyclical payments (CCPs).

**Grain and bean combines.** Data were collected for self-propelled combines only.

**Grain storage capacity.** Data include the capacity of all storage structures on the operation and normally used to store whole grains, oilseeds, and pulse crops. These structures can be bins, silos, buildings, trailers, etc. The capacity or usage of any off-farm public or commercial storage facilities was excluded. For 2012, pulse crops text was added to the Grain Storage screener question for clarity. Pulse crops include dry beans, dry peas, lentils, lupines, and other minor pulse crops. Data are comparable.

**Grains, oilseeds, dry beans, and dry peas sales.** Data are for the total market value of cash grains sold, including corn for grain, seed, or silage; wheat for grain; soybeans for beans; sorghum for grain, seed, or silage; barley for grain; rice; oats for grain; and other grains. Also included is the total market value of cash oilseeds sold, including sunflower seed (oil and non-oil), flaxseed, canola, rapeseed, safflower seed, mustard seed, dry beans, and dry peas.

**Greenhouse fruits and berries.** Data include strawberries, raspberries, etc. grown in greenhouses and high tunnels where the crops were always covered. See Nursery, greenhouse, floriculture, sod, mushrooms, vegetable seeds, and propagative materials.

**Gross cash rent or share payments.** See Total income from farm-related sources, gross before taxes and expenses.

**Guineas.** This is a new item for 2012. In 2007, guineas were reported as other poultry.

**Harvested cropland.** This category includes land from which crops were harvested and hay was cut, land used to grow short-rotation woody crops, Christmas trees, and land in orchards, groves, vineyards, berries, nurseries, and greenhouses. Land from which two or more crops were harvested was counted only once. Land in tapped maple trees was included in woodland not pastured. The 2012 census definition for harvested cropland is the same as the 2007 definition.

**Hay, all hay including alfalfa, other tame, small grain, and wild.** Data shown represent the acreage and quantity harvested of all types of dry hay. The quantity harvested was reported in dry tons (dry weight at the time the hay was removed from the field for storage or feeding). If two or more cuttings of dry hay were made from the same field, the acreage was reported only once as acres harvested of the appropriate dry hay category, but the production from all dry hay cuttings was combined in the corresponding quantity harvested. Straw acreage and production is excluded.

If dry hay was cut from the same land that haylage, grass silage, or greenchop was cut, the acreage and production for the dry hay was reported in the appropriate category of dry hay and the acreage and production for haylage, grass silage, or greenchop was reported in the appropriate haylage, grass silage, or greenchop category. For example, if 20 acres of alfalfa were cut for hay and then the same land was used to produce alfalfa haylage, 20 acres and the quantity harvested of hay were reported as Alfalfa and alfalfa mixtures for dry hay and 20 acres and the quantity harvested of alfalfa haylage were reported as Haylage or greenchop from alfalfa or alfalfa mixtures.

**Hay, other tame dry hay.** Data shown represent acreage and dry tons of hay harvested from clover, fescue, lespedeza, timothy, Bermuda grass, Sudangrass, sorghum hay, and other types of legumes (excluding alfalfa) and tame grasses (excluding small grains).

**Hay, wild dry.** Data shown represent acreage and dry tons of hay harvested that was predominately wild or native grasses, even if it had some fill-in seeding of other grasses.

**Haylage, grass silage, and greenchop, all.** Data shown represent the acreage and quantity harvested

of all types (alfalfa and all other). The quantity harvested was reported in green tons. If two or more cuttings of haylage, grass silage, or greenchop were made from the same field, the acreage was reported as acres harvested in the appropriate haylage category only once, and the tonnage from all cuttings was combined in the corresponding quantity harvested. Straw acreage and production is excluded.

**Hired farm labor.** Data are for total hired farm workers, including paid family members, by number of days worked. Data exclude contract laborers.

**Hogs and pigs by type of operation.** Hog and pig farms were classified by primary type of operation. Operation types were farrow to wean, farrow to feeder, farrow to finish, nursery, finish only, and other. Each description was accepted and the reported inventory and sales data were assigned to each reported type.

**Hogs and pigs by type of producer.** Hog and pig farms were classified by one type of producer. Producer types were independent grower, contractor or integrator, and contract grower (contractee). Each description was accepted and the reported inventory and sales data were assigned to each reported type.

**Honey collected**. Data are for pounds of honey collected but not necessarily sold. See Colonies of bees.

**Horses and ponies, owned.** See "Owned horses and ponies."

**Hungarian partridge.** This is a new item for 2012. In 2007, Hungarian partridge were reported as other poultry.

**Income**. Net cash farm income is published for the operation and operator. The difference between net cash income and net cash returns is that net cash returns does not include government payments and other farm-related income as income. See Net cash farm income of the operations and Net cash farm income of the operators.

**Income from farm-related sources.** See Total income from farm-related sources, gross before taxes and expenses.

**Institutional, research, experimental, and American Indian Reservation farms.** Data for these farms are combined into a single category. Research farms include farms operated by private companies as well as those operated by universities, colleges, and government organizations for the purpose of expanding agricultural knowledge.

**Irrigated land.** This category includes all land watered by any artificial or controlled means, such as sprinklers, flooding, furrows or ditches, sub-irrigation, and spreader dikes. Included are supplemental, partial, and preplant irrigation. Each acre was counted only once regardless of the number of times it was irrigated or harvested. If an operation reported less than one acre irrigated, the irrigated land for the operation was rounded to one acre. Livestock lagoon waste water distributed by sprinkler or flood systems was also included.

**Land area, approximate.** The approximate land area represents the total land area as determined by records and calculations as of January 1, 2012. The proportion of land area in farms may exceed 100-percent because some operations have land in two or more counties, but all acres are tabulated in the principal county of operation. The approximate land area data were supplied by the U.S. Department of Commerce, Bureau of the Census. See Land in two or more counties.

**Land enrolled in crop insurance programs.** The data are for all land enrolled in any Federal, private or other crop insurance program. It includes acreage of pasture/rangeland enrolled in crop insurance programs in areas where it is provided. Data are comparable with 2007.

**Land enrolled in the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Farmable Wetlands Program (FWP), or Conservation Reserve Enhancement Program (CREP).** CRP is a program established by the USDA in 1985 that takes land prone to erosion out of production for 10 to 15 years and devotes it to conservation uses. In return, farmers receive an annual rental payment for carrying out approved conservation practices on the conservation acreage. The WRP, FWP, and CREP programs are included under the Conservation Reserve Program and offers landowners financial incentives for conservation

practices.

Operations with land enrolled in the CRP, WRP, FWP, or CREP were counted as farms, given they received $1,000 or more in government payments, even if they had no sales and otherwise lacked the potential to have $1,000 or more in sales.

**Land in berries.** Data are for total land in berries. Respondents also reported harvested acres and not harvested acres by individual berry crops.

**Land in farms.** The acreage designated as ‘‘land in farms’’ consists primarily of agricultural land used for crops, pasture, or grazing. It also includes woodland and wasteland not actually under cultivation or used for pasture or grazing, provided it was part of the farm operator’s total operation. Large acreages of woodland or wasteland held for nonagricultural purposes were deleted from individual reports during the edit process. Land in farms includes CRP, WRP, FWP, and CREP acres.

Land in farms is an operating unit concept and includes land owned and operated as well as land rented from others. Land used rent free was reported as land rented from others. All grazing land, except land used under government permits on a per-head basis, was included as ‘‘land in farms’’ provided it was part of a farm or ranch. Land under the exclusive use of a grazing association was reported by the grazing association and included as land in farms. All land in American Indian reservations used for growing crops, grazing livestock, or with the potential of grazing livestock was included as land in farms. Land in reservations not reported by reservation, individual American Indians, or non-Native Americans was reported in the name of the cooperative group that used the land. In many instances, an entire American Indian reservation was reported as one farm.

**Land in orchards.** This category includes land in bearing age and nonbearing age fruit trees, citrus or other groves, vineyards, and nut trees of all ages, including land on which all fruit crops failed. Respondents also reported bearing age acres and nonbearing age acres by individual fruit and nut crops. Respondents were instructed not to report abandoned plantings and plantings of fewer than 20 total fruit, citrus, or nut trees or grapevines.

**Land in two or more counties.** With few exceptions, the land in each farm was tabulated as being in the operator’s principal county. The principal county was defined as the one where the largest value of agricultural products was raised or produced. It was usually the county containing all or the largest proportion of the land in the farm or viewed by the respondent as his/her principal county. Reports received showing land in more than one county were separated into two or more reports if the data would substantially distort county totals.

**Land use practices.** This is a new category for 2012. It includes all agricultural land used for the production of agricultural commodities.

*Drained by tile.* Tile drainage is a practice that removes excess water from the soils subsurface.

*Artificially drained by ditches.* A field ditch installed for surface drainage for collecting excess surface or subsurface water in a field.

*Conservation easement.* A conservation easement is a legal agreement voluntarily entered into by a property owner and a qualified conservation organization such as a land trust or government agency

*No-till practices used.* Using no-till or minimum till is a practice used for weed control and helps reduce weed seed germination by not disturbing the soil.

*Conservation tillage.* Conserves the soil by reducing erosion and decreasing water pollution.

*Conventional tillage.* Refers to tillage operations that use standard practices for a specific location and crop to bury crop residues.

*Cover crop*. A crop planted primarily to manage soil fertility, soil quality, water, weeds, pests, diseases, or wildlife.

**Land used for vegetables.** Data are for the total land used for vegetable and melon crops. The acres were reported only once, even though two or more harvests of a vegetable or more than one vegetable were harvested from the same acres. Respondents also reported harvested acres, acres harvested for

fresh market, and acres harvested for processing by individual vegetable crops.

**Landlord's share of the total sales.** Data represent the share of the operation's total sales that went to landlord(s).

**Layers.** This category includes table-egg type layers, hatching layers for meat-types, hatching layers for table egg types, and reported bantams.

**Legal status for tax purposes.** See Farms by legal status.

**Less than $1,000.** See Farms with sales and government payments of less than $1,000.

**Livestock and poultry purchased or leased.** See Total farm production expenses; *Livestock and poultry purchased or leased*.

**Maple syrup.** Data are for the number of taps set, syrup produced, and value of sales.

**Market value of agricultural products sold.** This category represents the gross market value before taxes and production expenses of all agricultural products sold or removed from the place in 2012 regardless of who received the payment. It is equivalent to total sales and it includes sales by the operators as well as the value of any shares received by partners, landlords, contractors, or others associated with the operation. It includes value of direct sales and the value of commodities placed in the Commodity Credit Corporation (CCC) loan program. Market value of agricultural products sold does not include payments received for participation in other federal farm programs. Also, it does not include income from farm-related sources such as customwork and other agricultural services, or income from nonfarm sources.

The value of crops sold in 2012 does not necessarily represent the sales from crops harvested in 2012. Data may include sales from crops produced in earlier years and may exclude some crops produced in 2007 but held in storage and not sold. For commodities such as sugarbeets and wool sold through a co-op that made payments in several installments, respondents were requested to report the total value received in 2012.

The value of agricultural products sold was requested of all operators. If the operators failed to report this information, estimates were made based on the amount of crops harvested, livestock or poultry inventory, or number sold. Caution should be used when comparing sales in the 2012 census with sales reported in earlier censuses. Sales figures are expressed in current dollars and have not been adjusted for inflation or deflation. See Farms with sales and government payments of less than $1,000.

**Market value of agricultural products sold and government payments.** See Total market value of agricultural products sold and government payments.

**Methane digesters.** See Renewable energy producing systems.

**Migrant farm labor on farms reporting only contract labor.** Data are for those operations that did not have hired farm workers but reported that they did have migrant contract workers on their operation in 2012.

**Migrant farm labor on farms with hired labor.** Operators were asked whether any hired or contract workers were migrant workers. A migrant farm worker is a farm worker whose employment required travel that prevented the worker from returning to his/her permanent place of residence the same day.

**Migrant workers, total.** This is a new item for 2012. The 2007 census did not collect a total. Data are for total migrant farm workers whose employment requires travel that prevents the worker from returning to his or her permanent place of residence the same day.

**Milk from cows, value of sales.** This is a new item for 2012. In 2007, milk from cows value of sales also included other dairy products from cows. Data are not comparable.

**Milk from sheep and goats, value.** This is a new item for 2012. In 2007, milk from sheep and goats value of sales was included in Other livestock products. Data are not comparable.

**Mink, live.** For the 2012 census, data are for inventory and sales of live mink. Mink pelts are included in Other livestock products. In 2007, mink

and their pelts were reported together.

**Mint for tea leaves.** This is a new item for 2012. In 2007 and previous censuses, data were included in other field crops.

**Miscanthus.** This is a new item for 2012. In 2007 and previous censuses, data were included in other field crops.

**Miscellaneous poultry.** Poultry other than chickens or turkeys. Listed in Chapter 2, table 20.

**Misreported or miscoded crops.** In a few cases, data may have been reported on the wrong line, in the wrong section, or the wrong crop code may have been assigned to a write-in crop code. A few of these errors may not have been identified and corrected during processing which resulted in rare cases of inaccurately tabulated data. Reports with significant acres of unusual crops for the area were examined to minimize the possibility that they were in error.

**Mollusks.** These are invertebrate animals with a soft body covering and shells of 1-18 parts or sections. Examples include abalones, clams, mussels, oysters, and snails. See Aquaculture for more information on production reported on the census.

**More than one race reported.** This category represents those operators who chose to report more than one race on the census form.

**Mushroom spawn.** Respondents reported only sales; growing area was not summarized.

**Mushrooms**. All mushroom crops were considered grown under glass or other protection and no mushroom data were published as area in the open. Those reporting mushrooms grown in the open area were converted to an equivalent area of square feet under protection proportional to their sales.

**NAICS.** See Farms by North American Industry Classification System (NAICS).

**Net cash farm income of the operations.** This concept is derived by subtracting total farm expenses from total sales, government payments, and other farm-related income. Depreciation is not used in the calculation of net cash farm income. Net cash farm income of the operation includes the value of commodities produced under production contract by the contract growers.

For publication purposes, farms are divided into two categories:

1. Farms with net gains (includes those operations that broke even).

2. Farms with net losses.

**Net cash farm income of the operators.** This value is the operators' total revenue (fees for producing under a production contract, total sales not under a production contract, government payments, and farm-related income) minus total expenses paid by the operators. Net cash farm income of the operator includes the payments received for producing under a production contract and does not include value of commodities produced under production contract by the contract growers. Depreciation is not used in the calculation of net cash farm income.
For publication purposes, farms are divided into two categories:

1. Farms with net gains (includes those operators that broke even).

2. Farms with net losses.

**Noncitrus fruit, all.** This is a summation of all acres reported in the commodities defined as noncitrus such as apples, grapes, and plums.

**Noncitrus fruit, other.** See other noncitrus fruit.

**Nursery, greenhouse, floriculture, sod, mushrooms, vegetable seeds, and propagative materials.** Data are for total square feet under protection and acres in the open. Individual crop data were collected for area under glass or other protection, area in the open, and sales of aquatic plants, floriculture and bedding crops, nursery crops, sod, propagative materials, food crops grown under protection, and mushroom crops. Total sales data are the summation of all crops.

**Nursery stock crops.** Data include ornamentals, shrubs, shade trees, flowering trees, evergreens, live Christmas trees, fruit and nut trees and plants, vines,

palms, ornamental grasses, and bare root herbaceous perennials.

**Nuts, all.** Data include all nut trees.

**Occupation**. See Primary occupation of operator and/or Farms by age and primary occupation of operator.

**Operations legal status for tax purposes.** See Farms by legal status.

**Operator.** The term operator designates a person who operates a farm, either doing the work or making day-to-day decisions about such things as planting, harvesting, feeding, and marketing. The operator may be the owner, a member of the owner's household, a hired manager, a tenant, a renter, or a sharecropper. If a person rents land to others or has land worked on shares by others, he/she is considered the operator only of the land which is retained for his/her own operation. The census collected information on the total number of operators, the total number of women operators, and demographic information for up to three operators per farm.

**Operator characteristics.** Operators (up to three operators per farm) were asked to report primary occupation, sex, age, race, place of residence, if retired, number of days worked off farm, year in which his/her operation of the farm began, year began operating any farm, hired manager, number of persons living in the operators' households, internet access and type of services, and Spanish, Hispanic, or Latino origin. Information on the total number of operators and total number of women operators was collected from each operation. The principal operator was asked to report the percentage of total household income that came from the farm operation. In addition, operators two and three were asked if they were the spouse of the principal operator.

**Operators, number.** Demographic and other information were collected for up to three operators per farm - the principal operator plus up to two additional operators. This may be fewer than the total operators on some farms. Demographic data for up to three operators reported are presented separately for women, by race categories, and for Spanish, Hispanic, or Latino origin.

**Operators of Spanish, Hispanic, or Latino origin.** See Spanish, Hispanic, or Latino origin.

**Operators, total.** The data represent the total reported number of operators for the operation.

**Operators, total women.** The data represent the total number of women operators reported for the operation.

**Oranges, all.** All oranges are a summation of Valencia oranges and Other oranges. Total acres, bearing age acres, and nonbearing age acres were collected by category.

**Oranges, other.** See Other oranges.

**Organic agriculture.** Respondents were instructed to indicate if they had organic production according to USDA's National Organic Program (NOP) in 2012. Respondents reported whether their organic production was certified or exempt from certification and the sales from NOP produced commodities. They also reported whether they had acres transitioning into NOP production and the value of sales of USDA NOP certified or exempt organically produced commodities. Also see Total organic product sales.

**Organic value of sales.** See Total organic product sales.

**Ornamental fish.** This category includes various fish raised for water gardens, aquariums, etc. Examples include angel fish, guppies, koi, ornamental goldfish, and tropical fish. The value of sales was tabulated for each specified species.

**Other animals and other animal products sold.** This category includes number of farms and value of sales for all animals and animal products not listed elsewhere on that specific table.

**Other aquaculture products.** This category includes aquaculture not listed separately. Examples include the production of alligators, frogs, leeches, eels, live rock, salamanders, and turtles.

**Other cattle.** Data include heifers that had not

calved, steers, calves, and bulls.

**Other cattle, sheep, livestock, or poultry.** See Commodities raised and delivered under production contract.

**Other citrus.** Data relate to any citrus crop not having a specific code on the report form.

**Other cropland.** This includes all cropland other than harvested cropland or other pasture and grazing land that could have been used for crops without additional improvements. It includes cropland idle, used for cover crops or soil improvement, cropland which all crops failed or were abandoned, and cropland in cultivated summer fallow.

**Other crops.** In Chapter 1, table 45, Commodities Raised and Delivered Under Production Contracts, the data relate to any crop that did not have a specific code in the Grains and Oilseeds, or Vegetables, melons, and potatoes sections of the 2012 report form. In Chapter 2, table 27, Other Crops the data relate to any field crops that did not have a specific code in the field crops section.

**Other crops and hay.** Data are for the total market value of all crops not categorized into one of the prelisted crop sales categories on the report form and include hay sales. This category includes crops such as grass seed, hay and grass silage, haylage, greenchop, hops, maple syrup, mint for oil, peanuts, sugarcane, sugarbeets, etc.

**Other-farm related income sources.** See Total income from farm-related sources, gross before taxes and expenses.

**Other field and grass seed crops.** Data relate to any field or grass seed crop not having a specified code on the 2012 report form.

**Other floriculture and bedding crops.** Data relate to any floriculture and bedding crops not having a specific code on the 2012 report form.

**Other food fish.** Data are for fish, other than catfish and trout, raised on farms primarily for food. Examples include hybrid striped bass, perch, salmon, sturgeon, and tilapia.

**Other greenhouse vegetables and fresh cut herbs.** This category includes vegetable crops, other than tomatoes, that were grown under protection and fresh cut herbs grown under protection.

**Other land.** This category includes land in house lots, barn lots, ponds, roads, ditches, wasteland, etc. It includes those acres in the farm operation not classified as cropland, pastureland, or woodland. See Land in farms.

**Other livestock.** This category includes all livestock not having specific codes on the 2012 report form. See Other animals and other animal products sold.

**Other livestock and poultry purchased or leased.** See Total farm production expenses.

**Other livestock products.** Data for this category include the number of farms that sold livestock products that did not have a specific code on the 2012 report form. Data are for farms with production, not necessarily sold. Mink pelts and rabbit pelts are included here in 2012, but were in specific codes in 2007, so data are not directly comparable.

**Other noncitrus fruit.** Data relate to any noncitrus fruit not having a specific code on the census report form.

**Other nuts.** This category includes any nut crop not having a specific code on the report form.

**Other oranges.** Data are for Oranges other than Valencia oranges, including Navel oranges.

**Other pasture and grazing land that could have been used for crops without additional improvements.** This category includes land used only for pasture or grazing that could have been used for crops without additional improvement. Also included are acres of crops hogged or grazed but not harvested prior to grazing. However, cropland that was pastured before or after crops were harvested in 2012 was included as harvested cropland rather than cropland for pasture or grazing. In 2007, this category was referred to as other pasture or grazing land that could have been used for crops without additional improvements. This is a wording change only; data are comparable.

**Other poultry.** Data are for other poultry not having a specific code on the report form. The list of poultry with specific codes changed from 2007, so data are not directly comparable.

**Other tame hay.** See Hay, other tame dry hay.

**Other vegetables.** Data shown for other vegetables relate to any vegetable not having a specific code on the census form.

**Owned horses and ponies.** Only horses and ponies which are owned by the operation and sold contribute to the total value of production of the operation. Horses on the operation which are not owned and sold do not contribute to the total value of production. Therefore, the value of horses owned sold is published instead of all sold horses. This removes not owned horses sold that were not part of an operation's value of production. It is not possible to publish a value for Total horses sold in 2012 as the data were not summarized.

**Patronage dividends.** See Total income from farm-related sources, gross before taxes and expenses.

**Payments received by the contractee for commodities produced under production contract.** These data show the number of farms and the dollar amount the contractees received from contractors for commodities produced under contract. This is not the market value of the commodities delivered, but the payment or fee the operators received for commodities delivered.

**Peaches, all.** Data for all peaches were collected as a category in all States except for California and Arizona. Peach data in California and Arizona were collected separately for clingstone and freestone peaches. The data were later combined with all peaches for publication. Data for clingstone and freestone are found in the California and Arizona publications only.

**Peacocks and peahens.** This is a new item for 2012. In 2007, peacocks and peahens were reported as other poultry.

**Pears, all.** Data for all pears were collected as a category in all States except for California, Arizona, Idaho, Oregon, Alaska, and Washington. These States collected data separately for Bartlett pears and Other pears which were later combined into the Pear, all category. Data for Bartlett and other pears are found only in the State publications where collected.

**Pecans, all.** All pecans is a summation of Pecans, improved and Pecans, native and seedling. Total acres, bearing acres, and nonbearing acres were collected by category.

**Pecans, improved.** Improved pecans are varieties that have been genetically altered through breeding and grafting techniques to produce more nuts, and nuts with a greater percentage of nut meat. See Pecans, all for further explanation.

**Pecans, native and seedlings.** Native pecans are varieties that developed under natural conditions. Seedling pecans are produced from seed (the nut) and have not been budded or grafted. See Pecans, all for further explanation.

**Peppers, Bell (excluding pimientos).** Pimientos were reported as other vegetables.

**Peppers, other than bell (including chile).** The data include all other peppers including chile. Pimientos were reported as other vegetables.

**Permanent pasture and rangeland, other than cropland and woodland pastured.** This land use category encompasses grazable land that does not qualify as woodland pasture or cropland pasture. It may be irrigated or dry land. In some areas, it can be a high quality pasture that could not be cropped without improvements. In other areas, it is barely able to be grazed and is only marginally better than wasteland.

**Plums**. This item was reported as an individual item only in California and Arizona. All other States reported plums in a combined plum and prune category.

**Plumcots, pluots, and other plum-apricot hybrids.** In 2012, plumcots, pluots and other plum-apricot hybrids were reported as an individual item only in California, Arizona, Idaho, Oregon, Alaska, Washington, Nebraska, Kansas, Iowa, Wisconsin, Illinois, Indiana, Michigan, Ohio, New York, Pennsylvania, New Jersey, and New England States.

In all other States they were reported in the Other noncitrus category. In 2007, this category was referred to as pluots and they were reported as an individual item in California, Arizona, Idaho, Oregon, Alaska, and Washington. Pluot is a registered trademark of plumcots, which are genetic crosses between plums and apricots. This is only a wording change, all data are comparable.

**Potatoes.** Potato acres are included in the vegetable acres. Data are for total acres harvested, acres harvested for fresh market, and acres harvested for processing. Production was not collected.

**Poultry hatched.** This category includes all poultry hatched on the operation during the year. The number of poultry hatched is under the sales heading.

**Poultry, other.** See Other poultry.

**Primary occupation of operator.** Data on age and primary occupation were obtained from up to three operators per farm. The primary occupation classifications used were:

1. *Farming or ranch work.* The operator spent 50-percent or more of his/her worktime during 2012 at farming or ranching.

2. *Other.* The operator spent less than 50-percent of his/her worktime during 2012 in farming or ranching operations.

**Principal operator.** The person primarily responsible for the on-site, day-to-day operation of the farm or ranch business. This person may be a hired manager or business manager. See Operators for further explanation.

**Production contracts.** See Commodities raised and delivered under production contracts.

**Production expenses.** See Total farm production expenses.

**Prunes**. This was reported as an individual item only in California and Arizona. All other States reported prunes in a combined plum and prune category.

**Pullets for laying flock replacement.** Data are for pullet inventory and the number sold or moved for laying flock replacement.

**Pulse crops.** For 2012, pulse crops text was added to the Grain Storage screener question for clarity. Pulse crops include dry beans, dry peas, lentils, lupines, and other minor pulse crops. Data are comparable.

**Rabbits, live.** This is a new item for 2012. The data are for inventory and sales of live rabbits. Rabbit pelts are included in Other livestock products**.** In 2007, rabbits and their pelts were reported together.

**Race of operator.** With the exception of Hawaii, data were collected for American Indian (included Alaska Native), Asian, Black or African American, Native Hawaiian and Other Pacific Islander, and White operators. Respondents were asked to mark one or more of the race categories. In Hawaii operator race data were collected for American Indian (included Alaska Native), Chinese, Filipino, Japanese, Korean, Other Asian, Black or African American, Native Hawaiian, other Pacific Islander, and White. The combination of Native Hawaiian and Other Pacific Islander is equivalent to the Native Hawaiian or Other Pacific Islander category on the other forms. The combination of the Chinese, Filipino, Japanese, Korean, and Other Asian categories is equivalent to the Asian category on the other forms. The Volume 1, Geographic Area Series, U.S. Summary publication only displays counts for the categories of Native Hawaiian and Other Pacific Islander and Asian. Data for the 11 Hawaii race categories are published in chapter 2 of the Hawaii publication of the Volume 1 series.

**Raspberries, all.** Raspberries were reported as All raspberries but the data for black and red are reported separately in Alaska, Idaho, Oregon, and Washington where they were reported as black raspberries or red raspberries. In these States, black raspberries and red raspberries data were combined as Raspberries, all for comparability with other States.

**Raspberries, black.** See Raspberries.

**Raspberries, red.** See Raspberries.

**Renewable energy producing systems.** This is a new category for 2012. These types of systems

produce power, heat, or mechanical energy by converting resources either to electricity or to motor power.

*Biodiesel***.** Data are for production of non-petroleum based diesel fuel made from vegetable oil or animal fats. Biodiesel can be used alone or blended with conventional petroleum-based diesel fuel

*Ethanol.* A fuel produced by converting crops such as corn and sugarcane, biomass crops, or wood. This fuel is generally blended with gasoline. Production of ethanol for fuel requires a permit from the Bureau of Alcohol, Tobacco, and Firearms (ATF). Only ethanol production for fuel was reported.

*Geoexchange system.* A system that uses temperatures from the earth to reduce the operational costs of heating and cooling.

*Methane digesters.* It is a device which captures biogas resulting from the decomposition of manure, processing by-products, and other materials. Harvested biogas is used as a substitute for natural gas to power engines which generate electricity. It is fed into the natural gas pipeline or flared. Methane digesters were reported only if in production and used in 2012.

*Small hydro system.* A water driven system, which produces electricity, by the gravitational force of falling or flowing water. It excludes water driven systems that only provide mechanical power, such as turning a grinding stone for a flour mill.

*Solar panel.* A flat panel designed to capture the sun's energy. Include photovoltaic systems, which convert light from the sun into electricity, and thermal systems that passively generate electricity.

*Wind turbines.* A device which converts wind power into electricity. Include wind generators, wind power units, wind energy converters and aero generators. Exclude windmills, which do not produce electricity.

**Rental of farmland.** See Total income from farm-related sources, gross before taxes and expenses; Gross cash rent or share payments.

**Sales, total.** See Market value of agricultural products sold.

**Sheep and lambs inventory.** Data for Western States (AK, AZ, CA, CO, HI, ID, MN, MT, NV, ND, OR, SD, UT, WA, WY) are for sheep and lambs of all ages owned regardless of location. Data for all other States are for sheep and lambs of all ages on the operation regardless of ownership. Sheep and lambs were collected in their own section to clarify to respondents when to report "owned" sheep and lambs versus any sheep and lambs on the operation.

**Short-rotation woody crops.** Data are for short-rotation woody crops that grow from seed to a mature tree in 10 years or less. These are trees for use by the paper or pulp industry or as engineered wood. This does not include lumber. Acres in production were included in Cropland harvested in the "Land" section of the report form.

**Size of farm.** See Farms by size.

**Small hydro system.** See Renewable energy producing systems.

**Solar panel.** See Renewable energy producing systems.

**Spanish, Hispanic, or Latino origin.** Operators of Spanish, Hispanic, or Latino origin are found in all of the racial groups listed in the census and were tabulated according to the race reported, as well as on tables pertaining only to this group.

**Sport or game fish.** Data are for sport or game fish raised on farms to be used primarily for sport. Examples include bluegill, crappie, largemouth bass, smallmouth bass, sunfish, muskie, northern pike, and walleye.

**Squash, all.** All squash is a summation of summer squash and winter squash. Total acres, acres for fresh market, and acres for processing were collected by category.

**Squash, summer.** See Squash, all.

**Squash, winter.** See Squash, all.

**Sweet potatoes.** Sweet potato acres are included in the vegetable acres. Data are for total acres harvested, acres harvested for fresh market, and acres harvested for processing. Production was not

collected.

**Switchgrass**. This is a new item for 2012. In 2007 and previous censuses, data were included in other field crops. Other field crops data are comparable.

**Tame hay.** See Hay, other tame dry hay.

**Tenure**. See Farms by tenure of operator.

**Tobacco transplants.** Data are for tobacco transplants that were sold for transplant to farm fields. Transplants grown for transplanting to the same operation were not reported or removed during data review.

**Tomatoes in the open.** Data are for tomatoes grown in the open and excludes tomatoes produced under glass or other protection.

**Total cropland.** This category includes cropland harvested, other pasture and grazing land that could have been used for crops without additional improvements, cropland on which all crops failed or were abandoned, cropland in cultivated summer fallow, and cropland idle or used for cover crops or soil improvement but not harvested and not pastured or grazed.

**Total farm production expenses.** Includes the production expenses provided by the operators, partners, landlords (excluding property taxes), and production contractors for the farm business in 2012. Tenant farmers reported expenses paid by landlords for the agricultural production on the operation, as well as their expenses. Farm or ranch operators who rented part of their land to others reported only the expenses for the land they actually used themselves and not expenses for land rented to others. The 2012 total farm production expenditure includes all farm-related expenses such as customwork, fuel costs, cost of cutting timber, services provided to hunters, cooperative membership fees, etc. However, if the income from these farm-related categories was not considered a part of the operation (i.e., if the income was regarded as derived from a separate business), then the associated expenses were not included. The contractor's portion of expenses was solely based on computer generated estimates for 2012.

This item excludes expenses relating to non-farm activities such as trading and speculation in the commodities market or livestock trading activities. Explanations of selected production expenses are listed below.

*All other production expenses.* This category includes all expenses not listed on the report form. Examples include animal health costs, storage and warehousing, marketing and ginning expenses, insurance, etc. Health expenses and payroll taxes were excluded.

*Breeding livestock purchased or leased.* These expenses include all breeding livestock and poultry purchased or leased during 2012 for production on the farm or ranch. The total includes amount spent for beef and dairy cows, heifers, bulls, sows, gilts, boars, rams, lambs, ewes, roosters, hens, layers, etc. Estimations of the value of livestock or poultry fed on a custom basis were to be made based on their value when they arrived on the farm or ranch.

*Cash rent paid in 2012 for land and buildings.* These data include the cost of renting land and buildings that were part of the operation. Rent paid for the operator's dwelling or other non-farm property and the value of the shares of crops and livestock paid to landlords were excluded.

*Chemicals.* These 2012 expenses include insecticides, herbicides, fungicides, and other pesticides, including costs of custom application. Data exclude commercial fertilizer purchased.

*Contract labor.* These data include payments made to contractors, crew leaders, cooperatives, or any other organization hired to furnish a crew of laborers to do a job that may involve one or more agricultural operations. In some cases, a crew leader may furnish some equipment. Data exclude expenses made on a contractual basis for repair or maintenance or for capital improvements, such as construction of farm buildings, installation of fences or irrigation systems, and land leveling.

*Customwork and custom hauling.* These expenses include costs incurred for having customwork done on the place and for renting machines to perform agricultural operations. The cost of cotton ginning is excluded. The cost of labor involved in the customwork service is included in the customwork

expense. Some examples of customwork are planting, spraying, harvesting, preparation of products for marketing, grinding and mixing feed, corn picking, grain drying, and silo filling. The cost of custom application of fertilizer and chemicals is included in expenditures for fertilizer and chemicals in 2012, just as it was in the 2007 census. The cost of hired labor for operating rented or hired machinery is included as a hired farm and ranch labor expense.

*Feed purchased.* These expenses include the cost of all feed purchased for livestock and poultry including grain, hay, silage, mixed feeds, concentrates, etc. during 2012.

*Fertilizer, lime, and soil conditioners.* These 2012 expenses include fertilizer and lime including rock phosphate and gypsum, and the costs of custom application.

*Gasolines, fuels, and oils.* These expenses include the cost of all gasoline, diesel, natural gas, LP gas, motor oil, and grease products for the farm during 2012. Expenses exclude fuel for personal use of automobiles by the family and others, fuel used for cooking and heating the farmhouse, and any other use outside of farmwork on the operation.

*Hired farm labor.* These 2012 expenses include the total amount paid for farm or ranch labor including regular workers, part-time workers, and members of the operator's family if they received payments for labor. Expenses include social security taxes, State taxes, unemployment tax, payment for sick leave or vacation pay, workman's compensation, insurance premiums, and pension plans.

*Interest paid on debts.* These expenses include interest and finance charges paid in 2012 for debts secured by real estate and on debt not secured by real estate. Interest expenses excluded from this category are non-farm interest expenses and interest expenses originating from machinery and equipment used for a separate customwork business or for other operations. Interest expense for the operator's dwelling, where the amount is separate from interest on farm land and buildings on the operation, is excluded. Interest paid on debts was reported in one of two categories:

1. *Secured by real estate.* These data include all interest expenses paid in 2012 on debts secured by real estate for the farm.

2. *Not secured by real estate.* These data include all interest expenses paid in 2012 on debts secured by machinery, tractors, trucks, other equipment, livestock, poultry, breeding stock, money borrowed for use as working capital, and interest paid on CCC loans for the farm.

*Livestock and poultry purchased or leased.* These data include Breeding livestock purchased or leased and Other livestock and poultry purchased or leased.

*Other livestock and poultry purchased or leased.* These expenses include all non-breeding livestock and poultry purchased or leased during 2012 for production on the farm or ranch. The total includes amounts spent for cattle, calves, hogs, pigs, sheep, hatchery eggs, etc.

*Property taxes paid.* These data include property taxes paid by the operators for the farm share of land, machinery, buildings, and livestock, excluding taxes paid by this operator's landlords.

*Rent and lease expenses for machinery, equipment, and farm share of vehicles*. These data include the farm share cost of renting or leasing machinery, equipment, and vehicles during 2012. Rental and lease expenses of items used only for custom hire are excluded here.

*Repairs, supplies, and maintenance.* These expenses include all costs for the repair and upkeep of buildings, motor vehicles, fences, and farm equipment used for the farm business during 2012. Repairs to equipment used both for the farm business and for performing customwork are included.

*Seeds, plants, vines, and trees.* These expenses include the cost of all seeds, bulbs, plants, propagation materials, trees, seed treatments, seed cleaning costs, etc. purchased during 2012. Excluded were items purchased for immediate resale or the value of seed grown on the operation.

*Utilities.* These data show the farm share cost of electricity, telephone charges, internet fees, and water purchased in 2012. Included in the water cost is water purchased for irrigation purposes, livestock

watering, etc. Household utility costs were excluded from these items.

**Total greenhouse vegetables and fresh cut herbs.** This category includes greenhouse tomatoes and other greenhouse vegetables and fresh cut herbs.

**Total income from farm-related sources, gross before taxes and expenses.** This includes gross income from farm-related sources received in 2012 before taxes and expenses from the sales of farm byproducts and other sales and services closely related to the principal functions of the farm business. The data exclude income from employment or business activities which were separate from the farm business. Categories that make up the farm-related income calculation changed between the 2002 and 2007 censuses. In the 2012 census as in the 2007 census, Crop and livestock insurance payments received and Amount from State and local government agricultural program payments are published separately. In the 2002 census, these categories were combined with Other farm-related income sources.

*Agri-tourism and recreational services.* This income includes income from recreational services such as hunting, fishing, farm or wine tours, hay rides, etc.

*Amount from State and local government agricultural program payments.* This income includes State and local government agricultural program payments. Respondents were to exclude the State and local portion of CREP payments if they were reported in the amount received for participation in CREP in section 5, item 1 of the report form.

*Crop and livestock insurance payments received.* This income includes insurance payments from crop and livestock losses.

*Customwork and other agricultural services.* This income includes gross receipts received by the farm operators for providing services for others such as planting, plowing, spraying, and harvesting. Income from customwork and other agricultural services is generally included in the agriculture census if it is closely related to the farming operation. However, it is excluded if it constituted a separate business or was conducted from another location.

*Gross cash rent or share payments.* This income includes gross cash or share payments received from renting out farmland, payments received from the lease or sale of allotments, and payments received for livestock pastured on a per-head, per month, or per pound basis. It excludes rental income from nonfarm property.

*Other-farm related income sources.* This is other income which is closely related to the agricultural operation. This income includes animal boarding, breeding fees (horse breeding or stud fees received were reported in the Value of Sales section in the Other animals and other animal products category), tobacco quota buyouts, State fuel tax refunds, farm generated energy, etc. Crop and livestock insurance payments received and amount from State and local government agricultural program payments were published separately.

*Patronage dividends and refunds from cooperatives.* This income includes payments to a farmer or rancher for business done with a cooperative to which he/she usually belongs. The payment is usually for goods sold through the co-op.

*Sales of forest products.* This income includes gross receipts from sales of standing timber, pulpwood, firewood, etc. from the farm or ranch operation. It excludes income from nonfarm timber tracts, sawmill businesses, cut Christmas trees, maple products, and short-rotation woody crops.

**Total market value of agricultural products sold and government payments.** This category represents the value of products sold plus government payments. Total value of products sold combines total sales not under production contract and total sales under production contract. Government payments consist of government payments received from the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Farmable Wetlands Program (FWP), or Conservation Reserve Enhancement Program (CREP) plus government payments received from Federal, State, and local programs other than the CRP, WRP, FWP, and CREP, and Commodity Credit Corporation loans.

**Total operators.** See Operators, total.

**Total organic product sales.** The data represent the value of commodities produced according to USDA's National Organic Program and sold from operations during 2012. Crops, livestock, and poultry products were reported individually on the 2012 report form, but in 2007, these commodities were combined and may have come from either crops or livestock production. The data for the 2012 census years is not directly comparable.

**Total sales.** See Market value of agricultural products sold.

**Turkeys.** Turkey data are a combination of turkeys for meat production, turkey hens and toms kept for breeding, and turkey brooders, tabulated from three questions. Turkey brooders are immature birds sent to another farm for further growout to meat production or breeding. This may result in a turkey being sold more than once from different operations.

**Type of organization.** See Farms by type of organization.

**Unpaid workers.** This is a new item for 2012. It includes agricultural workers not on the payroll who performed activities or work on a farm or ranch.

**Utilities.** See Total farm production expense.

**Value of agricultural products sold directly to individuals for human consumption.** This item represents the value of agricultural products produced and sold directly to individuals for human consumption from roadside stands, farmers' markets, pick-your-own sites, etc. It excludes non-edible products such as nursery crops, cut flowers, and wool but includes livestock sales. Sales of agricultural products by vertically integrated operations through their own processing and marketing operations were excluded.

**Value of commodities.** Data show the number of farms and the market value of all commodities delivered under a production contract. Also see commodities raised and delivered under production contract.

**Value of landlord's share of total sales.** Data include the value of agricultural sales received by the landlords.

**Value of organically produced commodities.** See Total organic product sales.

**Value of sales.** See Market value of agricultural products sold.

**Vegetable transplants.** Data are for vegetable transplants grown and sold from this operation for transplanting to fields on another operation.

**Vegetables harvested for fresh market.** Respondents reported the total vegetable acres harvested, harvested for fresh market and harvested for processing.

**Vegetables harvested for sale.** The acres of vegetables harvested is the summation of the acres of individual vegetables harvested. All of the individual vegetable items may not be shown. When more than one vegetable crop was harvested from the same acreage, acres were counted for each crop.

**Vegetables, melons, and potatoes.** See Commodities raised and delivered under production contracts.

**Vegetables, other.** See Other vegetables.

**Wheat for grain.** Data were reported by type of wheat - Durum, winter, and spring other than Durum.

**Wind turbines.** See Renewable energy systems.

**Woodland pastured.** This category includes all woodland used for pasture or grazing during the census year. Woodland or forest land pastured under a per-head grazing permit was not counted as land in farms and, therefore, was not included in woodland pastured.

**Woodland, total.** This category includes natural or planted woodlots or timber tracts, cutover and deforested land with young growth which has or will have value for wood products and woodland pastured. Land covered by sagebrush or mesquite was reported as Permanent pastureland and rangeland or other land. Land planted for Christmas tree production and short rotation woody crops was reported in Cropland harvested, and land in tapped maple trees was reported as Woodland not pastured.

**Write-in crops.** To reduce the length of the report form, only the major crops for each region were prelisted on the regional report forms. For other crops, the respondent was asked to look at a list of crops in each section and write in the crop name and its code. For crops that had no individual code listed on the report form, the respondent was to write in the crop name and code of the appropriate ‘‘all other’’ category for that section. Write-in crops coded as ‘‘all other’’ were reviewed and assigned a specific code when possible. Crops not assigned a specific code were left in the appropriate ‘‘all other’’ category.

**Years operating any farm.** This is a new item for 2012. This section collects information about how long the operator(s) has operated any farm, regardless of location.

**DUE FEBRUARY 4, 2013**

OMB No. 0535-0226: Approval Expires 10/31/2014

# UNITED STATES 2012 CENSUS OF AGRICULTURE

Form Number: 12-A106
(12/13/2011)

USDA

AGRICULTURE COUNTS NASS

National Agricultural Statistics Service

Return your completed report to:

Census of Agriculture
1201 East 10th Street
Jeffersonville, IN 47132

**OFFICE USE ONLY**

| 0013 | | |
|---|---|---|
| | | |
| 0011 | 0012 | |
| | | |
| 0014 | 0015 | 0016 |
| | | |
| 0021 | 0022 | 0023 |
| | | |

**12-A106**

*Make corrections to name, address, and ZIP code if necessary.*

Complete your report by mail or via the internet at **www.agcensus.usda.gov**.

- **Your report is due by February 4, 2013.**
- To fill out the paper form, use a black or blue ballpoint pen.
- **Duplicate forms?** If you received extra Census report forms for the SAME farming operation, return all report forms in the same envelope with this completed report.

Print the information below for the person completing this form:

1092 Name

1093 Area Code and Phone Number – –

1094 Date Completed (MM-DD-YYYY) – –

1095 E-mail

**THANK YOU FOR YOUR COOPERATION.**
**Questions? Call us toll free at 1-888-424-7828**
¿Preguntas? Llámenos libre de cargos al 1-888-424-7828

**NOTICE:** Response to this inquiry is required by law (Title 7, U.S. Code). By the same law and the Confidential Information Protection and Statistical Efficiency Act of 2002 (Public Law 107-347), YOUR REPORT IS CONFIDENTIAL and will only be used for statistical purposes. Your report CANNOT be used for purposes of taxation, investigation, or regulation. The law also provides that copies retained in your files are immune from legal process. (Title 7, U.S.Code)
http://www.agcensus.usda.gov/About_the_Census/Regulations_Guiding_NASS/index.asp

12106019

## SECTION 1 ACREAGE IN 2012

Report land owned, rented, or used by you, your spouse, or by the partnership, corporation, or organization named on the front of this form. Include ALL LAND, REGARDLESS OF LOCATION OR USE - cropland, Conservation Reserve Program (CRP) and Wetlands Reserve Program (WRP) land, pastureland, rangeland, woodland, idle land, farmsteads, etc.

1. Number of acres owned . . . . . 0043 None ☐ **BOX A** _____

2. Number of acres RENTED or LEASED FROM OTHERS . . . . . 0044 ☐ **BOX B** _____

*INCLUDE*
- *land worked by you on shares*
- *land used rent free in exchange for services, payment of taxes, etc.*
- *Federal, State, and railroad land leased on a per acre basis*
- *land rented or leased by you for cash*

*EXCLUDE*
- *land used on a per-head or animal unit month (AUM) basis.*

3. Number of acres RENTED or LEASED TO OTHERS . . . . . 0045 ☐ **BOX C** _____

*INCLUDE LAND*
- *worked on shares by others*
- *subleased*
- *rented or leased to others for cash*
- *used rent free in exchange for services, payment of taxes, etc.*

*EXCLUDE acres enrolled in:*
- *Conservation Reserve Program (CRP)*
- *Wetlands Reserve Program (WRP)*
- *Farmable Wetlands Program (FWP)*
- *Conservation Reserve Enhancement Program (CREP)*
- *or acres rented or leased to others part of the year*

a. How many acres rented or leased to others (Box C above) did this operation own? . . . . . 0053 None ☐ Number of Acres _____

4. Enter the figures from the boxes above to determine your total acres operated:

**BOX A** _____ + **BOX B** _____ - **BOX C** _____ = 0046 **BOX D** _____

5. Did this operation pay to use any land on a fee per-head or animal unit month (AUM) basis?

☐ **Yes** - How many acres?. . . . . 0041 1160 **Don't Know** ☐ Number of Acres _____

**DO NOT** include these acres in the boxes above. If you did, **GO BACK** and **EXCLUDE** them from the boxes above and recalculate BOX D.

☐ **No** - Continue

6. Does the figure in **Box D** = 0?

☐ **Yes** - Refer to the instruction sheet to complete this form ☐ **No** - Continue

7. Location of agricultural activity for this operation.

a. In what county was the largest value of your agricultural products raised or produced?

| | Principal County Name | | State | | Number of Acres |
|---|---|---|---|---|---|
| 0055 | | 0060 | | 0056 | |

b. If you also had agricultural activity in any **other** county, enter the county name(s), etc.

| | Other County Name(s) | | State | | Number of Acres |
|---|---|---|---|---|---|
| 3026 | | 3031 | | 0057 | |
| 3027 | | 3032 | | 0058 | |
| 3028 | | 3033 | | 0059 | |
| 3029 | | 3034 | | 0042 | |

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## SECTION 2 LAND

Of the acres reported in **Box D** on the previous page, report acres in the first item that applies. **REPORT LAND ONLY ONCE ON THIS PAGE**. NOTE: Report acres in CRP, WRP, FWP, and CREP in the most appropriate item below.

1. **Cropland** – Exclude cropland pasture.

a. Cropland harvested

*INCLUDE*
- *land from which crops were harvested or hay was cut*
- *orchards and vineyards*
- *nursery and greenhouse crops*

*INCLUDE – cont.*
- *Christmas trees*
- *citrus groves*
- *berries*
- *short rotation woody crops* . . . . . 0787

| | | None | Number of Acres |
|---|---|---|---|
| b. Cropland on which all crops failed or were abandoned – Exclude land in orchards and vineyards | 0790 | ☐ | |
| c. Cropland in cultivated summer fallow | 0791 | ☐ | |
| d. Cropland idle or used for cover crops or soil-improvement but not harvested and not pastured or grazed | 1062 | ☐ | |

2. **Pasture**

| | | | |
|---|---|---|---|
| a. Permanent pasture and rangeland | 0796 | ☐ | |
| b. Woodland pastured | 0794 | ☐ | |
| c. Other pasture and grazing land (including rotational pasture) that could have been used for crops without additional improvements | 0788 | ☐ | |

3. **Woodland not pastured**

*INCLUDE*
- *woodlots*
- *timber tracts*
- *sugarbush* . . . . . 0795 ☐

4. **All other land**

*INCLUDE*
- *farmsteads, home, and buildings*
- *livestock facilities*
- *ponds*
- *roads*
- *wasteland, etc.* . . . . . 0797 ☐

| | | BOX E |
|---|---|---|
| 5. **TOTAL ACRES** - Add items 1-4 to determine your total acres operated | 0798 | |

6. Does the total in **Box E** = the total in **Box D** on the previous page?

☐ **Yes** - Continue

☐ **No** - Go back and correct your figures. These numbers should be the same.

Acres in Box D (Box E) will be referred to as "this operation" for the remainder of this form.

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## SECTION 3 LAND RENTED OR LEASED FROM OTHERS FOR CASH

1. In 2012, did this operation **rent or lease** any cropland or pasture acres from others **for cash**? ***Exclude*** land rented or leased on a share basis, per-head or AUM basis, free of charge, and rent that includes buildings, such as barns.

3420 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 4

| | | None | Acres |
|---|---|---|---|
| 2. How many acres of **non-irrigated cropland** were rented or leased for cash? Include acres cut and to be cut for hay. | 3421 | ☐ | |
| 3. How many acres of **irrigated cropland** were rented or leased for cash? Include fruit, nut, berry, vineyard, nursery, and hay land | 3424 | ☐ | |
| 4. How many acres of **permanent pasture, grazing or grassland** were rented or leased for cash? Exclude Federal, State, and other types of land rented or leased on an animal unit month (AUM) basis | 3427 | ☐ | |

## SECTION 4 IRRIGATION

1. Were any of the acres in this operation irrigated by sprinklers, flooding, ditches or furrows, drip or trickle irrigation, etc. in 2012?

1065 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 5

| | | None | Acres Irrigated |
|---|---|---|---|
| 2. How many acres of harvested land were irrigated? Include irrigated land from which crops were harvested or hay was cut and land in bearing and nonbearing fruit, nut, berry, and nursery crops. | 0680 | ☐ | |
| 3. How many acres of pastureland, rangeland, abandoned cropland, and other land were irrigated? | 0681 | ☐ | |

## SECTION 5 FEDERAL AND STATE AGRICULTURAL PROGRAMS AND CROP INSURANCE ACRES

| | | None | Number of Acres | Dollars |
|---|---|---|---|---|
| 1. Acres in the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Farmable Wetlands Program (FWP), or Conservation Reserve Enhancement Program (CREP) on September 30, 2012 and amount received in 2012 for participation. | 0683 | ☐ | | $ .00 |
| 2. Acres in this operation covered under a crop insurance policy in 2012. | 1067 | ☐ | | |

STOP If acres are reported in items 1 and/or 2, were these acres included in the acres reported in Section 2?

☐ **Yes** - Continue ☐ **No** - Go back to Section 2 and correct your figures.

| | | None | Dollars |
|---|---|---|---|
| 3. Direct, counter cyclical, and ACRE (Average Crop Revenue Election) payments received in 2012 as defined under the 2008 Farm Bill | 1424 | ☐ | $ .00 |
| 4. Amount received in 2012 from loan deficiency payments (LDPs), marketing loan gains, and net value of commodity certificates. Include payments received through cooperatives | 1425 | ☐ | $ .00 |
| 5. Other Federal agricultural program payments received in 2012 | 1422 | ☐ | $ .00 |
| 6. State and local government agricultural program payments received in 2012 | 1423 | ☐ | $ .00 |
| 7. Amount received in 2012 from CCC loans for all commodities. Include Austrian winter peas, barley, canola and other rapeseed, corn, cotton, crambe, dry edible peas, flaxseed, honey, lentils, wool, mohair, mustard seed, oats, peanuts, rice, safflower, sesame seed, small chickpeas, sorghum, soybeans, sunflower seed, and wheat | 1411 | ☐ | $ .00 |
| 8. What was the total amount spent to repay CCC loan(s) in 2012? | 1414 | ☐ | $ .00 |

*INCLUDE*
- *disaster, market loss*
- *national dairy market loss*
- *NAP (non-insured assistance program)*
- *EQIP (Environmental Quality Incentives Program)*

*INCLUDE - cont*
- *CSP (Conservation Security Program)*
- *livestock programs*
- *any other Federal programs*

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## SECTION 6 FIELD CROPS

1. Were any field crops, such as corn, wheat, rice, etc., harvested from this operation in 2012?

*INCLUDE*
- *your landlord's share and crops grown under contract*

*EXCLUDE*
- *crops grown on land rented to others*

1011 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 7

2. Report quantity harvested in the unit specified with the crop name. For those crops not printed in the following table, enter the field crop name and code from the list below for any other field crop harvested in 2012. Report gross value of agricultural products sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts.

| Field Crop | Code | Acres Harvested | Total Quantity Harvested | | Acres Irrigated | Value of Sales (Dollars) |
|---|---|---|---|---|---|---|
| Alfalfa seed | 0542 | | | Lbs. | | $ .00 |
| Barley for grain or seed | 0079 | | | Tons | | $ .00 |
| Bermuda grass seed | 0563 | | | Lbs. | | $ .00 |
| Corn for grain or seed | 0067 | | | Tons | | $ .00 |
| Corn for silage or greenchop | 0070 | | | Tons | | $ .00 |
| Cotton, Pima - Include cottonseed in value of sales only | 0644 | | | Bales | | $ .00 |
| Cotton, Upland - Include cottonseed in value of sales only | 0581 | | | Bales | | $ .00 |
| Dry edible beans - Include garbanzo | 0554 | | | Cwt. | | $ .00 |
| Dry Lima beans | 0557 | | | Cwt. | | $ .00 |
| Oats for grain or seed | 0076 | | | Tons | | $ .00 |
| Rice | 0677 | | | Cwt. | | $ .00 |
| Sorghum for grain or seed - Include milo | 0082 | | | Tons | | $ .00 |
| Sorghum for silage or greenchop | 0085 | | | Tons | | $ .00 |
| Sugarbeets for sugar | 0719 | | | Tons | | $ .00 |
| Wheat, Durum for grain or seed | 0578 | | | Tons | | $ .00 |
| Wheat, Spring for grain or seed, other than Durum | 0728 | | | Tons | | $ .00 |
| Wheat, Winter for grain or seed harvested in 2012 | 0572 | | | Tons | | $ .00 |
| | | | | | | $ .00 |
| | | | | | | $ .00 |

If more space is needed, use a separate sheet of paper.

| FIELD CROPS | CODE |
|---|---|
| Canola, edible (pounds) | 0614 |
| Clover, crimson clover seed (pounds) | 0593 |
| Clover, red clover seed (pounds) | 0671 |
| Clover, white clover seed (pounds) | 0761 |
| Hay - Report in SECTION 7. | |
| Herbs, dried (pounds) | 0620 |
| Hops (pounds) | 0623 |
| Jojoba harvested (pounds) | 0626 |
| Mint, peppermint (pounds of oil) | 0047 |
| Mint, spearmint (pounds of oil) | 0050 |
| Mint, tea leaves (pounds) | 0767 |

| FIELD CROPS | CODE |
|---|---|
| Mustard seed (pounds) | 0650 |
| Peanuts for nuts (pounds) | 0656 |
| Peas, dry edible (hundredweight) | 0659 |
| Popcorn (pounds shelled) | 0662 |
| Potatoes - Report in SECTION 10. | |
| Proso millet for grain or seed (bushels) | 0665 |
| Rapeseed (pounds) | 0668 |
| Rye for grain or seed (bushels) | 0686 |
| Sesame (pounds) | 0701 |
| Sorghum-Sudan crosses - Report in SECTION 7. | |

| FIELD CROPS | CODE |
|---|---|
| Sudangrass seed (pounds) | 0713 |
| Sugarbeets for seed (pounds) | 0716 |
| Sunflower seed, non-oil variety (pounds) | 0776 |
| Sunflower seed, oil variety (pounds) | 0773 |
| Sweet potatoes - Report in SECTION 10. | |
| Switchgrass (tons) | 0647 |
| Taro (pounds) | 0743 |
| Triticale for grain (bushels) | 0749 |
| Vetch seed (pounds) | 0755 |
| Wild rice (pounds) | 0764 |
| Other field crop, specify above | 0752 |

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## SECTION 7 HAY AND FORAGE CROPS

1. Were any hay or forage crops cut or harvested from this operation in 2012?

*INCLUDE*
- *your landlord's share and crops grown under contract*

*EXCLUDE*
- *crops grown on land rented to others*

1152 1 ☐ **Yes** - Complete this section  3 ☐ **No** - Go to SECTION 8

TOTAL HAY AND FORAGE CROPS

*EXCLUDE*
- *straw, corn silage, and sorghum silage*

| | | None | Acres Harvested | Acres Irrigated |
|---|---|---|---|---|
| 2. All land from which dry hay, haylage, grass silage, or greenchop was cut or forage was harvested. . . . . | 1021 | ☐ | | |

For items 3 through 8, when both dry hay and haylage were cut from the same acres, report acres for each type. If two or more cuttings were made from the same acres, report acres for that item only once, but report total quantity harvested from all cuttings.

| | | None | Acres Harvested | Total Tons Harvested | | Acres Irrigated |
|---|---|---|---|---|---|---|
| ALFALFA HAY AND SILAGE | | | | | | |
| 3. Alfalfa and alfalfa mixtures for dry hay . . . | 0103 | ☐ | | | Tons, dry | |
| 4. Haylage or greenchop from alfalfa or alfalfa mixtures. . . . . | 1070 | ☐ | | | Tons, green | |
| OTHER HAY AND SILAGE | | | | | | |
| 5. Small grain dry hay - barley, oats, rye, wheat, etc. . . . . | 0106 | ☐ | | | Tons, dry | |
| 6. Other tame dry hay - clover, fescue, lespedeza, timothy, Bermuda grass, Sudangrass, etc. . . . . | 0109 | ☐ | | | Tons, dry | |
| 7. Wild dry hay. . . . . | 0112 | ☐ | | | Tons, dry | |
| 8. All other haylage, grass silage, and greenchop. . . . . | 1073 | ☐ | | | Tons, green | |

TOTAL SALES

| | | None | Value of Sales (Dollars) |
|---|---|---|---|
| 9. Report gross value of hay and forage sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts. . . | 1328 | ☐ | $ .00 |

## SECTION 8 CUT CHRISTMAS TREES, SHORT ROTATION WOODY CROPS, AND MAPLE SYRUP

1. Were any woodland crops grown, harvested, or tapped on this operation in 2012?

*INCLUDE*
- *your landlord's share and crops grown under contract*

*EXCLUDE*
- *crops grown on land rented to others*

1153 1 ☐ **Yes** - Complete this section  3 ☐ **No** - Go to SECTION 9

For items 2 through 4, report gross value of sales for products below sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts.

| | | None | Acres in Production | Number of Trees Cut | Acres Irrigated | Value of Sales (Dollars) |
|---|---|---|---|---|---|---|
| 2. Cut Christmas trees - cut or to be cut. Report live trees sold in SECTION 9. . . . . | 1023 | ☐ | | | | $ .00 |

| | | | Acres in Production | Acres Harvested | Acres Irrigated | Value of Sales (Dollars) |
|---|---|---|---|---|---|---|
| 3. Short rotation woody crops - Trees with growth cycles of 10 years or less. Exclude timber. Report nursery stock in SECTION 9. . . . . | 1025 | ☐ | | | | $ .00 |

| | | | Number of Taps | Syrup Produced | | Value of Sales (Dollars) |
|---|---|---|---|---|---|---|
| 4. Maple syrup . . . . . | 0800 | ☐ | | | Gallons | $ .00 |

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## SECTION 9 NURSERY, GREENHOUSE, FLORICULTURE, SOD, MUSHROOMS, VEGETABLE SEEDS, AND PROPAGATIVE MATERIALS

1. Were any nursery, floriculture, or greenhouse crops, including ornamental plants, flowers, mushrooms, aquatic plants, sod, food crops under protection, vegetable seeds, flower seeds, or other propagative materials, grown for sale on this operation in 2012? Report food crops temporarily covered for early germination, frost protection, etc. in SECTION 10, 11, or 12.

*INCLUDE*
- *crops produced, including under contract*
- *food crops grown in greenhouses, caves, and high tunnels where crops were always covered*

*EXCLUDE*
- *home garden, personal or home use crops*
- *finished plants purchased from others and resold*

1032 1 ☐ **Yes** - Complete this section  3 ☐ **No** - Go to SECTION 10

2. Area on which nursery, greenhouse, floriculture, sod, mushrooms and propagative materials were grown. . . . . 0474 None ☐

| Total Area | | | Area Irrigated | | |
|---|---|---|---|---|---|
| Square Feet Under Glass or Other Protection | Acres in the Open | | Square Feet Under Glass or Other Protection | Acres in the Open | |
| | Acres | Tenths | | Acres | Tenths |
| | | | | | |

3. Enter the crop type and code from the list below for all crops grown in 2012. Report area grown and gross value of sales for products sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts.

| Crop Type | Code | Square Feet Under Glass or Other Protection | Acres in the Open | | Value of Sales (Dollars) |
|---|---|---|---|---|---|
| | | | Acres | Tenths | |
| | | | | | $ .00 |
| | | | | | $ .00 |
| | | | | | $ .00 |
| | | | | | $ .00 |
| | | | | | $ .00 |
| | | | | | $ .00 |
| | | | | | $ .00 |
| | | | | | $ .00 |

If more space is needed, use a separate sheet of paper.

| FLORICULTURE AND BEDDING CROPS | CODE |
|---|---|
| Bedding/Garden plants - annuals, herbaceous perennials, vegetable plants - Include hanging baskets. . . . . | 0479 |
| Cut flowers and cut florist greens . . . . . | 0485 |
| Foliage plants, indoor - Include hanging baskets. . . . . | 0707 |
| Potted flowering plants. . . . . | 0710 |
| Other floriculture and bedding, specify above. . . . . | 1015 |

| NURSERY CROPS | CODE |
|---|---|
| Nursery stock – ornamentals, shrubs, shade trees, flowering trees, evergreens, live Christmas trees, fruit and nut trees and plants, vines, palms, ornamental grasses, and bareroot herbaceous perennials. . . . . | 0488 |
| Aquatic plants. . . . . | 0880 |

| SOD | CODE |
|---|---|
| Sod harvested. . . . . | 0497 |

| PROPAGATIVE MATERIALS SOLD | CODE |
|---|---|
| Bulbs, corms, rhizomes, and tubers, dry. . . . . | 0482 |
| Cuttings, seedlings, liners, plugs. . . . . | 1002 |
| Flower seeds. . . . . | 0882 |
| Tobacco plants sold for transplant to farm fields. . . . . | 1004 |
| Vegetable seeds. . . . . | 0884 |
| Vegetable transplants to farm fields. . . . . | 1006 |

| FOOD CROPS GROWN UNDER GLASS OR OTHER PROTECTION | CODE |
|---|---|
| Tomatoes. . . . . | 1019 |
| Other vegetables and fresh cut herbs. . . . . | 0503 |
| Fruits and berries. . . . . | 1008 |

| MUSHROOM CROPS | CODE |
|---|---|
| Mushrooms - Report growing area and sales. . . . . | 0494 |
| Mushroom spawn - Report sales only. . . . . | 2495 |

12106076

## SECTION 10 VEGETABLES, POTATOES, AND MELONS

1. Were any vegetables, potatoes, sweet corn, or melons harvested from this operation in 2012? Report crops grown under glass or other protection in SECTION 9.

*INCLUDE*
- *crops grown under contract*

*EXCLUDE*
- *home garden, personal or home use crops*

1101 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 11

2. Area from which vegetables, potatoes, and melons were harvested in 2012. Report multiple cropped acreage only once. . . . . 0375

| Acres Harvested | | Acres Irrigated | |
|---|---|---|---|
| Acres | Tenths | Acres | Tenths |
| | | | |

3. For those crops not printed in the following table, enter the crop name and code from the list below for any other vegetables harvested in 2012.
   - If more than one vegetable crop was harvested from the same acres, report acres for each crop.
   - For two or more pickings of the same crop, report the area harvested only once.
   - Processing refers to vegetables that have been altered by heat, pressure, or freezing.

| Crop Name | Code | Total Acres Harvested | | Acres Harvested for Fresh Market | | Acres Harvested for Processing | |
|---|---|---|---|---|---|---|---|
| | | Acres | Tenths | Acres | Tenths | Acres | Tenths |
| Cantaloupes and muskmelons | 0395 | | | | | | |
| Lettuce, head | 0428 | | | | | | |
| Lettuce, leaf | 0430 | | | | | | |
| Lettuce, Romaine | 0432 | | | | | | |
| Tomatoes in the open | 0463 | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

If more space is needed, use a separate sheet of paper.

4. Report gross value of vegetables, potatoes, and melons sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts. . . . . 1388

None ☐

| Value of Sales (Dollars) |
|---|
| $ .00 |

| CROP NAME | CODE |
|---|---|
| Artichokes - Exclude Jerusalem | 0377 |
| Asparagus, bearing age | 0418 |
| Beans, Lima (green) | 0429 |
| Beans, snap (bush and pole) | 0381 |
| Beets | 0383 |
| Broccoli | 0385 |
| Brussels sprouts | 0387 |
| Cabbage, Chinese | 0389 |
| Cabbage, head | 0391 |
| Carrots | 0397 |
| Cauliflower | 0399 |
| Celery | 0401 |
| Chicory | 0403 |
| Collards | 0407 |
| Cucumbers and pickles | 0411 |
| Daikon | 0413 |

| CROP NAME | CODE |
|---|---|
| Eggplant | 0415 |
| Escarole and endive | 0417 |
| Garlic | 0421 |
| Herbs, fresh cut | 0455 |
| Honeydew melons | 0423 |
| Horseradish | 0424 |
| Kale | 0425 |
| Mustard greens | 0431 |
| Okra | 0437 |
| Onions, dry | 0433 |
| Onions, green | 0435 |
| Parsley | 0439 |
| Peas, Chinese (sugar, snow) | 0405 |
| Peas, green | 0441 |
| Peas, Southern (cowpeas) - blackeyed, crowder, etc. | 0409 |

| CROP NAME | CODE |
|---|---|
| Peppers, Bell - Exclude pimientos | 0443 |
| Peppers, other than Bell - Include chile | 0445 |
| Potatoes | 0097 |
| Pumpkins | 0449 |
| Radishes | 0451 |
| Rhubarb | 0453 |
| Spinach | 0457 |
| Squash, summer | 0468 |
| Squash, winter | 0470 |
| Sweet corn | 0461 |
| Sweet potatoes | 0100 |
| Turnip greens | 0467 |
| Turnips | 0465 |
| Watercress | 0471 |
| Watermelons | 0473 |
| Vegetables, other, specify above | 0475 |

12106084

## SECTION 11 FRUIT AND NUTS

1. Was there a combined total of 20 or more fruit or nut trees, including grapevines, on this operation in 2012? Report berries in SECTION 12.

*INCLUDE*
- *crops grown under contract*

*EXCLUDE*
- *abandoned acres*
- *home garden, personal or home use crops*

1047 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 12

2. Acres in bearing and nonbearing fruit orchards, vineyards, and nut trees . . . . . 0121

| Total Acres | | Acres Irrigated | |
|---|---|---|---|
| Acres | Tenths | Acres | Tenths |
| | | | |

3. For those crops not printed in the following table, enter the crop name and code from the list below for any other fruit and nuts on this operation in 2012. Include acres even if not harvested because of low prices, damage from hail, frost, etc.

| Crop Name | Code | Total Acres | | Bearing Age Acres | | Nonbearing Age Acres | |
|---|---|---|---|---|---|---|---|
| | | Acres | Tenths | Acres | Tenths | Acres | Tenths |
| Almonds | 0321 | | | | | | |
| Apples | 0123 | | | | | | |
| Avocados - Report for the Nov '11 - Nov '12 harvest season. | 0135 | | | | | | |
| Grapes | 0366 | | | | | | |
| Lemons | 0279 | | | | | | |
| Oranges, other than Valencia - Include Navel | 0174 | | | | | | |
| Oranges, Valencia | 0150 | | | | | | |
| Peaches, clingstone | 0222 | | | | | | |
| Peaches, freestone | 0216 | | | | | | |
| Pistachios | 0351 | | | | | | |
| Walnuts, English | 0357 | | | | | | |
| | | | | | | | |
| | | | | | | | |

If more space is needed, use a separate sheet of paper.

4. Report gross value of fruits and nuts sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts. . . . . 1329

None ☐

| Value of Sales (Dollars) |
|---|
| $ .00 |

| NON-CITRUS FRUIT | CODE | NON-CITRUS FRUIT | CODE | CITRUS FRUIT | CODE | NUTS | CODE |
|---|---|---|---|---|---|---|---|
| Apricots | 0129 | Papayas | 0213 | Report for the 2011 – 2012 harvest season | | Chestnuts | 0324 |
| Bananas | 0141 | Passion fruit | 0219 | Grapefruit - Include pummelo | 0267 | Hazelnuts (Filberts) | 0327 |
| Cherries, sweet | 0345 | Pears, Bartlett | 0234 | Kumquats | 0273 | Macadamia nuts | 0333 |
| Cherries, tart | 0587 | Pears, other than Bartlett | 0240 | Lemons | 0279 | Pecans, improved | 0336 |
| Dates | 0159 | Persimmons | 0237 | Limes | 0285 | Pecans, native and seedling | 0342 |
| Figs | 0165 | Plums | 0243 | Tangelos | 0303 | Other nuts, specify above | 0363 |
| Guavas | 0183 | Plumcots, pluots and other plum-apricot hybrids | 0264 | Tangerines | 0309 | | |
| Kiwifruit | 0189 | Pomegranates | 0255 | Temples | 0144 | | |
| Mangos | 0195 | Prunes | 0249 | Other citrus fruit, specify above | 0315 | | |
| Nectarines | 0201 | Other non-citrus fruits, specify above | 0261 | | | | |
| Olives - Report for the Sept. '11 - Mar. '12 harvest season | 0207 | | | | | | |

12106092

## SECTION 12 BERRIES

1. Were any strawberries or other berries grown on this operation in 2012? Report crops grown under glass or other protection in SECTION 9.

*INCLUDE*
- *crops grown under contract*

*EXCLUDE*
- *home garden, personal or home use crops*

1041 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 13

| | Acres Grown | | Acres Irrigated | |
|---|---|---|---|---|
| | Acres | Tenths | Acres | Tenths |
| 2. Acres on which berries were grown in 2012. . . . . 1045 | | | | |

3. Complete the following table for each berry crop grown on this operation in 2012. For two or more pickings of the same crop, report the acres only once.

| Crop Name | Code | Total Acres | | Acres Harvested | | Acres not Harvested | |
|---|---|---|---|---|---|---|---|
| | | Acres | Tenths | Acres | Tenths | Acres | Tenths |
| Blackberries and dewberries (including Marionberries) | 0509 | | | | | | |
| Blueberries, tame | 0512 | | | | | | |
| Boysenberries | 0518 | | | | | | |
| Currants | 0524 | | | | | | |
| Loganberries | 0530 | | | | | | |
| Raspberries | 0492 | | | | | | |
| Strawberries | 0536 | | | | | | |
| Other berries, specify below ✉ 1112 | 0539 | | | | | | |
| Other berries, specify below ✉ 1113 | 0539 | | | | | | |
| Other berries, specify below ✉ 1162 | 0539 | | | | | | |
| Other berries, specify below ✉ 1163 | 0539 | | | | | | |

If more space is needed, use a separate sheet of paper.

4. Report gross value of berries sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts. . . . . 1330

None ☐

| Value of Sales (Dollars) |
|---|
| $ .00 |

12106100

## SECTION 13 CATTLE AND CALVES

1. Did you or anyone else have any cattle or calves, including dairy cattle, on this operation in 2012?

*INCLUDE*
- *cattle on this operation*
- *cattle on public or industrial property under a grazing permit*
- *cattle on land used rent free by this operation*
- *cattle grown or fed on this operation for others on a custom or contract basis*

*EXCLUDE*
- *cattle grown or fed by someone else on a custom or contract basis*

1201 1 ☐ **Yes** - Complete this section  3 ☐ **No** - Go to SECTION 14

### DECEMBER 31, 2012 INVENTORY

2. Of the total number of cattle and calves on hand, how many were –

| | | None | Number on this operation **December 31, 2012** |
|---|---|---|---|
| a. Beef cows? Include beef heifers that had calved. Exclude heifers that had not calved, steers, calves, and bulls. | 0804 | ☐ | |
| b. Milk cows kept for production of milk? Include dry milk cows and milk heifers that had calved. | 0805 | ☐ | |
| c. Other cattle? Include heifers that had not calved, steers, calves, and bulls. | 1206 | ☐ | |
| d. **TOTAL** cattle and calves on hand December 31, 2012. Add items 2a, 2b and 2c. | 0803 | ☐ | |

### CATTLE AND CALVES SOLD OR MOVED FROM THIS OPERATION

3. Of the cattle and calves sold or moved from this operation during 2012, how many were –

| | | None | Number sold or moved in 2012 |
|---|---|---|---|
| a. Calves sold or moved in 2012 weighing less than 500 pounds? | 0808 | ☐ | |
| b. Cattle sold or moved in 2012, including calves weighing 500 pounds or more? | 0810 | ☐ | |

**VALUE OF SALES –** Report gross value of sales in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts.

4. Sales of cattle and calves

*INCLUDE*
- *beef and dairy cattle for breeding stock*
- *fed cattle*
- *beef and dairy cull animals*
- *stockers and feeders*
- *veal calves, etc.*

| | | None | Value of Sales (Dollars) |
|---|---|---|---|
| 4. Sales of cattle and calves | 1339 | ☐ | $ .00 |
| 5. Sales of milk from cows. | 1380 | ☐ | $ .00 |

### CATTLE IN FEEDLOTS –

*INCLUDE*
- *animals for slaughter market fed a ration of grain or other concentrates that are expected to produce a carcass that will grade select or better*

*EXCLUDE*
- *cattle being backgrounded, pastured only, fed for home use, or veal*

| | | None | Number on this operation on December 31, 2012 |
|---|---|---|---|
| 6. How many of the cattle on hand reported in Item 2d above were on feed December 31, 2012, and were or will be shipped directly from your feedlot to slaughter market? Exclude cattle being backgrounded | 1207 | ☐ | |

| | | | Number sold or moved in 2012 |
|---|---|---|---|
| 7. How many of the cattle sold during 2012 reported in Item 3b above were shipped directly from your feedlot to slaughter market? Exclude any of your cattle being custom fed in feedlots operated by others. Exclude cattle sold as feeders | 0812 | ☐ | |

12106118

## SECTION 14 HOGS AND PIGS

1. Did you or anyone else have any hogs or pigs on this operation in 2012? Contractors or integrators only report hogs on land you operate.

*INCLUDE*
- *hogs grown for others on a contract basis*

*EXCLUDE*
- *hogs grown by someone else on a custom or contract basis*

1211 1 ☐ **Yes** - Complete this section  3 ☐ **No** - Go to SECTION 15

DECEMBER 31, 2012 INVENTORY

| 2. Of the total number of hogs and pigs on hand, how many were – | | None | Number on this operation **December 31, 2012** |
|---|---|---|---|
| a. Hogs and pigs used or to be used for breeding? | 0816 | ☐ | |
| b. All other hogs and pigs, including market hogs and unweaned pigs? | 0817 | ☐ | |
| c. **TOTAL** hogs and pigs on hand December 31, 2012. Add items 2a and 2b. | 0815 | ☐ | |

| | | None | Number sold or moved in 2012 |
|---|---|---|---|
| 3. Number of hogs and pigs sold or moved from this operation during 2012, including feeder pigs. | 0820 | ☐ | |

| | | None | Value of Sales (Dollars) |
|---|---|---|---|
| 4. Report gross value of sales for hogs and pigs sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts | 1341 | ☐ | $ .00 |

TYPE OF OPERATION AND PRODUCER

5. Mark the **one** item which best describes this operation –

1241 ☐ Farrow to wean  1242 ☐ Farrow to finish  1243 ☐ Finish only
1244 ☐ Farrow to feeder  1245 ☐ Nursery  1246 ☐ Other, specify → 1118

6. Mark the **one** item which best describes this producer -

1214 ☐ Independent grower  1216 ☐ Contract grower (contractee)  1215 ☐ Contractor or integrator

## SECTION 15 EQUINE

1. Did you or anyone else have any horses, ponies, mules, burros or donkeys on this operation in 2012? Report gross value of sales in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts.

1247 1 ☐ **Yes** - Complete this section  3 ☐ **No** - Go to SECTION 16

| | | None | Number on this operation **December 31, 2012** | Total Number Sold in 2012 | Value of Sales (Dollars) |
|---|---|---|---|---|---|
| 2. Horses and ponies OWNED by this operation. | 0872 | ☐ | | | $ .00 |
| 3. Horses and ponies NOT owned by this operation. | 0822 | ☐ | | | $ .00 |
| 4. Mules, burros, and donkeys | 0833 | ☐ | | | $ .00 |

| | | None | |
|---|---|---|---|
| 5. Horse breeding or stud fees, semen, and other equine products (Exclude income from boarding, training, or riding facilities which are included in SECTION 22, ITEM 7). | 1406 | ☐ | $ .00 |

6. For the horses and ponies NOT OWNED BY YOU reported in item 3 above, mark the one item which best describes why they are on this operation:

1191 ☐ Operation is a race track  1192 ☐ Operation is a boarding, training or riding facility (Including recreational places)  1193 ☐ Operation is a breeding service place
1194 ☐ Operation is not a boarding facility but horses are being kept for others' personal use  1195 ☐ Other - specify → 1115

12106126

## SECTION 16 SHEEP AND GOATS

1. Did this operation own or custom feed for others any sheep, lambs, goats or kids in 2012, regardless of location?
   *INCLUDE*
   - *sheep and goats on public or industrial property under a grazing permit*
   - *sheep and goats on land used rent free by this operation*
   - *sheep and goats grown or fed on this operation for others on a custom or contract basis*

   1102 1 ☐ **Yes** - Complete this section  3 ☐ **No** - Go to SECTION 17

2. Report for this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc.

| | | None | Number owned or custom fed **December 31, 2012** | Total number sold or moved in 2012 | Value of Sales (Dollars) |
|---|---|---|---|---|---|
| **SHEEP AND LAMBS** | | | | | |
| a. Sheep and lambs | 0824 | ☐ | | | $ .00 |
| i. Ewes 1 year old or older | 0826 | ☐ | | | |
| b. For sheep reported in item 2a, how many were hair sheep or wool-hair crosses? | 0818 | ☐ | | | |
| **GOATS AND KIDS** | | | | | |
| c. Angora goats and kids | 0847 | ☐ | | | $ .00 |
| d. Milk goats and kids | 0843 | ☐ | | | $ .00 |
| e. Meat goats and kids, other goats and kids | 0851 | ☐ | | | $ .00 |

| | | | Total amount produced in 2012 | | Total amount sold or moved in 2012 | | Value of Sales (Dollars) |
|---|---|---|---|---|---|---|---|
| **SHEEP AND GOAT PRODUCTS** | | | | | | | |
| f. Wool shorn | 0828 | ☐ | | lbs. | | lbs. | $ .00 |
| g. Mohair clipped | 0849 | ☐ | | lbs. | | lbs. | $ .00 |
| h. Milk from sheep and goats | 1389 | ☐ | | | | | $ .00 |

## SECTION 17 AQUACULTURE

1. Did you or anyone else have any aquaculture on this operation in 2012? Include production for others on a contract basis.

   1157 1 ☐ **Yes** - Complete this section  3 ☐ **No** - Go to SECTION 18

2. Enter the aquaculture type and code from the list below for fish and other aquaculture products grown on this operation in 2012. Include all sizes for each type. Include food size, fingerlings, fry, and eggs. Report aquatic plants in SECTION 9. Report gross value of sales for aquaculture and aquaculture products sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts.

| Aquaculture Type | Code | Total pounds sold or moved in 2012 | OR | Total number sold or moved in 2012 | Value of Sales (Dollars) |
|---|---|---|---|---|---|
| | | | OR | | $ .00 |
| | | | OR | | $ .00 |
| | | | OR | | $ .00 |
| | | | OR | | $ .00 |

If more space is needed, use a separate sheet of paper.

| AQUACULTURE TYPE | CODE | AQUACULTURE TYPE | CODE | AQUACULTURE TYPE | CODE |
|---|---|---|---|---|---|
| Catfish | 0860 | Baitfish (including crawfish for bait) | 0900 | Ornamental fish | 0980 |
| Trout | 0863 | Crustaceans (crawfish for food, shrimp, etc.) | 0902 | Sport or game fish | 0984 |
| Other food fish - specify above | 0896 | Mollusks (clams, oysters, etc.) | 0978 | Other aquaculture products - specify above | 0869 |

12106134

## SECTION 18 POULTRY

1. Did you or anyone else have any poultry, such as chickens, turkeys, ducks, emus, ostriches, etc., on this operation in 2012? Include poultry grown for others on a contract basis.

1217 1 ☐ **Yes** - Complete this section  3 ☐ **No** - Go to SECTION 19

2. CHICKENS

| | | None | Number on this operation **December 31, 2012** | Total number sold or moved from this operation in 2012 |
|---|---|---|---|---|
| a. Broilers, fryers, and other chickens raised for meat production, including capons and roasters | 0898 | ☐ | | |
| b. Table egg layers – Include those for home use | 1229 | ☐ | | |
| c. Hatching layers for meat-types – Include layers for broilers, roasters, and other meat-types | 1231 | ☐ | | |
| d. Hatching layers for table eggs | 1233 | ☐ | | |
| e. Pullets for laying flock replacement | 1221 | ☐ | | |

3. TURKEYS

| | | None | | |
|---|---|---|---|---|
| a. Turkeys raised for meat production – Exclude breeders | 1225 | ☐ | | |
| b. Turkey hens and toms kept for breeding | 1227 | ☐ | | |
| c. Turkey brooders, immature birds for further growout on another farm | 1219 | ☐ | | |

4. ALL OTHER POULTRY – for poultry not reported above, enter the type and code from the list below.

| | Code | Number on this operation **December 31, 2012** | Total number sold or moved from this operation in 2012 |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

If more space is needed, use a separate sheet of paper.

| OTHER POULTRY TYPE | CODE | OTHER POULTRY TYPE | CODE | OTHER POULTRY TYPE | CODE |
|---|---|---|---|---|---|
| Bantams | 0934 | Guineas | 0966 | Pigeons or squabs | 0908 |
| Chukars | 1275 | Hungarian partridge | 1277 | Quail | 0912 |
| Ducks | 0904 | Ostriches | 0878 | Rheas | 1281 |
| Emus | 0845 | Peacocks or peahens | 1279 | Roosters | 0968 |
| Geese | 0906 | Pheasants | 0910 | Other poultry not reported elsewhere, specify above | 0865 |

5. All poultry hatched in this operation's hatcheries in 2012. Include chicks, poults, ducklings, etc. Include poultry custom hatched for others. Specify kind(s) of poultry below ✉

1116 _____ . . . 0916 None ☐ | Number Hatched on this operation in 2012 |

6. Of the poultry hatched in this operation's hatcheries, reported in item 5 above, mark all poultry items that apply –

1291 ☐ Egg-type chicken  1292 ☐ Broiler-type chicken  1293 ☐ Turkey  1294 ☐ All other poultry

7. VALUE OF SALES - Report gross value of sales for poultry, chicks, eggs, and other poultry products. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts. . . . 1344 None ☐ | Value of Sales (Dollars) $ _____ .00 |

12106142

## SECTION 19 COLONIES OF BEES

1. Did this operation own bees in 2012, regardless of location?

1104 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 20

| | Number of colonies owned on **December 31, 2012** | Largest number of colonies owned for all purposes in 2012 | Largest number of honey producing colonies owned in 2012 | Honey collected in 2012, regardless of location (pounds) | Value of Sales of honey (Dollars) |
|---|---|---|---|---|---|
| 2. Colonies of bees owned. . . . 0839 | | | | | $ .00 |

## SECTION 20 OTHER LIVESTOCK AND LIVESTOCK PRODUCTS

1. Did you or anyone else have other livestock or livestock products on this operation in 2012?

1239 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 21

2. Report gross value of sales for other livestock sold from this operation in 2012. Include the value of your landlord's share, marketing charges, taxes, hauling, etc. Exclude value of items produced under production contracts.

| | None | Number on this operation **December 31, 2012** | Total number sold in 2012 | Value of Sales (Dollars) |
|---|---|---|---|---|
| a. Alpacas . . . . . 0876 | ☐ | | | $ .00 |
| b. Llamas. . . . . 0874 | ☐ | | | $ .00 |
| c. Bison. . . . . 0886 | ☐ | | | $ .00 |
| d. Deer in captivity . . . . . 0888 | ☐ | | | $ .00 |
| e. Elk in captivity. . . . . 0890 | ☐ | | | $ .00 |
| f. Live Mink. . . . . 1106 | ☐ | | | $ .00 |
| g. Live Rabbits. . . . . 1108 | ☐ | | | $ .00 |

3. Other Livestock such as laboratory animals, worms, bees, etc., not reported elsewhere on the form. Specify below ✉

1119

| None | Number on this operation **December 31, 2012** | Total number sold in 2012 | Value of Sales (Dollars) |
|---|---|---|---|
| 0857 ☐ | | | $ .00 |

4. Other livestock products not reported elsewhere on the form. Include embryos, fur or pelts, horns, manure sold, semen, breeding fees, other animal specialties, etc. Report equine products in SECTION 15. Specify below ✉

1121

| None | Quantity produced in 2012 | Unit Reported | Value of Sales (Dollars) |
|---|---|---|---|
| 1110 ☐ | | | $ .00 |

12106159

## SECTION 21 PRODUCTION CONTRACTS AND CUSTOM FEEDING

1. During 2012, were you a production contract grower for a processor or contractor for whom you grew a crop, raised livestock or poultry, or custom fed any livestock that **you did not own**? A production contract is an agreement setting terms, conditions, and fees to be paid by the contractor to this operation for the production of crops, livestock, or poultry.

1301 1 ☐ **Yes** - Complete this section  3 ☐ **No** - Go to SECTION 22

2. Report number of head, bushels, etc. that were grown or raised under production contracts and moved from this operation in 2012. Exclude commodities grown or raised for marketing contracts.

| | | None | Total quantity moved from this operation in 2012 | Unit | | Total dollar amount received in 2012 for delivering commodities under production contracts (Dollars) |
|---|---|---|---|---|---|---|
| a. Broilers and other meat-type chickens | 1304 | ☐ | | birds | 3304 | $ .00 |
| b. Chicken eggs | 1305 | ☐ | | dozen | 3305 | $ .00 |
| c. Layers | 1302 | ☐ | | birds | 3302 | $ .00 |
| d. Pullets for laying flock replacement | 1306 | ☐ | | birds | 3306 | $ .00 |
| e. Turkeys | 1307 | ☐ | | birds | 3307 | $ .00 |
| f. Custom fed cattle shipped directly for slaughter – Exclude cattle custom fed for you by others | 1308 | ☐ | | head | 3308 | $ .00 |
| g. Replacement dairy heifers | 1303 | ☐ | | head | 3303 | $ .00 |
| h. Hogs and pigs | 1309 | ☐ | | head | 3309 | $ .00 |
| i. Other cattle, sheep, livestock, or poultry – specify type ✉ 1140 | 1310 | ☐ | | | 3310 | $ .00 |
| j. Grains and oilseeds – specify type ✉ 1141 | 1311 | ☐ | | bushels | 3311 | $ .00 |
| k. Vegetables, melons, and potatoes – specify type ✉ 1142 | 1312 | ☐ | | | 3312 | $ .00 |
| l. Other crops – specify type ✉ 1143 | 1313 | ☐ | | | 3313 | $ .00 |

3. Mark all inputs that were partially or completely paid or provided by contractor(s) –

1317 ☐ Feed  1325 ☐ Seed  1320 ☐ Supplies

1316 ☐ Feeder livestock and poultry  1318 ☐ Fertilizer and lime  1322 ☐ Utilities

1324 ☐ Breeding livestock  1319 ☐ Chemicals  1326 ☐ Other, specify → 1146

1323 ☐ Veterinary services  1321 ☐ Fuels  1315 ☐ None

4. Enter the name of the contractor that provided inputs and owned the commodity ✉

1327

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## SECTION 22 INCOME FROM FARM-RELATED SOURCES

Report amount received before taxes and expenses in 2012.

| | | None | Dollars |
|---|---|---|---|
| 1. Customwork and other agricultural services provided for farmers and others, such as plowing, planting, spraying, harvesting, preparation of products for market, etc. Exclude if customwork was an entirely separate business from your agricultural operation | 0992 | ☐ | $ .00 |
| 2. Payments received from cash rent or share payments from renting out farmland or payments from lease of allotments. Include payments for livestock pastured on a per-head basis, per-month basis, AUM basis, etc. | 0993 | ☐ | $ .00 |
| 3. Sales of forest products. Include timber, firewood, etc. Exclude sales of Christmas trees, short rotation woody crops, and maple products | 0994 | ☐ | $ .00 |
| 4. Agri-tourism and recreational services, such as farm or winery tours, hay rides, hunting, fishing, etc. | 1401 | ☐ | $ .00 |
| 5. Patronage dividends and refunds from cooperatives | 1402 | ☐ | $ .00 |
| 6. Crop and livestock insurance payments received. Exclude payments received from casualty insurance, vehicle liability, blanket policies, and operator dwelling insurance | 1404 | ☐ | $ .00 |
| 7. Other income which is closely related to the agricultural operation. Include renting and leasing farm machinery and trucks, renting and leasing of livestock, bee colony rental, animal boarding, state fuel tax refunds, farm-generated energy, etc. Specify ✉ 1433 _____ | 1403 | ☐ | $ .00 |

## SECTION 23 FARM LABOR

| | | None | Number |
|---|---|---|---|
| 1. How many HIRED farm or ranch workers, including paid family members and office workers – | | | |
| a. Worked less than 150 days on this operation in 2012? Exclude contract labor | 0941 | ☐ | |
| b. Worked 150 days or more on this operation in 2012? Exclude contract labor | 0942 | ☐ | |
| 2. How many UNPAID farm or ranch workers, including family members and office workers, worked on this farm or ranch? | 3401 | ☐ | |
| 3. How many MIGRANT workers were on this operation in 2012? A migrant worker is a farm worker whose employment required travel that prevented the migrant worker from returning to his/her permanent place of residence the same day. Include hired and contract workers | 3402 | ☐ | |

## SECTION 24 GRAIN STORAGE CAPACITY

1. Were any facilities to store whole grains, oilseeds, or pulse crops on this operation on **December 31, 2012**?

1028 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 25

| | | Tons |
|---|---|---|
| 2. What was the total whole grains, oilseed, and pulse crops storage capacity on this operation? Include capacity of all structures normally used for storing whole grains and oilseeds | 1029 | |

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## SECTION 25 PRODUCTION EXPENSES

Report total production expenses paid by this operation in 2012.

*INCLUDE*
- *expenses paid by you and your landlords*
- *expenses connected with performing customwork for others*

*EXCLUDE*
- *expenses not related to the farm business*
- *any expenses paid by the contractor*

EXPENSES PAID BY THIS OPERATION AND ITS LANDLORD(S)

| | | None | Dollars |
|---|---|---|---|
| 1. Fertilizer, lime, and soil conditioners purchased – Include rock phosphate, gypsum, manure purchased, potting soil, growing media, and other organic materials. Include the cost of any custom application. | 1501 | ☐ | $ .00 |
| 2. Chemicals purchased such as insecticides, herbicides, fungicides, other pesticides, etc. – Include cost of custom application | 1502 | ☐ | $ .00 |
| 3. Seeds, plants, vines, trees, etc. purchased – Include technology or other fees, seed treatments, and seed cleaning cost. Exclude items purchased for resale without additional growth. | 1503 | ☐ | $ .00 |
| 4. Breeding livestock purchased or leased, regardless of age – Include dairy cattle. | 1504 | ☐ | $ .00 |
| 5. All other livestock and poultry purchased or leased – Include stocker and feeder cattle, calves, sheep, lambs, feeder pigs, chicks, pullets, poults, horses, fish, goats, bee colonies, etc. Include livestock leasing expense. | 1505 | ☐ | $ .00 |
| 6. Feed purchased for livestock and poultry – Include grain, hay, silage, mixed feeds, concentrates, supplements, premixes, etc. | 1506 | ☐ | $ .00 |
| 7. Gasoline, fuels, and oils purchased for the farm business – Include diesel, natural gas, LP gas, motor oil and grease, etc. | 1507 | ☐ | $ .00 |
| 8. Utilities purchased for the farm business – Include electricity, farm share of telephone, water purchased, etc. | 1508 | ☐ | $ .00 |
| 9. Repairs, supplies, and maintenance cost for the farm business. | 1509 | ☐ | $ .00 |
| 10. Labor – | | | |
| a. Hired farm and ranch labor – Include employer's cost for social security, worker's compensation, insurance premiums, pension plans, etc. | 1510 | ☐ | $ .00 |
| b. Contract labor – Include expenses for labor, such as harvesting of fruit, vegetables, berries, etc. performed on a contract basis by a contractor, crew leader, etc. | 1511 | ☐ | $ .00 |
| 11. Customwork and custom hauling, such as custom planting, harvesting, etc. and custom hauling of grain, livestock, milk, manure, etc. | 1512 | ☐ | $ .00 |
| 12. Rent – | | | |
| a. Cash rent paid in 2012 for land and buildings – Include grazing fees. | 1513 | ☐ | $ .00 |
| b. Rent and lease expenses for machinery, equipment, and farm share of vehicles – Exclude custom hire | 1514 | ☐ | $ .00 |
| 13. Interest paid on debts – | | | |
| a. Secured by real estate. | 1515 | ☐ | $ .00 |
| b. Not secured by real estate. | 1516 | ☐ | $ .00 |
| 14. Property taxes paid in 2012 – Include farm real estate, machinery, livestock, etc. for the farm business. Exclude taxes paid by this operation's landlords. | 1517 | ☐ | $ .00 |
| 15. Other production expenses – Include animal health cost, storage and warehousing, marketing expenses, insurance, etc. Exclude health insurance premiums and payroll taxes | 1518 | ☐ | $ .00 |
| 16. How much did your landlord(s) pay for the production expenses for this operation in 2012? | 1519 | ☐ | $ .00 |
| 17. What was the value of your landlord's share of the total sales produced by this operation? – Exclude cash rent | 1349 | ☐ | $ .00 |
| 18. What was the total depreciation expense claimed by this operation in 2012 for all capital assets? Estimate 2012 from 2011 if necessary. | 1520 | ☐ | $ .00 |

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## SECTION 26 FERTILIZERS AND CHEMICALS APPLIED

1. Were any fertilizers, manure, herbicides, insecticides, fungicides, nematicides, other pesticides, growth regulators, or other chemicals used on this operation during 2012? Include rock phosphate, lime, and gypsum as fertilizer.

1568 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 27

| | | None | Number of Acres |
|---|---|---|---|
| 2. Commercial fertilizer and soil conditioners applied to – | | | |
| a. Cropland in 2012 – Exclude cropland used only for pasture | 0932 | ☐ | |
| b. Pastureland and rangeland acres in 2012 – Include cropland used only for pasture or grazing | 0933 | ☐ | |
| 3. Acres of cropland and pastureland on which animal manure was applied | 1569 | ☐ | |

| | | | Number of Acres |
|---|---|---|---|
| 4. Acres treated with chemicals to control the items listed below. The same acres can be reported in more than one item below. However, report acres only once for each item, regardless of the number of applications. | | | |
| a. Insects | 0936 | ☐ | |
| b. Weeds, grass, or brush - Include both pre-emergence and post emergence | 0939 | ☐ | |
| c. Nematodes | 0937 | ☐ | |
| d. Diseases in crops and orchards such as blight, smut, rust, etc. | 0938 | ☐ | |
| 5. Acres of crops treated to control growth, thin fruit, ripen, or defoliate | 0940 | ☐ | |

## SECTION 27 ORGANIC AGRICULTURE

1. In 2012, did this operation produce organic products according to USDA's National Organic Program (NOP) standards or have acres transitioning into USDA NOP production?

3501 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to SECTION 28

2. Report type of production. Check all that apply

3502 ☐ USDA NOP certified organic production (exclude handling). Specify agency or organization that certified the organic production below. ✉

1252 _____

3503 ☐ USDA NOP organic production exempt from certification (exempt is production normally less than $5,000 in sales).

3504 ☐ Acres transitioning into USDA NOP organic production.

3506 ☐ Production according to USDA NOP standards but NOT certified or exempt.

| | | None | Value of Sales (Dollars) |
|---|---|---|---|
| 3. What was the value of USDA NOP certified or exempt organically produced commodities sold from this operation in 2012? | 3505 | ☐ | $ _____ .00 |

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## SECTION 28 MARKET VALUE OF LAND, BUILDINGS, MACHINERY, AND EQUIPMENT

1. Report your estimate of the **current market value** of land and buildings reported in SECTION 1.

| | | None | Estimated Market Value (Dollars) |
|---|---|---|---|
| a. All land and buildings owned | 0996 | ☐ | $ .00 |
| b. All land and buildings rented or leased from others | 0997 | ☐ | $ .00 |
| c. All land and buildings rented or leased to others | 0998 | ☐ | $ .00 |

2. What is your estimate of the **current value of all machinery, equipment, and implements** used for farm-related activities on this operation, regardless of ownership, on **December 31, 2012**? 0943 ☐ Estimated Market Value (Dollars) $ .00

*INCLUDE - the following kept on this operation and used for this farm or ranch business in 2012.*

- *cars*
- *combines*
- *pumps*
- *dryers*
- *trucks*
- *plows*
- *motors*
- *computers*
- *tractors*
- *disks*
- *tanks*
- *tools*
- *harrows*
- *feeders*
- *dairy equipment*
- *irrigation equipment*
- *grinding and mixing equipment, etc.*

## SECTION 29 MACHINERY AND EQUIPMENT

1. For the items listed below, report the number on this operation on **December 31, 2012.** Include machinery, equipment, and implements used for the farm or ranch business in 2011 or 2012, and usually kept on the operation.

| | | None | Number on this operation **December 31, 2012** | None | Of these, the number manufactured in the last 5 years (2008-2012) |
|---|---|---|---|---|---|
| a. Trucks, including pickups | 0944 | ☐ | | ☐ | |
| b. Tractors less than 40 horsepower (PTO) – Exclude garden tractors | 0946 | ☐ | | ☐ | |
| c. Tractors 40 - 99 horsepower (PTO) | 0948 | ☐ | | ☐ | |
| d. Tractors 100 horsepower (PTO) or more | 0962 | ☐ | | ☐ | |
| e. Grain and bean combines, self-propelled | 0950 | ☐ | | ☐ | |
| f. Cotton pickers and strippers, self-propelled | 0956 | ☐ | | ☐ | |
| g. Forage harvesters, self-propelled | 0953 | ☐ | | ☐ | |
| h. Hay balers | 0960 | ☐ | | ☐ | |

## SECTION 30 ENERGY

1. During 2012, were there any renewable energy producing systems, regardless of ownership, on this operation?

3601 1 ☐ **Yes** - Complete this section 3 ☐ **No** - Go to item 3

2. Report types of systems on this operation. Check all that apply

| | | | | | |
|---|---|---|---|---|---|
| 3603 | ☐ Solar panels | 3614 | ☐ Geoexchange system | 3610 | ☐ Ethanol |
| 3604 | ☐ Wind turbines | 3615 | ☐ Small hydro system | 3606 | ☐ Other, specify below ✉ |
| 3605 | ☐ Methane digesters | 3609 | ☐ Biodiesel | 3612 | |

3. On the land owned by this operation, were there any wind rights leased to others?

3607 1 ☐ **Yes** 3 ☐ **No**

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## SECTION 31 LAND USE PRACTICES

1. During 2012, considering the total acres on this operation –

| | | None | Number of Acres |
|---|---|---|---|
| a. How many acres were drained by tile? | 3450 | ☐ | |
| b. How many acres were artificially drained by ditches? | 3451 | ☐ | |
| c. How many acres were under a conservation easement? | 3452 | ☐ | |
| d. On how many cropland acres were no-till practices used? | 3455 | ☐ | |
| e. On how many cropland acres were conservation tillage, excluding no-till, practices used? | 3454 | ☐ | |
| f. On how many cropland acres were conventional tillage practices used? | 3453 | ☐ | |
| g. How many cropland acres were planted to a cover crop? Exclude CRP acres. | 3456 | ☐ | |

## SECTION 32 PRACTICES

1. At any time during 2012, did this operation –

| | | | |
|---|---|---|---|
| a. Receive irrigation water supplied by a U.S. Bureau of Reclamation project or facility? Include reclamation water delivered by a local district. | 1722 | 1 ☐ Yes | 3 ☐ No |
| b. Practice rotational or management-intensive grazing? | 1725 | 1 ☐ Yes | 3 ☐ No |
| c. Produce and sell value added crops, livestock, or products such as beef jerky, fruit jams, jelly, preserves, floral arrangements, cider, wine, etc.? | 1726 | 1 ☐ Yes | 3 ☐ No |
| d. Market products through a Community Supported Agriculture (CSA) arrangement? | 1727 | 1 ☐ Yes | 3 ☐ No |
| e. Raise or sell veal calves? | 1728 | 1 ☐ Yes | 3 ☐ No |
| f. Practice alley cropping or silvopasture? | 1731 | 1 ☐ Yes | 3 ☐ No |
| g. Harvest any biomass (crop residue, grasses, woody biomass, etc.) for use in the production of renewable energy? Exclude grains, oilseeds, and firewood | 1750 | 1 ☐ Yes | 3 ☐ No |
| h. Market products directly to retail outlets (including restaurants, grocery stores, schools, hospitals, or other businesses) that in turn sell directly to consumers? | 1751 | 1 ☐ Yes | 3 ☐ No |
| i. Have an on-farm packing facility for distributing vegetables, potatoes, fruit, nuts, berries or other crops? | 1752 | 1 ☐ Yes | 3 ☐ No |

## SECTION 33 DIRECT SALES FOR HUMAN CONSUMPTION

1. During 2012, did you produce, raise, or grow any crops, livestock, poultry, or agricultural products that were **sold directly to individual consumers for human consumption**?

*INCLUDE - sales from*
- *roadside stands*
- *farmers markets*
- *pick your own*
- *door to door, etc.*
- *Community Supported Agriculture (CSA)*

*EXCLUDE*
- *craft items*
- *processed products such as cheese, butter, jellies, sausages, and hams*
- *wine and cider*

1409 1 ☐ **Yes** - Gross value of these direct sales . . . 0920 — Value of Sales (Dollars): $ _____ .00

Specify product(s) → 1410 _____

3 ☐ **No** - Go to SECTION 34

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## SECTION 34 AGRICULTURAL ACTIVITY WITHIN THE BORDERS OF AMERICAN INDIAN RESERVATIONS, PUEBLOS, AND SERVICE AREAS

1. Did this operation use any land for livestock or cropland within the borders of an American Indian Reservation, Pueblo, or Service Area at any time during 2012? Include owned, deeded, tribal or allotted land.

1050 1 ☐ **Yes** - Complete this Section  3 ☐ **No** - Go to SECTION 35

2. Enter the name and state of the American Indian Reservation, Pueblo, or Service Area where the agricultural activity occurred.

| | Reservation, Pueblo, or Service Area Name | | State |
|---|---|---|---|
| 1051 | | 1052 | |

3. How many total acres did this operation use for livestock or cropland within this Reservation, Pueblo, or Service Area in 2012? Exclude land used on a per-head or animal unit month (AUM) basis. . . . . 1053

   a. How many of these acres were harvested cropland?. . . . . 1054

| Number of Acres |
|---|
| |
| |

4. In 2012, did this operation have any livestock within the borders of an American Indian Reservation, Pueblo, or Service Area? Include livestock on land used on a per-head or animal unit month (AUM) basis.

1056 1 ☐ **Yes** - Continue  3 ☐ **No** - Go to SECTION 35

   a. **On December 31, 2012,** what percent of this operation's livestock was on this Reservation, Pueblo, or Service Area?

1057 1 ☐ None  3 ☐ 26 - 50 percent  5 ☐ 76 - 99 percent

2 ☐ 1 - 25 percent  4 ☐ 51 - 75 percent  6 ☐ 100 percent (all livestock)

## SECTION 35 OPERATOR CHARACTERISTICS

1. In 2012, how many operators (individuals) were involved in the day-to-day decisions for this operation? Enter the number of operators and the number of women operators. Exclude hired workers unless they were a hired manager or family member. . . . 1575

| Total Number of Operators | | Number of **Women** Operators |
|---|---|---|
| | 1574 | |

2. Answer the following questions for up to three primary operators of this operation as of **December 31, 2012.**

| | Principal Operator or Senior Partner | Operator 2 | Operator 3 |
|---|---|---|---|
| a. Full name . . . . . | 1835 | 1852 | 1872 |
| b. Sex of operator . . . . . | 0926 1 ☐ Male 2 ☐ Female | 1586 1 ☐ Male 2 ☐ Female | 1597 1 ☐ Male 2 ☐ Female |
| c. Is operator 2 or 3 the spouse of the principal operator? . . . . . | | 1590 1 ☐ Yes 3 ☐ No | 1601 1 ☐ Yes 3 ☐ No |
| d. At which occupation did the operator spend the majority (50 percent or more) of his/her worktime in 2012? | **Mark one answer only.** 0928 1 ☐ Farm or ranch work 2 ☐ Other | **Mark one answer only.** 1580 1 ☐ Farm or ranch work 2 ☐ Other | **Mark one answer only.** 1591 1 ☐ Farm or ranch work 2 ☐ Other |
| e. Is this operator retired? . . . | 0924 1 ☐ Yes 3 ☐ No | 1582 1 ☐ Yes 3 ☐ No | 1593 1 ☐ Yes 3 ☐ No |
| f. How many days did the operator work off the farm in 2012? Include days in which the operator worked at least 4 hours per day in an off-farm job. Include work on someone else's farm for pay. . . . . | **Mark one answer only.** 0929 1 ☐ None 2 ☐ 1 - 49 days 3 ☐ 50 - 99 days 4 ☐ 100 - 199 days 5 ☐ 200 days or more | **Mark one answer only.** 1831 1 ☐ None 2 ☐ 1 - 49 days 3 ☐ 50 - 99 days 4 ☐ 100 - 199 days 5 ☐ 200 days or more | **Mark one answer only.** 1931 1 ☐ None 2 ☐ 1 - 49 days 3 ☐ 50 - 99 days 4 ☐ 100 - 199 days 5 ☐ 200 days or more |

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| | Principal Operator or Senior Partner | Operator 2 | Operator 3 |
|---|---|---|---|
| g. Did the operator live on this operation at any time in 2012? | 0923 1 ☐ Yes 3 ☐ No | 1581 1 ☐ Yes 3 ☐ No | 1592 1 ☐ Yes 3 ☐ No |
| h. In what year did the operator begin to operate any part of **THIS** operation? | 0930 | 1584 | 1595 |
| i. What year did the operator begin to operate **ANY** farm? | 1834 | 1851 | 1871 |
| j. What was the operator's age on December 31, 2012? | 0925 years | 1585 years | 1596 years |
| k. Is the operator of Spanish, Hispanic, or Latino origin or background, such as Mexican, Cuban, or Puerto Rican, regardless of race? | 0927 Spanish, Hispanic, or Latino origin 1 ☐ Yes 3 ☐ No | 1587 Spanish, Hispanic, or Latino origin 1 ☐ Yes 3 ☐ No | 1598 Spanish, Hispanic, or Latino origin 1 ☐ Yes 3 ☐ No |
| l. What is the operator's race? | **Mark one or more.**<br>1701 ☐ White<br>1702 ☐ Black or African American<br>1703 ☐ American Indian or Alaska Native. Specify tribe ✉<br>1733<br>1705 ☐ Asian<br>1704 ☐ Native Hawaiian or Other Pacific Islander | **Mark one or more.**<br>1801 ☐ White<br>1802 ☐ Black or African American<br>1803 ☐ American Indian or Alaska Native. Specify tribe ✉<br>1833<br>1805 ☐ Asian<br>1804 ☐ Native Hawaiian or Other Pacific Islander | **Mark one or more.**<br>1901 ☐ White<br>1902 ☐ Black or African American<br>1903 ☐ American Indian or Alaska Native. Specify tribe ✉<br>1933<br>1905 ☐ Asian<br>1904 ☐ Native Hawaiian or Other Pacific Islander |
| m. How many people lived in the operator's household in 2012? | Number of persons living in Principal Operator's household<br>1577 number | Number living in household of Operator 2. Enter "0" if this operator was counted in the previous column.<br>1589 number | Number living in household of Operator 3. Enter "0" if this operator was counted in a previous column.<br>1600 number |
| n. Is this operator a hired manager for this operation? | 1576 1 ☐ Yes 3 ☐ No | 1588 1 ☐ Yes 3 ☐ No | 1599 1 ☐ Yes 3 ☐ No |

## HOUSEHOLD INCOME

| | Number |
|---|---|
| 3. In 2012, how many households shared in the net farm income of this operation? 1608 | |
| | **Percent (%)** |
| 4. In 2012, what percent of the principal operator's total household income came from this operation? 1578 | |

## INTERNET ACCESS

5. At any time during 2012, did this operation have internet access, either on the operation or at the principal operator's residence?

1260 1 ☐ Yes – Report the type of service that was used to access the internet. Check all that apply

1261 ☐ Dial-up service
1262 ☐ DSL Service
1263 ☐ Cable modem service
1264 ☐ Fiber-optic service
1265 ☐ Mobile broadband plan for a computer or a cell phone
1266 ☐ Satellite service
1267 ☐ Broadband over Power Lines (BPL)
1268 ☐ Other, specify below ✉
1269

3 ☐ No – Go to SECTION 36

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## SECTION 36 TYPE OF ORGANIZATION

1. Was more than 50 percent of the ownership interest in this operation held by you (the principal operator) and/or persons related to you by blood, marriage, or adoption, including relatives not residing in your household? Ownership interest is defined as partners, corporate shareholders, and members of a Limited Liability Company. Ownership interest DOES NOT INCLUDE landlords, contractors, and lenders. . . . . 1672 1 ☐ Yes 3 ☐ No

2. Was this operation organized as a Limited Liability Company (LLC) under State law? . . . . . 1673 1 ☐ Yes 3 ☐ No

3. In 2012, what was this operation's legal status for tax purposes? Mark one:

1671 1 ☐ Family or individual operation – Exclude partnerships and corporations.

2 ☐ Partnership operation – Include family partnerships.

- Is this partnership registered under state law? 1567 1 ☐ Yes 3 ☐ No

3 ☐ Incorporated under state law –

- Is this a family-held corporation? . . . . . 1681 1 ☐ Yes 3 ☐ No
- Are there more than 10 stockholders? . . . . . 1683 1 ☐ Yes 3 ☐ No

4 ☐ Other, such as estate or trust, prison farm, grazing association, American Indian Reservation etc. . . . . specify type 1685 ☐

## SECTION 37 CONCLUSION

1. Is it possible the information on this form would be duplicated on a form with another name or address?

1080 1 ☐ **Yes** - Provide the other name and address below 3 ☐ **No** - Go to Item 2

1081 Possible Duplicate Name ☐ 1082 Address ☐

1083 City ☐ 1084 State ☐ 1085 Zip ☐

2. Do you (the individual named on the label) make any day-to-day decisions for **another** farm or ranch? It is important that the Census of Agriculture accurately accounts for all of your farm or ranch operations.

1086 1 ☐ **Yes** - Continue 3 ☐ **No**

a. Did you receive a 2012 Census of Agriculture report form for this additional farm or ranch?

1087 1 ☐ **Yes** 3 ☐ **No** - Enter the information of the additional farm or ranch below

1088 Additional Farm or Ranch ☐ 1089 Area Code and Phone Number ☐ - ☐ - ☐

b. Did you include all data from this additional farm or ranch on THIS REPORT? Do not make changes to the data in this report, regardless of your answer.

1091 1 ☐ **Yes** 3 ☐ **No**

Return your form in the envelope provided. Thank you for your participation.

A wide variety of agricultural statistics is available from the National Agricultural Statistics Service (NASS). Check out the NASS reports, data products, and services on the Internet at www.nass.usda.gov

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. The valid OMB number is 0535-0226. The time required to complete this information collection is estimated to average 50 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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U.S. DEPARTMENT OF AGRICULTURE
NATIONAL AGRICULTURAL STATISTICS SERVICE
For additional help, call 1-888-424-7828
Para ayuda adicional, llamar al 1-888-424-7828

# INSTRUCTION SHEET
# UNITED STATES 2012 CENSUS OF AGRICULTURE
## Your report is due February 4, 2013

**Who Should Report**?
**A reply is needed from EVERYONE who receives a report form**, including persons who operated a farm, ranch or other agricultural operation in 2012 as well as those who were not involved in agriculture. More census information is on the Internet at www.agcensus.usda.gov

**If you do not return your report form, you will continue to receive contacts from us.**

**If you were a landlord only** and rented out all of your land, complete the front page, Sections 1 and 37 of the enclosed report form and return it in the preaddressed envelope. If you were a landlord but still operated other land yourself, you should complete the entire report form for that land which you operated.

**If you had no land, no livestock, and no agricultural operations**, return the report form with a note indicating your status on the front of the form below the address label.

**Partial Year Operations -** If you stopped farming during 2012, complete the report form for the portion of the year that you did farm. Write "Stopped farming during 2012" and the date you stopped farming below the address area. Mail the completed report form in the return envelope. If the person whose name is on the label was deceased during 2012, complete the form for the portion of the year that was farmed, and write a note.

**Involved In More Than One Operation** - If you made decisions for more than one operation, you may have received a report form for each operation. Provide information for each operation on a separate form. To obtain additional report forms, or if you have questions, please call the toll-free help line at 1-888-424-7828.

**Partnership Operation** - Complete only ONE form for the entire partnership's agricultural operation and include the entire operation that one form. If you made day-to-day decisions for more than one partnership operation, complete a report form for each separate operation. We have listed all known partners below the address area to assist in defining the operation. Make any necessary corrections to these names.

**If you owned farm or ranch land in 2012 that was idle and NOT rented out,** you should complete and return the report form.

**Specialty Commodities -** Horses, bees, elk, emus, fish, nursery, etc., are an important part of the agriculture industry. Report for all commodities, regardless of the amount of production or sales you had in 2012.

**Land in Federal conservation programs in 2012** - If you had land in the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Farmable Wetlands Program (FWP), or Conservation Reserve Enhancement Program (CREP) and you made the decisions on the acres, include the conservation land on the report form in Sections 1, 2, and 5.

**Received More Than One Report Form For the Same Operation** - If you received more than one report form for the same operation, complete only ONE form per operation. Write "Duplicate" below the address area of each extra form. Return all forms in the same return envelope with your completed form so that we can correct our records.

**Entering Your Responses - Use BLUE or BLACK INK only**. Enter your replies in the unit requested, i.e., dollars, bushels, tons, etc. When reporting dollars, report in whole dollars only. Convert fractions to decimals. Please print clearly and keep numbers and letters within the white boxes. Mark all applicable Yes/No and None boxes with an "X".

**SECTION 1** - ACREAGE IN **2012**
Your answers in this section will determine the land **(Acres in "THIS OPERATION")** referred to throughout the report form. Include land associated with your agricultural operation in 2012, whether in production or not. Include all land that you owned or rented during 2012, even if only for part of the year. Exclude residential or commercial land. Report land in whole acres.
***Item 1*** **(Box A)** - Report all land owned in 2012 whether held under deed, purchase contract or mortgage, homestead law, or as heir/heiress or trustee of an undivided estate. Include all land owned by you and/or your spouse, or by the partnership, corporation, or organization named on the front of the report form.
***Item 2*** **(Box B)** - Report all land rented or leased by you or your operation. Exclude land used under Government grazing permits or on a per head or animal unit (AUM) basis. Bureau of Land Management (BLM) Section 15 land leased by your operation with a specified acreage tract should be included here even though your fees to BLM are paid on an AUM basis.
***Item 3*** **(Box C)** - Include all land rented out for any purpose if it was part of the acreage reported in Items 1 and 2. Your tenant(s) will receive a form to report production for the land they rent. Do not report land placed in conservation programs as acres rented to others.
***Item 3a -*** Report all land owned by the operation and rented or leased to others.
***Item 4*** **(Box D)** - This is all land you operated at any time in 2012. Land use in Section 2 should be reported for these acres.
***Item 6 Total acres equals zero (0)*** - After completing Section 1, if the acres in Item 4, BOX D equals zero and you did not raise or own any livestock, aquaculture, or poultry in 2012, write a description of land use in the space by question 6. Complete Section 37 and mail the report form in the return envelope.

**SECTION 2** - LAND
The total (Item 5) of the acres from Items 1 - 4 entered in BOX E should equal the total acres in Section 1, Item 4, BOX D. These acres represent "this operation" for this census report. **If these two numbers are not the same, please GO BACK and CORRECT your figures.** Do not report any crops grown on land rented or leased to others or worked by others on shares during 2012.
***Land used for more than one purpose*** - Do not report the same acreage in more than one of the listed categories. If part or all of your land was used for more than one listed purpose in 2012, report that land only in the first purpose listed. For example, if you planted and harvested a grain crop and grazed the crop residue in the fall, report the land in Item 1a, cropland harvested. Do not report those acres again in Item 2c pasture or grazing land.
***CRP/WRP and other conservation programs*** - Report these acres in the Items in this section that best describe them. For example, CRP land may be reported in cropland harvested, cropland idle, or woodland not pastured depending on its use.
***Item 1a -*** Land maintained for orchards or vineyards should be recorded even if the crop failed, or the trees or vines are not of bearing age. Abandoned acres of orchards or vineyards should be reported in Item 1d. Harvested cropland includes **trees** for fruit, nuts, and berries along with Christmas trees and short rotation woody crops. Do not include the area harvested for timber or firewood. If more than one crop was harvested from the same land in 2012, report that land as cropland harvested only once.
***Item 1b -*** Include land you intended to harvest but were forced to abandon or had the crop fail.
***Item 1c*** - Include cropland left unseeded for the 2012 harvest and summer fallowed, cultivated by tillage, or treated with herbicides to control weeds and conserve moisture. Include cropland summer fallowed in 2012 even though it may have been planted to wheat, etc., for the 2013 harvest.

**SECTION 3** - CASH RENTS
Include all acres rented from others on a cash basis. If you rent a whole farm from someone else that includes dwellings and buildings, exclude the whole farm acres from this section.

**SECTION 4** - IRRIGATION

Include acres irrigated by all methods and from all water sources including those irrigated from lagoons through a sprinkler or flood system.

**SECTION 5** - AGRICULTURAL PROGRAMS AND CROP INSURANCE ACRES

For conservation program cost shares, include the government's share of the amount paid. Exclude any payments from loans or programs that must be repaid.

***Item 2*** - Report all acres covered by any crop insurance policy in 2012. Include land in pasture insurance programs and acres covered by guaranteed revenue policies.

***Item 7*** - Report amount received for commodities placed under CCC loan during 2012. Include amount received even if commodity was redeemed or forfeited prior to December 31, 2012. Exclude CCC loans to build crop storage facilities.

***Item 8*** - Report total amount repaid in 2012, regardless of the crop year the loan was made.

**REPORTING VALUE OF SALES**

Report the value of all crops and livestock sold from this operation in 2012 in the appropriate commodity section. Report the sales in 2012 regardless of the year crops were harvested or raised. Include the value of your landlord's share of the commodities harvested. Report commodities as sold that you owned and moved to someone else's operation for further feeding, such as cattle. Report the gross value before the deduction of expenses, fees, or income taxes. Include payments received in 2012 from cooperatives or marketing organizations for crops produced on this operation regardless of the year in which the crops were harvested. Also, include as sales your estimate of the value of any crop or livestock removed from this operation in trade of services, such as baled hay for labor or other services. Report the total value you received for animals and poultry sold from this operation in 2012, without deducting production or marketing expenses (cost of feed, cost of livestock purchased, cost of hauling and selling, etc).

***Do NOT include***:

- Proceeds from CCC loans or other government payments.
- The value of sales of any cattle, hogs, or poultry owned by you but kept and sold from a location you did not operate.
- The value of commodities grown under a production contract.

**SECTION 6** - FIELD CROPS

***Acres harvested*** - Enter the acres harvested in 2012. Round fractions to whole acres except for tobacco, where tenths should be reported.

***Total quantity harvested*** - If your unit of measure is different than the unit requested on the report form, convert your figure for the quantity harvested to the unit requested. If the harvest was incomplete by December 31, 2012, estimate the total quantity to be harvested.

***Acres irrigated*** - Report the irrigated harvested acres only once, even if the crop was irrigated multiple times during the growing season.

***Double cropping*** - If two or more crops were harvested from the same land (double cropping), report the total acres and production of each harvested crop.

***Interplanted crops*** - If two crops were grown at the same time in alternating strips in the same field, report the acreage of the field used for each crop.

***Skip row planting*** - If a crop was planted in an alternating pattern of planted and non-planted rows, such as two rows planted and two rows skipped, report the acreage occupied by the crop and report the skipped portion as cropland idle in Section 2, Item 1d.

If you rented land under a share arrangement, include your landlord's share of the crop in value of sales.

**SECTION 7** - HAY AND FORAGE CROPS

Include hay and forage from alfalfa, wild or native grasses, small grains, soybeans, and peanuts. Report production in tons. Any pasture or conservation land that had hay cut from it should be reported as cropland harvested in Section 2, Item 1a.

**SECTION 8** - CUT CHRISTMAS TREES, SHORT ROTATION WOODY CROPS AND MAPLE SYRUP

***Item 2*** - Acres in production of cut Christmas trees include both those to be harvested in future years as well as those harvested in 2012. Trees cut should include only those trees cut in 2012.

***Item 3*** - A short rotation woody crop is a tree that is harvested in 10 years or less. These are trees for use by the paper or pulp industry or as engineered wood. Exclude trees cut for timber. Acres harvested in 2012 should be reported as having been both in production and harvested. Acres not harvested in 2012 should be reported as acres in production but not as acres harvested.

***Item 4*** - Producers should report number of taps and gallons of syrup. If sap was sold, estimate the number of gallons of syrup it would have produced. Report the acres of tapped maple trees in Section 2, Item 3, woodland not pastured.

**SECTION 9** - NURSERY, GREENHOUSE, FLORICULTURE, SOD, MUSHROOMS, VEGETABLE SEEDS, AND PROPAGATIVE MATERIALS

Report Christmas trees grown on this operation and sold live as nursery stock, code 0488. Exclude crops bought for resale without additional growing, and garden center items, such as chemicals and fertilizers. Report all acres of Christmas trees in production for cut Christmas trees and the number cut in 2012 in Section 8, Item 2.

**SECTION 10** - VEGETABLES, POTATOES, AND MELONS

***Item 3*** - Report acres harvested for individual crops. If the same crop was planted more than once during the year on the same field, report the sum of the acres harvested during 2012. For example, if 4 acres were planted to lettuce and harvested, then replanted to lettuce and harvested, report 8 acres of lettuce in Item 3 but only 4 acres in Item 2.

**SECTION 11** - FRUIT AND NUTS

Report fruit and nut trees only if there was a combined total of 20 or more trees and vines, whose production was for sale. Exclude abandoned acres of orchards or vineyards that should be reported in Section 2, Item 1d. Bearing age acres are the acres of trees or vines that produced any fruit or nut crop in 2012 or previous years. If fruit and nut trees and vines were interplanted with other crops, report only the total acres for the orchard in Section 11, and the total acres of each interplanted crop in their appropriate section(s).

**SECTION 12** - BERRIES

***Item 2*** - Report all acres on which berries were grown in 2012 for harvest in 2012 or later years. Do not include abandoned acres or acres harvested for home use.

**SECTIONS 13, 14, AND 18** - CATTLE AND CALVES, HOGS AND PIGS, AND POULTRY

Include all animals on this operation on December 31, 2012 owned by you, raised by you under contract, or kept by you for others. Include animals on unfenced lands, National Forest land, Indian Reservation Land, cooperative grazing association land, or rangeland administered by the Bureau of Land Management on a per head, animal unit month (AUM), or lease basis. Animals in transit on December 31, 2012, should be reported by the person who had control of the animals on that day. Report beefalo as cattle in Section 13. Report buffalo as bison in Section 20.

***Contract and custom feeding operations*** - Report numbers of all animals or poultry on this operation on December 31, 2012. Animals and poultry kept on a contract or custom basis and moved or sold from this operation in 2012 should be reported as sold. In addition, report in *Section 21- Production Contracts and Custom Feeding* on the appropriate line the quantity delivered of custom fed livestock or production contract livestock and poultry and the dollar amount received from the contractor in Section 21. Do NOT include fees received for commodities produced under production contract in the value of sales in Sections 6 - 20.

***Cattle, hogs, and poultry to exclude from the report form*** - Exclude animals or poultry kept on land rented to others or kept under a share arrangement on land rented to others. Exclude animals quartered in feedlots that were not located on this

operation. Do not report the sales of animals bought and then resold within 30 days. Such purchases and sales are considered dealer transactions.

***Number sold*** - Report all animals and poultry sold or moved from this operation in 2012, without regard to ownership or who shared in the receipts. Include animals sold for a landlord or given to a landlord or others in trade or in payment for goods or services. Do not report number sold of any hogs and pigs, cattle and calves, or poultry owned by you that were kept and sold from a location that you did not operate.

***Number moved from this operation*** - For animals and poultry moved from this operation to another, such as for further feeding, report them as "sold." Cattle moved are not considered sold if they were moved to another operation for a short term, such as winter wheat or corn stubble grazing, or during the winter to public grazing land.

***Cattle in feedlots*** - Do NOT include in cattle in feedlots:

- Cattle and calves sold or moved off the operation for further feeding
- Veal calves or any calves weighing less than 500 pounds
- Cull or dairy cows fed only the usual dairy ration before being sold

**SECTION 15** - EQUINE

Exclude horses owned by this operation but stabled elsewhere. Mules, burros and donkeys on this operation should be reported regardless of ownership. Exclude feral equine.

**SECTION 16** - SHEEP AND GOATS

***Item 2*** - Include ewes in both Item 2.a. and Item 2.a.i. Report goats based on utilization regardless of breed. Report pounds of wool shorn and mohair clipped in 2012 only.

**SECTION 17** - AQUACULTURE

Include all sizes for each type. On a separate line, specify the sale of fish eggs, fry, or fingerlings for each type. Convert units such as bushels, bags, or gallons to number or pounds. Report the same production as either pounds or number.

**SECTION 19** - COLONIES OF BEES

***Item 2*** - Report the number of bee colonies owned regardless of location. Report the pounds of honey collected in 2012 whether sold or not sold. Report package bees and other bees such as leaf cutter bees, and the sale of complete bee colonies, in Section 20, Item 3. Report beeswax and pollen in Section 20, Item 4. Report pollination fees in Section 22, Item 7.

**SECTION 20** - OTHER LIVESTOCK AND LIVESTOCK PRODUCTS

***Items 2f, 2g - Mink and Rabbits*** – Report the sales of only live animals.

***Item 4*** - Include pelts and any meat from mink and rabbits.

**SECTION 21** - PRODUCTION CONTRACTS AND CUSTOM FEEDING

A production contract is an agreement between a grower and contractor (integrator) that specifies that the grower will raise an agricultural commodity and that the contractor will provide certain inputs such as seed, livestock, etc. The grower receives a payment or fee from the contractor, generally after delivery, which is less than the full market price of the commodity.

The grower should report amount of the specified commodity that you raised and delivered under production contracts in Items 2A - L. If you had multiple contracts to produce different commodities, report the appropriate amount of each commodity produced under each contract in the proper categories. Exclude marketing contracts, futures contracts, forward contracts, or other contracts based strictly on price. The contractor should not report commodities that were produced by the grower.

**SECTION 22** - INCOME FROM FARM-RELATED SOURCES

Report gross amounts received before taxes and expenses.

***Item 2*** - Exclude rental income from nonfarm property.

***Item 3*** - Include only those forest products cut from this operation, not items cut from other nonfarm timber acreage. Exclude income from a sawmill business. Report sales of Christmas trees, maple syrup or sap products in Section 8.

***Item 7*** - Include pollination fees.

**SECTION 23** - FARM LABOR

Report the number of paid farm or ranch workers who performed agricultural labor on this operation in 2012. Include paid family members. Include workers such as hired bookkeepers, office workers, maintenance workers, etc., if their work was primarily associated with agricultural production on this operation.

***Item 1*** - Include any short term or temporary workers who may have worked only a few days. Exclude contract labor.

**SECTION 24** - GRAIN STORAGE CAPACITY

Report total capacity of all structures normally used to store whole grains, even if they were not used in 2012. Do not report any capacity or usage of off farm public storage or capacity of structures leased to others.

**SECTION 25** - PRODUCTION EXPENSES

Include farm production expenses paid by you or your landlord(s) for crops, livestock, or poultry produced on this operation in 2012 in Items 1 through 15. Include expenses associated with the generation of farm-related income reported in Section 22. Include expenses incurred in 2012 even if they were not paid in 2012. Estimate if exact figures are not known.

***Contract growers or custom feeders*** - Do not report as production expenses the value of inputs provided by the contractor or livestock owner. Identify the items that were contractor provided in Section 21, Item 3.

***Item 2*** - Include surfactants and oils and other products used to increase a chemical's effectiveness.

***Item 6*** - Report the purchase cost of all grains, silage, hay, commercially mixed and premixed feeds, ingredients, concentrates, etc., fed to livestock or poultry on this operation. Contract livestock and poultry growers should not report the value of feed that was provided by a contractor. Do not report the value of feed raised and fed on this operation as an expense.

***Item 9*** - Include the cost of repairs and upkeep of farm machinery, vehicles, buildings, fences, and other equipment used in the farm business. Include expenses for repairs to machinery and equipment used only for custom work if income from those machines is reported in Section 22. Exclude repairs to vehicles not used in the farm business. Exclude expenditures for the construction of new buildings or the cost of additions to existing buildings.

***Item 10a*** - Include labor expense for the farm business for gross salaries and wages, commissions, dismissal pay, vacation pay, and bonuses paid to hired workers, family members, hired managers, administrative and clerical employees, and salaried corporate officers. Include cost for benefits such as employer's social security contributions, unemployment compensation, worker's compensation insurance, employer paid life and medical insurance expense, pension plans, etc.

***Item 10b*** - Include the labor costs of workers furnished on a contract basis by labor contractor, crew leader, or cooperative for harvesting vegetables or fruit, shearing sheep, or similar farm activities. Report costs for repair work done by a construction contractor in Item 9. Report the cost of customwork or machine hire in Item 11.

***Item 12a*** - Exclude rent paid for operator dwelling or other nonfarm property. Exclude the value of shares of crops or livestock paid to landlords.

***Item 13*** - Report all interest expenses paid in 2012 for the farm business. Include interest paid on CCC loans in Item 13b. Exclude interest associated with activities not related to production of crops or livestock on this operation, such as land or buildings rented to others, packing sheds, or feed mills that provided services to others. Exclude interest on owner/operator dwelling where the amount is separated from the interest on the land and buildings on this operation.

***Item 14*** - Include real estate property taxes you paid on the acres and buildings you owned and used in the farm business and property taxes on equipment or livestock. Exclude property taxes on land or buildings rented to someone else, or property taxes paid on other property not associated with the farm business.

**SECTION 26** - FERTILIZERS AND CHEMICALS APPLIED

***Fertilizer*** - Report acres on this operation on which commercial fertilizer was applied during 2012 only once, even if multiple applications were made. Report fertilizer and manure expenditures in Section 25, Item 1.

***Chemicals*** - Include acres on which custom application of

chemicals was made. If multiple applications of chemicals for the same purpose (for example, herbicides) were made on the same acres, report the acreage only once. If chemicals were applied for different purposes, report the acres for each purpose that the chemicals were used. Report agricultural chemical expenditures in Section 25, Item 2. Estimate the acreage for spot treatments.

SECTION 27 - ORGANIC AGRICULTURE

This section is for production under the National Organic Program standards. Farms that are USDA certified organic, or exempt from certification because they sell less than $5,000 in organic products a year, should report in this section. Farms in the three year transition period should report in Items 1and 2.

***Item 3*** - Total sales of organic products include all sales of the products, regardless of whether an organic premium was obtained. Sales of products from transitioning land or livestock should not be included in Item 3. Include gross value of agricultural production before expenses or taxes. Exclude the value of processed or value added items.

SECTION 28 - MARKET VALUE OF LAND, BUILDINGS, MACHINERY, AND EQUIPMENT

***Item 1*** - Estimate the value of the land, houses, barns, and other buildings for each of the three listed categories if they were sold in the current market. The real estate tax assessment value should not be used unless that value represents a full market value assessment and the land, house, and buildings could reasonably be assumed to be sold at that price. Do not deduct real estate marketing charges from your estimate. Report the total value, not the value on a per acre basis.

***Item 2*** - The estimated market value refers to all machinery and equipment kept primarily on this operation and used for the farm business. Report the value in its present condition, not the replacement or depreciated value. Include mobile implements, hand tools, and office supplies. Permanently installed equipment or equipment that is an integral part of a building should be included as a part of the value of land and buildings and reported in Item 1.

SECTION 29 - MACHINERY AND EQUIPMENT

Report the total on this operation, or normally on this operation and normally used on this operation, in the first column. Do not report obsolete or abandoned equipment. In the second column, report only the number manufactured in the last five years.

SECTION 30 - ENERGY

***Item 3*** - Include any wind rights leased to others on land owned by this operation.

SECTION 31 - LAND USE PRACTICES

***Items 1b*** - Land drained by ditches refers only to manmade ditches installed to improve drainage, not natural waterways.

***Item 1c*** - A conservation easement limits the right to develop the land, now and in the future.

***Items 1d through g*** - Include all cropland acres planted in the operation with the practice, not just cropland harvested. Conservation tillage leaves 30 percent or more of the soil surface covered by crop residue after planting. Conventional tillage has 100 percent of the soil surface mixed or inverted.

SECTION 32 - PRACTICES

***Item 1b*** - Rotational grazing is the practice of subdividing pasture into smaller sections and grazing different sections at different times.

SECTION 33 - DIRECT SALES FOR HUMAN CONSUMPTION

Include only those commodities sold directly for human consumption, such as vegetables, fruit, eggs, milk, cattle, chickens, hogs, turkeys, etc. Report only commodities grown or raised on this operation. Exclude crops, livestock, poultry, or other products that you bought and resold within 30 days. Exclude craft items such as birdhouses, woodwork, etc.

SECTION 34 - AGRICULTURAL ACTIVITY WITHIN THE BORDERS OF AMERICAN INDIAN RESERVATIONS, PUEBLOS, AND SERVICE AREAS

Complete this section if any of your cropland or livestock was on an American Indian Reservation, Pueblo, or service area in 2012. Include trust acres used, as well as deeded land or land leased from others that was on the Reservation.

SECTION 35 - OPERATOR CHARACTERISTICS

This section collects information about the operator(s) of this operation. A farm may be a family operation and still have multiple operators. Complete one column for each operator, listing the principal operator or senior partner in the first column. The principal operator is the person in charge, such as a hired manager, business manager, or other person primarily responsible for the on-site, day-to-day operation of the farm or ranch business.

***Item 1*** - Enter the total number of people who made day-to-day decisions for this operation, and the number of women operators. Do not report as operators minor-aged children who only worked on the farm.

***Item 2*** - Answer each question for up to three operators. If there were more than three, answer for three operators only.

***Item 2d*** - The principal occupation of the operator(s) is the occupation at which an operator spent the majority of his/her worktime. If the operator spent the majority working for **another** agricultural operation for wages, it is considered hours devoted to "Other."

***Item 2h*** - Report the first year the specified operator began to operate any part of this operation on a continuous basis. If the operator returned to a place previously operated, report the year operations were resumed.

***Item 2i*** - Report the first year the specified operator began to operate part of ANY operation on a continuous basis.

***Item 3*** - The number of households that share in the net farm income are those households involved with the day-to-day decisions and not those households that received funds because they are landlords, custom equipment operators, or provide other supplies that are listed in Section 25, Production Expenses. Your answer should not exceed the number of operators listed in Item 1.

***Item 4*** - If net income from the farm or ranch operation was negative in 2012, report zero as the percent of income from the operation.

***Item 5*** - Include internet access on the operation, or on equipment owned by the operation. Do not include access from a computer at a public site such as a library.

SECTION 36 - TYPE OF ORGANIZATION

Use the following definitions to determine the type of organization for this operation.

***An operation organized as a Limited Liability Company (LLC) may fall into any of the categories.***

***Family or individual operation*** - Farm or business organization controlled and operated by a family or an individual (sole proprietor). Include family operations that are not incorporated and not operated under a partnership agreement. Report family corporations under "Incorporated under state law."

***Partnership operation*** - Two or more persons who conduct an operation together and share work and profits. Co-ownership of land by husband and wife or joint filing of income tax forms by husband and wife does not constitute a partnership unless a specific agreement to share contributions, decision making, profits, and liabilities exists. Production under contract or under a share rental agreement does not constitute a partnership.

***Incorporated under state law*** - A corporation is a legal entity or artificial person created under the laws of a State to carry on a business, including family corporations. Exclude cooperatives, even if they are incorporated.

***Other*** - Estate or trust, grazing association, American Indian Reservation, university farm, prison farm, institution run by a government or religious entity, cooperatives (an incorporated or unincorporated enterprise or an association created and formed jointly by the members), etc.

SECTION 37 - CONCLUSION

***Item 1*** - If your operation might be identified under a different name than printed on the front of the form (for example, a farm name or another partner), please provide these names.

***Item 2a*** - All farms and ranches should receive their own forms to complete. If you operated another farm or ranch, indicate whether you received a form for that operation.

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| Cherries - | | | |
| Sweet | 39 | 31 | - |
| Tart | 39 | 31 | - |
| Chestnuts | 39 | 31 | - |
| Chicory | 38 | 29 | - |
| Chukars (Chukkars) | 32 | 20 | - |
| Citrus fruit | 39, 51, 64-70 | 31 | - |
| Coefficient of variation | - | - | B |
| Coffee | 39 | 31 | - |
| Collards | 38 | 29 | - |
| Colonies of bees | 34 | 21 | - |
| Combined market value of agricultural products sold and government payments | 3, 56, 58, 61, 64-70 | - | - |
| Combines, grain and bean | 48, 64-70 | 40 | - |
| Commercial fertilizer | 4, 11, 49, 64-70 | 3,41 | - |
| Commodity Credit Corporation loans | 6, 11, 56, 58, 61, 64-69 | 5 | - |
| Community supported agriculture | - | 43 | - |
| Computer use | 56, 58, 60, 61, 64-69 | 45 | - |
| Conservation practices | 8, 64-70 | 43 | - |
| Conservation Reserve Programs | 6, 8, 11, 56, 58, 60, 61, 64-70 | 5, 8 | - |
| Contract labor expense | 4, 11, 64-70 | 3, 7 | - |
| Corn | 1, 2, 36, 37, 51, 64-70 | 1, 2, 24-26 | A, B |
| Corporations | 56, 58, 60, 61, 64-70 | 45 | A, B |
| Cotton | 1, 36, 37 | 1, 25 | A, B |
| Cotton and cottonseed | 1, 2, 36, 37, 44, 64-70 | 1, 2, 24, 25 | - |
| Cotton pickers and strippers, self-propelled | 48, 64-70 | 40 | - |
| Counter-cyclical payments | 6 | - | - |
| Coverage adjustment | - | - | A, C |
| Cow herd size | 12, 14-17, 64-70 | 11 | - |
| Cowpeas, dry | - | 25 | - |
| Cowpeas, green | 38 | 29 | - |
| Cows and heifers that calved | 12, 14-17, 64-70 | 11 | - |
| Crambe | - | 27 | - |
| Cranberries | 40 | 33 | - |
| Crimson clover seed | - | 26 | - |
| Crop insurance, conservation, and organic practices | 50, 64-70 | 8 | - |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Crop insurance, land covered | 8, 64-70 | 8 | - |
| Cropland - | | | - |
| For pasture or grazing only | 8, 64-70 | 8 | - |
| Harvested | 1, 8-11, 43, 44, 51, 64-70 | 1, 8, 24, 46 | - |
| Idle or used for cover crops or soil improvement | 8, 64-70 | 8 | - |
| On which crops failed | 8, 64-70 | 8 | - |
| Summer fallow | 8, 64-70 | 8 | - |
| Crops, including nursery and greenhouse, value | 1, 2, 11, 53, 61 | 1, 2 | - |
| Crustaceans | 33 | 22 | - |
| Cucumbers | 38 | 29 | - |
| Currants | 40 | 33 | - |
| Customwork and custom hauling expense | 4, 11, 64-70 | 3 | - |
| Customwork and other agricultural services income | 7, 64-70 | 6 | - |
| Cut Christmas trees | 42 | 35 | - |
| Cut Christmas trees and short-rotation woody crops, sales value | 2, 7, 44, 64-70 | 2 | - |
| Cut flowers | 41 | 34 | - |
| Cuttings, seedlings, liners, and plugs | 41 | 34 | - |
| **D** | | | |
| Daikon | 38 | 29 | - |
| Dairy cows | 11, 12, 17 | 11, 44 | - |
| Dates | 39 | 31 | - |
| Days worked off farm | 54, 55, 57, 59, 62-70 | 45 | - |
| Deer | 34, 35 | 23 | - |
| Defoliation chemicals applied | 49, 64-70 | 41 | - |
| Depreciation expense | 4, 64-70 | 3 | - |
| Dill for oil | - | 27 | - |
| Direct payments | 6 | - | - |
| Direct sales to individuals | 2, 64-70 | 2 | - |
| Diseases, chemical control | 49, 64-70 | 41 | - |
| Donkeys (see Mules, burros, and donkeys) | | | |
| Dry edible beans | 1, 36, 37, 64-70 | 1, 24, 25 | - |
| Ducks | 32 | 20 | - |
| **E** | | | |
| Economic class of farms | 3, 56, 58, 60, 61, 64-70 | 2, 46 | - |
| Eggs, chicken | 45, 51 | 39 | - |
| Eggplant | 38 | 29 | - |
| Elk | 34, 35 | 23 | - |
| Energy, renewable | 52, 64-70 | 43 | - |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Emmer and spelt | - | 25 | - |
| Emus | 32 | 20 | - |
| Equine | 31, 46, 51 | 18 | - |
| Equipment and machinery | 1, 4, 11, 47, 48, 51, 53, 64-66, 68, 70 | 1, 40 | - |
| Escarole and endive | 38 | 29 | - |
| Estimated market value of land and buildings | 1, 11, 44, 46, 51, 53, 64-70 | 1, 8 | - |
| Estimated market value of machinery and equipment | 1, 11, 44, 53, 68, 70 | 1 | - |
| Ewes 1 year old or older | 27-29, 64-70 | 13 | - |
| Expenses paid by landlords | 4, 64-70 | - | - |
| Expenses, total farm production | 1, 4, 11, 44, 53, 64-70 | 1, 3 | - |
| **F** | | | |
| Family held corporations | 64-70 | 45 | A, B |
| Family or individual operations | 1, 56, 58, 60, 61, 64-70 | 45 | A, B |
| Farm characteristics | 51, 56-58, 60, 61 | - | B |
| Farm production expenses | 1, 4, 44, 53, 64-70 | 1, 3 | - |
| Farm size | 1, 53, 56, 60, 61, 64-70 | 6 | A, B |
| Farmer (see Operators) | | | |
| Farmland, rent income received | 7, 64-70 | 6 | - |
| Farms, number | 1-62, 64-70 | 1-24, 38-55 | A, B, C |
| Feed purchased, expense | 1, 4, 11, 44, 64-70 | 3 | - |
| Fertilizer and chemicals applied | 11, 49, 64-70 | 41 | - |
| Fertilizer, lime, and soil conditioners purchased, expense | 1, 4, 11, 44, 49, 64-70 | 3, 41 | - |
| Fescue seed | 37 | 26 | - |
| Field and grass seed crops | 37, 64-70 | 25, 26 | - |
| Figs | 39 | 31 | - |
| Filberts (hazelnuts) | 39 | 31 | - |
| Flaxseed | 37 | 25 | - |
| Floriculture crops | 41, 44, 65 | 2, 34 | - |
| Flower seeds | 41 | 34 | - |
| Foliage plants | 41 | 34 | - |
| Forage, all, land used | 1, 36, 37, 64-70 | 1, 24, 26 | A, B |
| Forage harvesters, self-propelled | 48, 64-70 | 40 | - |
| Forest products, sales values | 7, 64-70 | 6 | - |
| Fruit and tree nuts | 2, 37, 39, 44, 51, 56, 58, 60, 61, 64-70 | 2, 31 | - |
| Fruits, tree nuts, and berries, sales value | 2, 44, 64-70 | 2 | - |
| Fuels purchased, expense | 1, 4, 11, 44, 64-70 | 3 | - |
| Full owners | 53, 56, 58, 60, 61, 64-70 | 45 | A, B |
| **G** | | | |
| Gains, net income | 5, 60, 64-70 | 4 | - |
| Game or sport fish | 33 | 22 | - |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Garden plants sold | 41 | - | - |
| Garlic | 38 | 29 | - |
| Gasoline, fuels and oils purchased expense | 1, 4, 11, 44, 64-70 | 3 | - |
| Geese | 32 | 19, 20 | - |
| Generated energy | - | 43 | - |
| Ginger root | - | 27 | - |
| Ginseng | 38 | 29 | - |
| Goats | 2, 30, 35, 44, 51, 64-70 | 2, 14-17 | - |
| Government payments | 3, 6, 44, 56, 58, 60, 61, 3, 6, 64-70 | 1, 5 | - |
| Grain and bean combines | 48, 64-70 | - | - |
| Grain storage capacity | 43 | 38 | - |
| Grains, oilseeds, dry beans, dry peas | 2, 44, 45, 64-70 | 2, 39 | - |
| Grapefruit | 39 | 31 | - |
| Grapes | 39, 51, 64-70 | 31 | A, B |
| Grass silage | 36, 37 | 26 | - |
| Greenchop | 1, 36, 37, 64-70 | 1, 24, 26 | - |
| Greenhouse fruits and berries | 41 | 34 | - |
| Greenhouse vegetables and fresh cut herbs | 41 | 34 | - |
| Greenhouse tomatoes | 41 | 34 | - |
| Guar | - | 27 | - |
| Guavas | 39 | 31 | - |
| Guineas | 32 | 20 | - |
| **H** | | | |
| Harvested cropland | 1, 8-11, 37-40, 42-44, 51, 53, 54, 64-70 | 1, 8-10, 24-38, 45, 46, 48 | - |
| Hawaiian (see Native Hawaiian and Other Pacific Islander) | | | |
| Hay | 36, 37, 51, 64-70 | 26 | - |
| Hay balers | 48, 64-70 | - | - |
| Haylage, grass silage, and greenchop hay | 1, 36, 37 | 26 | - |
| Hazelnuts (Filberts) | 39 | 31 | - |
| Head lettuce | 38 | 29 | - |
| Heifers | 12, 14-17, 45, 64-70 | 11, 39 | - |
| Herbs | 38, 41 | 27, 29, 34 | - |
| Hired farm labor | 1, 4, 11, 44, 64-70 | 3, 7 | - |
| Hired managers | 56, 58, 60, 61, 64-70 | - | - |
| Hispanic (see Spanish, Hispanic or Latino origin) | | | |
| Hogs and pigs | 1, 2, 11, 19-26, 44, 45, 51, 64-70 | 1, 2, 12, 39, 44 | A, B |
| Honey collected | 35 | 21 | - |
| Honeydew melons | 38 | 29 | - |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Hops | 37 | 27 | - |
| Horseradish | 38 | 29 | - |
| Horses and ponies | 31, 51, 64-70 | 2, 18 | - |
| Horses, ponies, mules, burros and donkeys, sales value | 2, 31, 44, 64-70 | 2, 18 | - |
| Household income, percent from farming | 56, 58, 60, 61, 64-70 | - | - |
| Households sharing in farm income | 56, 58, 60, 61, 64-70 | - | - |
| Hungarian partridge | 32 | 20 | - |
| **I** | | | |
| Income from farm-related sources | 7, 11, 53, 64-70 | 1, 6 | - |
| Insects, chemical control | 49, 64-70 | 41 | - |
| Institutional farms | 53, 56, 58, 60, 61, 64-70 | - | - |
| Insurance payments | 7, 8, 64-70 | 6, 8 | - |
| Interest expenses | 1, 4, 11, 44, 45, 64-70 | 3, 45 | - |
| Internet access | 56, 58, 60, 61, 64-70 | 2, 45 | - |
| Irrigated land | 1, 9-11, 37, 53, 64-70 | 1, 10 | A, B |
| **J** | | | |
| Jojoba | - | 27 | - |
| **K** | | | |
| Kale | 38 | 29 | - |
| Kentucky bluegrass seed | - | 26 | - |
| Kiwifruit | 39 | 31 | - |
| Kumquats | 39 | 31 | - |
| **L** | | | |
| Labor expense, hired | 1, 4, 11, 64-70 | 3, 7 | - |
| Ladino clover seed | - | 26 | - |
| Land and buildings, estimated market value | 1, 11, 46, 51, 53, 64-70 | 8 | - |
| Land in farms, acres | 1, 8, 9, 11, 44, 50, 51, 53, 54, 61, 64-70 | 8, 45, 47-55 | A, B, C |
| Land use practices | 50, 64-70 | - | - |
| Land owned | 11, 64-70 | 45 | - |
| Land rented or leased to others | 56, 58, 60, 61, 64-70 | 45 | - |
| Land use | 1, 8, 11, 50, 51, 53, 64-70 | - | - |
| Land used for vegetables | 37, 64-70 | 28 | - |
| Landlord’s share of production expenses | 4, 64-70 | - | - |
| Landlord's share of sales | 2, 64-70 | - | - |
| Latino (see Spanish, Hispanic or Latino origin) | | | |
| Layers | 1, 32, 64-70 | 1, 19 | A, B |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Leaf lettuce | 38 | 29 | - |
| Legal status for tax purposes | 1, 56, 58, 60 | 45 | A, B |
| Lemons | 39 | 31 | - |
| Lentils | 37 | 25 | - |
| Lespedeza seed | - | 26 | - |
| Lettuce | 38 | 29 | - |
| Lima beans - | | | |
| Green | 38 | 29 | - |
| Dry | - | 25 | - |
| Limes | 39 | 31 | - |
| Livestock and poultry purchased expense | 1, 4, 11, 44, 64-70 | 3 | - |
| Livestock inventory | 1, 11, 64-70 | 1 | - |
| Livestock, poultry, and their products, value | 1, 2, 11, 53, 56, 58, 60, 61 | 1, 2 | - |
| Llamas | 34, 35 | 23 | - |
| Loan deficiency payments | 6 | - | - |
| Loganberries | 40 | 33 | - |
| Losses, net income | 5, 64-70 | 4 | - |
| **M** | | | |
| Macadamia nuts | 39 | 31 | - |
| Machinery and equipment - | | | |
| Estimated market value | 1, 11, 47, 51, 53, 64-70 | 1, 40 | - |
| Rent and lease expense | 11, 64-70 | 3 | - |
| Mangoes | 39 | 31 | - |
| Manure applied | 49, 64-70 | 41 | - |
| Maple syrup | 2, 42, 64-70 | 2, 37 | - |
| Marionberries (see Blackberries and dewberries) | | | |
| Market value of agricultural products | 1-3, 11, 44, 45, 53, 56, 60, 61, 64-70 | 1, 2 | A, B, C |
| Market value of agricultural products sold and government payments | 3, 56, 58, 60, 61, 64-70 | - | - |
| Meat and other goats | 30 | 17 | - |
| Melons | 38 | 29 | - |
| Migrant workers | 64-70 | 7 | - |
| Milk from cows | 2, 44, 51, 64-70 | 2 | - |
| Milk cows | 1, 11, 12, 17, 64-70 | 1, 11, 44 | A, B |
| Milk from sheep and goats | 35 | - | - |
| Milk goats | 30 | 15 | - |
| Mink, live | 34, 35 | - | - |
| Miscanthus | - | 27 | - |
| Mint for oil | 37 | 27 | - |
| Mint for tea leaves | - | 27 | - |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Miscellaneous poultry | 32 | 20 | - |
| Misclassification adjustment | - | - | A, C |
| Mohair | 30, 35 | 16 | - |
| Mollusks | 33 | 22 | - |
| More than one race, operators | 59, 60, 62, 64-70 | 55 | A, B |
| Mules, burros, and donkeys | 2, 31, 44, 64-70 | 2, 18 | - |
| Mushroom spawn | 41 | 34 | - |
| Mushrooms | 41 | 34 | - |
| Mustard greens | 38 | 29 | - |
| Mustard seed | - | 25 | - |
| **N** | | | |
| Native Hawaiian or other Pacific Islander operators | 59-70 | 53 | A, B |
| Nectarines | 39 | 31 | - |
| Nematodes, chemical control | 49, 64-70 | 41 | - |
| Net cash farm income of the operations and operators | 5, 64-70 | 1, 4 | A, B |
| Net gain | 5, 64-70 | 4 | - |
| Net loss | 5, 64-70 | 4 | - |
| Noncitrus fruit, all | 39, 51 | 31 | - |
| Nonirrigated farms | 11 | - | - |
| Nonresponse adjustment | - | - | A, C |
| North American Industry Classification System (NAICS) - | | | |
| All other animal production (11299) | 51 | - | - |
| All other crop farming (11199) | 51 | - | - |
| Animal aquaculture (1125) | 51 | - | - |
| Animal aquaculture and other animal production (1125, 1129) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Animal production (112) | 43, 51 | - | - |
| Apiculture (11291) | 51 | - | - |
| Apple orchards (111331) | 51 | - | - |
| Beef cattle ranching and farming including feedlots (11211) | 51 | - | - |
| Beef cattle ranching and farming (112111) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Berry (except strawberry) farming (111334) | 51 | - | - |
| Broilers and other meat-type chicken production (11232) | 51 | - | - |
| Cattle feedlots (112112) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Cattle ranching and farming (1121) | 51 | - | - |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Chicken egg production (11231) | 51 | - | - |
| Citrus (except orange) groves (11132) | 51 | - | - |
| Corn farming (11115) | 51 | - | - |
| Cotton farming (11192) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Crop farming, all other (11199) | 51, 56, 58, 60, 61, 64-70 | 44 | - |
| Crop production (111) | 43, 51 | 38 | - |
| Dairy cattle and milk production (11212) | 51, 56, 58, 60, 61, 64-70 | 44 | - |
| Dry Pea and bean farming (11113) | 51 | - | - |
| Floriculture production (111422) | 51 | - | - |
| Food crops grown under cover (11141) | 51 | - | - |
| Fruit and nut combination farming (111336) | 51 | - | - |
| Fruit and tree nut farming (1113) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Fur-bearing animal and rabbit production (11293) | 51 | - | - |
| Goat farming (11242) | 51 | - | - |
| Grape vineyards (111332) | 51 | - | - |
| Greenhouse, nursery, and floriculture production (1114) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Hay farming (11194) | 51 | - | - |
| Hog and pig farming (1122) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Horse and other equine production (11292) | 51 | - | - |
| Noncitrus fruit and tree nut farming (11133) | 51 | - | - |
| Nursery and floriculture production (11142) | 51 | - | - |
| Nursery and tree production (111421) | 51 | - | - |
| Oilseed and grain farming (1111) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Oilseed (except soybean) farming (11112) | 51 | - | - |
| Orange groves (11131) | 51 | - | - |
| Other animal production (1129) | - | 44 | - |
| Other crop farming (1119) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Other grain farming (11119) | 51 | - | - |
| Other noncitrus fruit farming (111339) | 51 | - | - |
| Other poultry production (11239) | 51 | - | - |
| Other vegetable (except potato) and melon farming (11219) | 51 | - | - |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Potato farming (111211) | 51 | - | - |
| Poultry and egg production (1123) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Poultry hatcheries (11234) | 51 | - | - |
| Rice farming (11116) | 51 | - | - |
| Sheep and goat farming (1124) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Sheep farming (11241) | 51 | - | - |
| Soybean farming (11111) | 51 | - | - |
| Strawberry farming (111333) | 51 | - | - |
| Sugarcane farming, hay farming and all other crop farming (11193, 11194, 11195) | 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Sugarcane farming (11193) | 51, 64-70 | - | - |
| Tobacco farming (11191) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Tree nut farming (111335) | 51 | - | - |
| Turkey production (11233) | 51 | - | - |
| Vegetable and melon farming (11121) | 51, 53, 56, 58, 60, 61, 64-70 | 44 | - |
| Wheat farming (11114) | 51 | - | - |
| Number of farms | 1, 8-35, 44, 45, 48, 50-53, 56, 58-61, 64-70 | 1, 2, 8-23, 31, 35, 36, 39, 40, 45 | A, B, C |
| Number of households sharing farm income | 56, 58, 60, 61, 64, 65, 67-70 | - | - |
| Number of operators | 55-70 | - | - |
| Number of persons living in operator's household | 55, 57, 59, 60, 62-70 | - | - |
| Nursery crops | 41 | 2, 34 | - |
| Nursery, greenhouse, floriculture, and sod, sales value | 2, 44, 64-70 | 2 | - |
| Nursery stock | 41 | 34 | - |
| Nuts, all | 39 | 31 | - |
| **O** | | | |
| Oats | 1, 36, 37, 64-70 | 1, 24, 25 | A, B |
| Occupation of operator | 1, 54, 55, 57, 59, 62-70 | 1, 45 | A, B |
| Off-farm work by operator | 1, 64, 65, 67-70 | 1, 45 | - |
| Okra | 38 | 29 | - |
| Olives | 39 | 31 | - |
| Onions | 38 | 29 | - |
| Operator characteristics | 54, 55, 57, 59, 62, 63, 66-70 | 45 | A, B |
| Operators - | | | |
| Age | 1, 54, 55, 57, 59, 62-70 | 45 | A, B |
| All | 55, 58, 60 | 45 | - |
| American Indian or Alaska Native operators | 57, 59-70 | 50 | A, B |
| Asian | 57, 59-70 | 51 | A, B |
| Black or African American | 57, 59-70 | 52 | A, B |
| More than one race reported | 55, 57-62, 64-70 | 55 | A, B |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Native Hawaiian or Other Pacific Islander | 57, 59-70 | 53 | A, B |
| Primary occupation | 1, 54, 55, 57, 59, 62-70 | 1, 45 | A, B |
| Principal Operator | 1, 54-60, 62-70 | 1, 45, 46, 48-55 | A, B |
| Race | 57, 59-70 | 49 | - |
| Second Operator | 55, 57, 59, 63 | - | - |
| Spanish, Hispanic, or Latino | 55, 57-70 | 49 | A, B |
| Tenure | 53, 56, 58, 60, 61, 64-70 | 45, 48 | |
| Third Operator | 55-59, 63 | - | - |
| White | 57, 59-70 | 54 | A, B |
| Women | 55-70 | 45-48 | A, B |
| Oranges | 39 | 31 | A, B |
| Orchardgrass seed | - | 26 | - |
| Orchards | 1, 36, 37, 64-70 | 1, 24, 30 | A, B |
| Organic agriculture | 44, 54, 64-70 | 42 | - |
| Ornamental fish | 33 | 22 | - |
| Ostriches | 32 | 20 | - |
| Other livestock and other animal products | 1, 2, 12-17, 19, 21, 25, 26, 32, 34, 35, 44, 45, 64-70 | 2, 23 | - |
| Other aquaculture products | 33 | 22 | - |
| Other berries | 40 | 33 | - |
| Other citrus | 39 | 31 | - |
| Other crops and hay | 2, 36-41, 44, 45, 64-70 | 2, 25-27, 29, 31, 33, 34 | - |
| Other farm characteristics | 56, 58, 60, 61 | - | - |
| Other farm production expenses | 4, 11, 64-70 | 3 | - |
| Other farm-related income | 7, 11, 64-70 | 6 | - |
| Other federal farm programs payments | 6, 56, 58, 60, 61 | 5 | - |
| Other food fish | 33 | 22 | - |
| Other floriculture and bedding crops | 41 | 34 | - |
| Other livestock | 34, 35, 64, 65 | 23 | - |
| Other livestock products | 35 | 23 | |
| Other livestock and poultry purchased | 4, 64-70 | 3 | - |
| Other poultry | 32 | 19, 20 | - |
| Other vegetables | 38 | - | - |
| Owned land in farms | 11, 56, 58, 60, 61, 64-70 | 45 | - |
| **P** | | | |
| Pacific Islander (see Native Hawaiian and Other Pacific Islander) | | | |
| Papayas | 39 | 31 | - |
| Parsley | 38 | 29 | - |
| Part owners | 53, 56, 58, 60, 61, 64-70 | 45, 48 | A, B |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Partnerships | 1, 56, 58, 60, 61, 64-70 | 45 | A, B |
| Passion fruit | 39 | 31 | - |
| Pastureland | 8, 10, 11, 44, 53, 64-70 | 8, 10, 41 | - |
| Patronage dividends and refunds from cooperatives | 7, 64-70 | 6 | - |
| Payroll | - | 7 | - |
| Peaches | 39, 64-70 | 31 | - |
| Peacocks and peahens | 32 | 20 | - |
| Peanuts | 1, 36, 37, 64-70 | 1, 24, 25 | A, B |
| Pears | 39 | 31 | - |
| Peas - | | | |
| Chinese | 38 | 29 | - |
| Dry edible | 37, 38, 64 | 25 | - |
| Dry southern (cowpeas) | 38 | 25, 29 | - |
| Green (excluding southern) | 38, 64-70 | 29 | - |
| Green southern (cowpeas) | 38 | 29 | - |
| Pecans | 39, 64-70 | 31 | - |
| Peppers | 38 | 29 | - |
| Percent of income from farming | 58, 60, 61, 64-70 | - | - |
| Permanent pasture and rangeland | 8, 53, 64-70 | 8 | - |
| Persimmons | 39 | 31 | - |
| Pesticides, acres applied | 64-66, 68, 70 | 41 | - |
| Pheasants | 32 | 20 | - |
| Pigeons or squab | 32 | 20 | - |
| Pima cotton | 36, 37 | 1, 25 | - |
| Pineapples | 1, 37 | 1, 24, 27 | - |
| Pistachios | 39 | 31 | - |
| Place of residence | 54, 55, 57, 59, 62-70 | 45 | - |
| Plums and prunes | 39 | 31 | - |
| Plumcots, pluots, and other plum-apricot hybrids | 39 | 31 | - |
| Pomegranates | 39 | 31 | - |
| Popcorn | 37 | 25 | - |
| Potatoes | 1, 2, 38, 44, 45, 64-70 | 1, 2, 29, 39 | - |
| Potted flowering plants | 41 | 34 | - |
| Poultry | 2, 32, 44, 45, 64-70 | 2, 19, 20, 39, 45, 49 | - |
| Poultry hatched | 32 | 20 | - |
| Primary occupation (see Operator, primary occupation) | | | |
| Principal operator (see Operator) | | | |
| Production contracts | 45 | 39 | - |
| Production expenses | 1, 4, 5, 11, 44, 53 | 1, 3, 4 | - |
| Property taxes paid, expense | 4, 11, 64-70 | 3 | - |
| Proso millet | 37 | 25 | - |
| Prunes | 39 | 31 | - |

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|---|---|---|---|
| Pullets for laying flock replacement | 32, 45, 64-70 | 19, 39 | - |
| Pumpkins | 38 | 29 | - |
| **Q** | | | |
| Quail | 32 | 20 | - |
| **R** | | | |
| Rabbits, live | 34, 35 | 23 | - |
| Race of operator | 57, 59-70 | 50-55 | A, B |
| Radishes | 38 | 29 | - |
| Rapeseed | - | 25 | - |
| Raspberries | 40 | 33 | - |
| Recreational services income | 7, 64-70 | 6 | - |
| Red clover seed | - | 26 | - |
| Rent and lease expenses for machinery, equipment, and farm share of vehicles | 4, 11, 64-70 | 3 | - |
| Rent or share payments income | 7, 64-70 | 6 | - |
| Rented or leased land | 11, 56, 58, 60, 61, 64-70 | 45 | - |
| Rheas | 32 | 20 | - |
| Rhubarb | 38 | 29 | - |
| Rice | 1, 2, 36, 37, 51, 64-70 | 1, 2, 24, 25 | A, B |
| Romaine lettuce | 38 | 29 | - |
| Roosters | 32 | 20 | - |
| Rotational or management intensive grazing | - | 43 | - |
| Rye for grain | 37 | 25 | - |
| Ryegrass seed | 37 | 26 | - |
| **S** | | | |
| Safflower | 37 | 25 | - |
| Seed harvested | 37, 41, 64-70 | 24-26, 34 | - |
| Seedlings | 41 | 34 | - |
| Seeds, plants, vines, and trees expense | 4, 11, 64-70 | 3 | - |
| Sesame | - | 27 | - |
| Sex of operator | 54, 55, 59, 62-70 | 45 | A, B |
| Share payments | 7, 64-70 | 6 | - |
| Sheep and lambs | 11, 27-29, 35, 44, 56, 58, 60, 64-70 | 1, 2, 13 | - |
| Sheep, goats, wool, mohair, and milk sales value | 2, 30, 44, 64-70 | 2 | - |
| Short rotation woody crops | 2, 7, 27, 44, 64-70 | 2, 6, 36 | - |
| Silage | 1, 36, 37, 64-70 | 1, 24, 26 | - |
| Small grain hay | 36, 37 | 26 | - |
| Sod | 41 | 34 | - |
| Soil conditioners | 1, 4, 11, 44, 49, 64-70 | 2, 41 | - |

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|---|---|---|---|
| Sorghum | 1, 2, 36, 37, 64-70 | 1, 2, 24-27 | - |
| Soybeans | 1, 2, 36, 37, 64-70 | 1, 2, 24, 25 | A, B |
| Spanish, Hispanic or Latino origin, operators | 57-59, 64-70 | 49 | B |
| Spearmint for oil | - | 27 | - |
| Specified fruits and nuts, acres | 39 | 31 | - |
| Spinach | 38 | 29 | - |
| Sport or game fish | 33 | 22 | - |
| Spring wheat, other | 1, 36, 37 | 1, 25 | - |
| Squab | 32 | 20 | - |
| Squash | 38 | 29 | - |
| State and local government program payments | 7, 64-70 | 6 | - |
| Stockholders in farm corporation | 64-70 | - | - |
| Strawberries | 40 | 33 | - |
| Sudangrass seed | - | 26 | - |
| Sugarbeets | 1, 36, 37, 64-70 | 1, 24, 25 | - |
| Sugarcane | 1, 36, 37, 51, 53, 56, 58, 60, 64-70 | 1, 24, 25 | - |
| Summer squash | 38 | 29 | - |
| Sunflower seed | 1, 64-70 | 1, 24, 25 | - |
| Supplies, repairs, and maintenance, expense | 4, 11, 64-70 | 3 | - |
| Sweet corn | 38, 64-70 | 27, 29 | - |
| Sweet potatoes | 1, 2, 38, 44, 64-70 | 1, 2, 29 | - |
| Switchgrass | - | 27 | - |
| **T** | | | |
| Tame hay, other | 36, 37, 64-70 | 26 | - |
| Tangelos | 39 | 31 | - |
| Tangerines | 39 | 31 | - |
| Taps, maple syrup | 42 | 37 | - |
| Taro | - | 27 | - |
| Taxes, property | 4, 11, 64-70 | 3 | - |
| Temples | 39 | 31 | - |
| Tenants | 53, 56, 58, 60, 61, 64-70 | 45, 48 | A, B |
| Tenure of operator | 53, 56, 58, 60, 61, 64-70 | 45, 48 | A, B |
| Timothy seed | - | 26 | - |
| Tobacco | 1, 2, 36, 37, 44, 51, 53, 64-70 | 1, 2, 24, 25, 44 | - |
| Tobacco transplants | 41 | 34 | - |
| Tomatoes | 38, 64-70 | 29 | - |
| Tomatoes, greenhouse | 41 | 34 | - |
| Total cropland | 1, 8, 11, 44, 53, 64-70 | 1, 8 | - |
| Total farm production expenses | 4, 11, 44, 64-70 | 1, 3 | - |
| Total sales | 2, 64-70 | 2 | - |
| Total woodland | 8, 53, 64-70 | 8 | - |
| Tractors | 48, 64-70 | 40 | - |

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|---|---|---|---|
| Triticale | - | 25 | - |
| Trout | 33 | 22 | - |
| Trucks | 48, 64-70 | 40 | - |
| Tubers | 41 | - | - |
| Turkeys | 32, 45, 64-70 | 19, 39 | - |
| Turnip greens | 38 | 29 | - |
| Turnips | 38 | 29 | - |
| Type of organization | 1, 56, 58, 60, 61, 64-70 | 45 | - |
| **U** | | | |
| Upland cotton | 36, 37 | 1, 25 | - |
| Utilities, expense | 4, 11, 44, 64-70 | 3 | - |
| **V** | | | |
| Valencia oranges | 39 | 31 | - |
| Value added commodities | - | 43 | - |
| Value - | | | |
| Agricultural products sold | 1, 3, 11, 13-22, 35, 41, 44, 45, 54, 56, 58, 61, 64-70 | 1, 2, 22, 34, 42 | A, B, C |
| Commodities under production contract | 45 | 39 | - |
| Land and buildings | 1, 11, 44, 46, 51, 53, 64-70 | 1, 8 | - |
| Landlord's share of total sales | 2, 44, 64-70 | - | - |
| Machinery and equipment | 1, 11, 44, 47, 51, 53, 64-70 | 1, 40 | - |
| Organic product sales | 44, 54, 64-70 | 42 | - |
| Veal calves | - | 43 | |
| Vegetable seeds | 41 | 34 | - |
| Vegetables transplants | 41 | 34 | - |
| Vegetables | 1, 2, 36, 37, 41, 44, 45, 64-70 | 1, 2, 24, 28, 29, 34, 39 | A, B |
| Vetch seed | - | 26 | - |
| **W** | | | |
| Walnuts, English | 39, 64-70 | 31 | - |
| Watercress | 38 | 29 | - |
| Watermelons | 38 | 29 | - |
| Weeds, grass, or brush, chemical control | 49, 64-70 | 41 | - |
| Wetlands Reserve Program | 6, 8, 11, 56, 58, 61, 64-70 | 5, 8 | - |
| Wheat - | | | |
| All | 1, 2, 36, 37, 51, 64-70 | 1, 2, 24, 25 | - |
| Durum | 1, 36, 37 | 1, 25 | A, B |
| Other spring | 1, 36, 37 | 1, 25 | A, B |
| Winter | 1, 36, 37 | 1, 25 | A, B |
| Wheatgrass seed | - | 26 | - |
| White clover seed | - | 26 | - |
| White operators | 57, 59-70 | 54 | B |
| Wild hay | 36, 37 | 26 | - |

| Item | Chapter 1 tables | Chapter 2 tables | Appendix tables |
|---|---|---|---|
| Wild rice | - | 25 | - |
| Winter squash | 38 | 29 | - |
| Women operators | 54-57, 60, 63, 64, 66-70 | 45-48 | A, B |
| Woodland crops | 42, 64-70 | 35-37 | - |
| Woodland, total | 8, 53, 64-70 | 8 | - |
| Wool production | 27-29 | 13 | - |
| **Y** | | | |
| Years on present farm | 54, 55, 57, 59, 62-70 | 45 | - |
| Years operating any farm | 55, 57, 59, 62-70 | 45 | - |

# Okanogan County Profile

*by Mark A. Berreth, regional labor economist*
*Updated May 2012*

Overview | Geographic facts | Outlook | Labor force and unemployment | Industry employment | Wages and Income | Population

## Overview

### *Regional context*

Okanogan County borders Canada on the north. The Columbia River Basin and Lake Roosevelt form its southern and eastern borders, and the North Cascade Mountains form its western border. It is one of the largest counties in the state at 5,268 square miles, but has the fifth fewest residents per square mile. It is an agricultural county with many outdoor recreation activities that draw many tourists.

The Colville Confederated Tribes occupy much of Okanogan County and part of Ferry County as well. As of January 2012, the Colville Confederated Tribes consists of 9,365 descendants of 12 aboriginal tribes.

### *Local economy*

Okanogan County was established in 1888, partitioned from Stevens County. Originally, the area was a trading center for furs and pelts, but eventually became part of the gold rush. Gold and silver were discovered in 1858, but gold production never reached higher than fourth in the state. Timber and logging were also an important industry. The original sawmill was built in 1920, and thrived into the mid-2000's. Then, after changing hands multiple times, it had to declare bankruptcy. Even with the closing of the large sawmill, there are still many small-scale woodworkers in the area.

With more than 300 days of sunshine a year and 3 million acres of public land, outdoor activities are plentiful and attract various outdoor enthusiasts. Recreation activities include hiking, skiing, rock climbing, camping, horseback riding and various lake activities. Access to the Cascade Mountains and North Cascades National Park also contributes to tourism in the area. The area is popular with birdwatchers as well as individuals interested in wildlife, from moose to deer to black bears.

Tourism in the area is very diverse. Okanogan is home to various rodeos during the spring and summer, along with a wine festival in the summer and a salmon festival in the fall. Another major tourist attraction is the Grand Coulee Dam, one of the largest concrete structures in the world and the largest electric power-producing facility in the United States.

Agriculture is a very important sector for Okanogan County, which mainly consists of various tree fruits and wheat. The first orchard was planted in 1858, and the area continued to develop tree fruits into the dominant industry it is today. In addition to the sales of agricultural products, tourists flock to breweries, wineries and the local fruit stands throughout the area.

The retail industry has been growing from 1990 to 2010. Although employment levels peaked in 2008, the area is still doing well as a tourist destination to the Methow Valley. Visiting Canadians have also boosted sales as they travel south to buy goods. As the value of

the dollar has dropped over the past 10 years, there has been an increase in Canadian shoppers.

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## Geographic facts

*(Source: U.S. Census Bureau QuickFacts)*

| | Okanogan County | Rank in State |
|---|---|---|
| Land area, 2010 (square miles) | 5,267.98 | 1 |
| Persons per square mile, 2010 | 7.8 | 34 |

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## Outlook

Over the past 20 years, Okanogan County has had a slow but steady annual average growth rate of 0.6 percent. The county finally recovered from the 2001 recession in 2006, only to be confronted with the Great Recession the very next year, causing further drops in employment. From 2000 to 2011, there was an annual average growth rate of -0.7 percent.

Even with the last decade of struggle, the future growth in the tourism industry is showing promise. When the recession initially hit in 2007, Okanogan County stayed insulated from the initial downturn and managed to post growth in 2008. Now that disposable incomes are recovering, leisure and hospitality are starting to show signs of growth. Manufacturing has been edging up recently along with construction and mining activities. Overall, the goods-producing sector is showing growth recently, and expansion is expected in various areas in Okanogan County. Overall, employment levels are not making strong gains.

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## Labor force and unemployment

*(Source: Employment Security Department)*

Current labor force and unemployment statistics are available on the **Labor area summaries page**.

Okanogan County's preliminary April 2012 unemployment rate was 10.6 percent, which was 0.7 percentage points below April 2011. The civilian labor force is up in year-over-year figures along with total employment. The average unemployment rate in 2011 was 10.2 percent compared to 10.7 percent in 2010. The lowest average unemployment rate in recent years was in 2007 at 6.3 percent.

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## Industry employment

*(Source: Employment Security Department)*

Current industry employment statistics are available on the **Labor area summaries page**.

Total nonfarm employment peaked in 2008 with an annual average employment level of 12,780. There was a decline each year through 2011 when total nonfarm employment was 11,720. Current employment levels through April 2012 are similar to those in the first four months of 2011 and 2010. Even though total nonfarm employment is down from 2010 to 2011, total private employment shows a slight boost. Government employment declined as a result of fiscal tightening.

- The goods-producing sector remained steady across natural resources, mining, construction and the manufacturing sector edged up slightly.
- The service-providing sector contracted because of the small losses in retail trade, which continues to decline in 2012.
- Government also suffered losses.

For historical industry employment data, **contact an economist.**

### *Industry employment by age and gender*

*(Source: The Local Employment Dynamics)*

The Local Employment Dynamics (LED) database, a joint project of state employment departments and the U.S. Census Bureau, matches state employment data with federal administrative data. Among the products is industry employment by age and gender. All workers covered by state unemployment insurance data are included; federal workers and non-covered workers, such as the self-employed, are not. Data are presented by place of work, not place of residence. Some highlights:

The largest job holder group in 2010 was those age 55 and older with 24.8 percent of the workforce. This group was followed closely by the 45 to 54 age group with 23.1 percent of the workforce.

In 2010, males held 48.7 percent and women held 51.3 percent of jobs in Okanogan County. There were substantial differences in gender dominance in employment groups:

In 2010, females held 56.8 percent and men held 43.2 percent of the jobs in Kitsap County. There were substantial differences in gender dominance by industry.

- Male-dominated industries included construction (86.1 percent), mining (86 percent), utilities (72.6 percent) and manufacturing (70.9 percent).
- Female-dominated industries included healthcare and social assistance (79.1 percent), finance and insurance (75.9 percent), educational services (68.4 percent) and professional, scientific and technical services (67 percent).

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## Wages and income

*(Source: Employment Security Department; Bureau of Labor Statistics; Bureau of Economic Analysis; U.S. Census Bureau; U.S. Census Bureau, American Community Survey)*

In 2010, there were 17,329 jobs with a total payroll of over $439.5 million covered by unemployment insurance in Okanogan County.

The county's average annual wage in 2010 was $25,362, which was significantly lower than Washington state's $48,521.

Okanogan County's median hourly wage was $12.51 in 2010, lower than Washington state's $21.01 median hourly wage.

### *Personal income*

Personal income includes earned income, investment income and government payments such as Social Security and Veterans Benefits. Investment income includes income imputed from pension funds and from owning a home. Per capita personal income equals total personal income divided by the resident population.

Per capita personal income was $34,016 in 2010. This figure is considerably below the state's figure of $42,589 and the nation's figure of $39,937.

According to U.S. Census QuickFacts, the median household income was $38,551, which is significantly below the state's at $57,244 over the period 2006 to 2010.

In the period 2006 to 2010, 19.5 percent of the county's population was living below poverty level, which is much higher than 12.1 percent for Washington state and 13.8 percent for the nation, according to U.S. Bureau of Census QuickFacts.

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## Population

*(Source: U.S. Census Bureau, Office of Financial Management )*

Okanogan County's population in 2010 was 41,120. The growth rate from 2000 to 2010 was 3.9 percent for Okanogan County, much lower than that of the state at 14.1 percent. The largest city in Okanogan County is Omak with a population of 4,845.

### *Population facts*

*(Source: U.S. Census Bureau QuickFacts)*

| | Okanogan County | Washington State |
|---|---|---|
| Population 2010 | 41,120 | 6,724,540 |
| Population 2000 | 39,564 | 5,894,121 |
| Percent Change, 2000 to 2010 | 3.9% | 14.1% |

### *Age, gender and ethnicity*

*(Source: U.S. Census Bureau QuickFacts)*

Okanogan County's population distribution is higher at both the oldest and youngest ages than the state.

- Okanogan County's population of individuals aged 65 and older was 17.2 percent compared to Washington state's 12.3 percent.
- The proportion of county residents under 18 years old was identical to that of the state at 23.5 percent in 2010.
- There were slightly more residents under 5 years old in Okanogan County at 6.8 percent than in the state at 6.5 percent.

Females made up 49.5 percent of Okanogan County's population, slightly less than that of the state (50.2 percent).

Okanogan distinguishes its demographic makeup with its significantly larger American Indian/Alaskan Native population (11.4 percent) than that of the state (1.5 percent). This is due to the concentration of the Colville Confederated Tribes in this area. Hispanics are also more prevalent in the county (17.6 percent) compared to the state (11.2 percent).

## *Demographics*

*(Source: U.S. Census Bureau QuickFacts)*

| | Okanogan County | Washington State |
|---|---|---|
| Population by age, 2010 | | |
| Under 5 years old | 6.8% | 6.5% |
| Under 18 years old | 23.5% | 23.5% |
| 65 years and older | 17.2% | 12.3% |
| Females, 2010 | 49.5% | 50.2% |
| Race/ethnicity, 2010 | | |
| White | 73.9% | 77.3% |
| Black | 0.4% | 3.6% |
| American Indian, Alaskan Native | 11.4% | 1.5% |
| Asian, Native Hawaiian, Other Pacific Islander | 0.7% | 7.8% |
| Hispanic or Latino, any race | 17.6% | 11.2% |

## *Educational attainment*

*(Source: U.S. Census Bureau QuickFacts)*

Over the period 2006 to 2010, 83.8 percent of individuals age 25 and older were high school graduates. This figure is somewhat lower than that of Washington state (89.6 percent) and the nation (85 percent).

Over the same period, far fewer of Okanogan County residents 25 and older have attained higher education as can be noted in the low levels of residents with a bachelor's degree or higher (17.7 percent). This figure does not compare favorably with the state (31 percent) or nation (27.9 percent).

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Methow Valley News Online

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# County to use public land base to satisfy state call for agriculture, resource lands

By Marcy Stamper

Okanogan County has the third-highest acreage in the state for apples and pears and the fifth for cherries. It also comes in fifth for number of cattle, according to the 2007 Census of Agriculture.

Agriculture employs more people than any other industry in the county, at 16 percent of the population, according to the Washington State Employment Security Department.

How much land is necessary to sustain this industry – the fruits and vegetables, the cattle, the packing sheds and feed stores? What inputs does a farmer or rancher need to be successful – good soil and irrigation, summer range and winter pasture?

Okanogan County planners and commissioners have been trying to answer these questions, with help from farm organizations and citizens, for almost a year, as they update the comprehensive plan.

Since Okanogan County does not plan under the state's Growth Management Act, county officials have considerable latitude in formulating those answers. But one of the state's requirements is the designation of resource lands for agriculture, forestry and minerals to preserve the economic viability of those industries.

Agriculture is so important in the county that the commissioners recently updated the right-to-farm ordinance, which requires that anyone subdividing land adjacent to a farm "be prepared to accept such inconveniences or discomfort as a normal and necessary aspect of living in a County with a strong rural character and a healthy agricultural sector."

Nevertheless, there is concern that designating specific parcels as agricultural resource lands may create "undue restrictions," according to county commissioner Bud Hover. Instead, the county is planning to fulfill the state's requirement by designating only public land and land protected by conservation easements, he said.

"Just because we're not designating every piece of land now in agriculture doesn't mean agriculture is not important and won't continue to thrive," he said. "We're satisfying our obligation to the state."

"There are no required development regulations that would constitute restrictions on lands" for jurisdictions that only partially plan under the GMA, according to Dee Caputo, senior planner with the state's Growth Management Services. "They are encouraged to come up with measures to protect agricultural resource lands – particularly incentive programs," she said. While the designations would not impose specific restrictions, Hover is concerned that taking land out of the resource designation in the future could be cumbersome.

With 57 percent of the county's 3.4 million acres owned by state and federal agencies, designating public land seemed like a way to satisfy the state requirement without an additional layer of regulation, according to the commissioners. By far, the most significant contribution of public land to agriculture is for grazing, with an estimated 800,000 acres of U.S. Forest Service land and almost 300,000 of land managed by the Washington Department of Natural Resources used for seasonal grazing. Nevertheless, the Forest Service requires ranchers to have a base property with livestock-handling facilities, according to Dean McFetridge, range management specialist for the Methow Valley Ranger District.

Because agencies and scientists quantify the ways land is used for agriculture for different reasons, the numbers do not always match. The Washington State Department of Agriculture maps irrigated pastureland and cropland, primarily to figure out where pesticides may be used, according to Perry Beale, senior crop mapping specialist with WSDA. Their most recent data is from 2006, when they found 25,418 acres devoted to orchards, 21,576 for wheat, and 16,333 for alfalfa and pastures.

DNR leased 1,374 of its 307,000 acres in the county for orchards and another 1,300 for other crops, both dryland and irrigated, according to Paul Penhallegon, DNR's assistant division manager for upland leasing and rights of way.

The county commissioners turned to the Okanogan County Farm Bureau for numbers. Bureau president Jon Wyss found that 30,000 cow-calf pairs are necessary for a viable industry. Since typical grazing leases issued by the Forest Service or DNR allow more than five pairs per acre and there are 1.1 million acres of public land, Wyss concluded that the existing acreage is more than adequate. Similarly, he found that the available public lands are sufficient for the 27,600 acres needed for the tree-fruit and vine industries.

Wyss said he had been asked to calculate whether available public acreage was adequate, without looking at the nature of those lands or whether they are currently used for or available for agriculture. He projected that leases could be negotiated with DNR for suitable orchard lands, for example.

The county is also including conservation easements in its agricultural designations. Some easements specifically protect agricultural lands – 22 percent of the Methow Conservancy's 6,629 protected acres are agricultural easements – but other easements, such as the Conservancy's 24 percent for riparian attributes, are generally not suitable for agriculture.

Other conservation easements in the county are held by the Okanogan Valley Land Council, most of which protect wildlife habitat and forests and allow grazing, and by the Washington Department of Fish and Wildlife, generally for wildlife habitat.

Planning director Perry Huston said the county is starting with public lands and conservation easements but would fine-tune those numbers with a soil analysis.

"What we're doing is creating your defensible record," he said last month at the commissioners' study session on resource lands. "This is the bright line – the gong we have to ring – since we've now established these numbers and, at this point, they haven't been refuted."

Huston is currently working on a revised draft of the comp plan and designations. Hover said he hoped the process, including public hearings, would be complete by the end of the year.

Although Growth Management Services does not have to sign off on the county's designations, they can be challenged in court, according to Caputo.

**MV News file photo by Sue Misao: In the realm of agriculture, Okanogan County has a lot of apples.**

**Date:** 09-28-2010 **| Volume:** 108 **| Issue:** 19

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Washington State
Employment Security Department

Labor Market and Economic Analysis
LMEA

# Okanogan County Profile, January 2009

T. Baba Moussa, Regional Labor Economist
1/9/2009

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Employment by Industry
Population, Labor Force, Unemployment and Commuting
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## Economic Overview

Links to 61 Okanogan County data sheets

**For more information on Okanogan County, please see Regional Economists and the Areas They Serve**

For some Washingtonians, and especially those who live in the Puget Sound region, Okanogan County is part of everything that lies on the other side of the Cascade Mountains, with its breathtaking, natural beauty that stretches hundreds of miles into wilderness. Without a doubt, Okanogan County encompasses a variety of wildlife and natural wonders that include beautiful mountains, lakes, horses and a variety of livestock. Every year, avid bird watchers and fishermen spend time in the Okanogan Valley enjoying their pastimes.

In addition to beautiful hills and large lakes, Okanogan County is also home to the largest Indian reservation in the Evergreen state: the Confederated Tribes of the Colville Reservation. Long before the first settlers set their foot in the West, the various Indian tribes were fur traders and fishermen, moving from place to place in search of better living conditions. Today, economic activities on the reservation are dominated by wood industries, gaming and casino enterprises. According to the Indian Tribes Reservation website, the Confederated Tribes are comprised of 12 different groups and own 2,100 square miles of land. The Reservation is a sovereign nation that has been recognized by the federal government since 1872. The Colville Reservation also contains a myriad of natural resources that include minerals, timber and rivers.

Perhaps, one of the most interesting events in Okanogan County is the Omak Stampede and the world-famous Suicide Race that takes place in August. The one-week long event draws tens of thousands of tourists and rodeo fans every year from different parts of the country to enjoy the wild horse race, rodeo, Western and Native American art show.

## Employment by Industry

*Agriculture:*

For many decades, agriculture, along with tree fruit industries, have been at the forefront of Okanogan County economy and will continue to provide employment for job seekers across the Okanogan Valley for years to come. Local growers across Brewster, Carlton, Coulee Dam, Methow, Okanogan, Omak, Oroville, Tonasket and Winthrop areas employ thousands of local and migrant agricultural workers every year. According to data produced by the U.S. Department of Agriculture National Agricultural Statistical Service, in 2006, Okanogan

County had:

- 6,253,646 apples trees,
- 725,446 Sweet Cherries trees, and
- 415,898 Winter Pears trees.

Statistical data compiled by the Labor Market and Economic Analysis branch of the Employment Security Department show that Okanogan nonfarm employment has been steadily increasing from a yearly average of 11,560 workers in 2002 to 12,580 at the end of 2007. Since 2006, the annual average jobless rate has been below 7 percent, a better performance of the job market compared to the double-digit unemployment rate in 2002.

*Goods-producing industries*

- At the end of 2007, employment in the goods-producing sector (which includes natural resources, mining and construction and manufacturing) was 10.0 percent of total nonfarm wage and salary employment in Okanogan County, or down 5.8 percentage points from 15.8 percent in 1990.

- Natural resources, mining and construction reached a peak in 2006, then declined slightly in 2007:
  - 2000 – negative 3.8 percent;
  - 2001 – negative 13.2 percent;
  - 2002 – negative 3.0 percent;
  - 2003 – positive 1.6 percent;
  - 2004 – positive 1.5 percent;
  - 2005 – positive 7.6 percent;
  - 2006 – positive 18.3 percent; and
  - 2007 – positive 16.7 percent.

- Manufacturing saw accelerated growth in 2004 and 2006, with declines in 2005 and 2007:
  - 2000 – negative 59.1 percent;
  - 2001 – negative 44.7 percent;
  - 2002 – negative 4.8 percent;
  - 2003 – negative 10.0 percent;
  - 2004 – positive 16.7 percent;
  - 2005 – positive 9.5 percent;
  - 2006 – positive 13.0 percent; and
  - 2007 – positive 7.7 percent.

*Services-providing industries*

- The services-providing sector includes the subsectors of trade, transportation, warehousing and utilities, information and financial activities, leisure and hospitality, professional and business services, education and health services, government and other services.
  - The share of services-providing sectors employment edged down from 90.8 percent in 2000 to 90.1 percent of Okanogan County total nonfarm employment in 2007.

- Since 2000, with the exceptions of 2003 and 2004, services-providing employment has grown less across the Okanogan Valley than in Washington state.
  - The yearly growth rate reached its peak of 3.8 percent in 2004, up from 2.7 percent in 2000, before sliding to minus 0.7 percent in 2007.

- Wholesale trade as well as transportation, warehousing and utilities have been hard hit over the last

eight years.

- With an average of 2,370 workers in 2007, the subsector of trade, transportation and utilities provided 18.8 percent of total nonfarm employment, a decline of 0.8 percentage points compared to its level in 2000. Since 2003, employers have been adding jobs, although at a decelerating rate.

- Wholesale trade employment declined from 550 employees in 2000 to 280 jobs in 2007, declining from an annual growth rate of 34.1 percent to a 15.2 percent downturn over the same time period. Fresh fruit packing houses, metal and mining companies, beer, wine and alcoholic beverage merchants, as well as raw-material farm products make up part of wholesale trade industries in Okanogan County.

- Retail trade lost 30 employees from 2000 to 2003 before posting a gain of 230 jobs four years later and closing with a total of 1,900 workers in 2007. Over the seven-year period, the annual growth rate was negative from 2000 to 2002, positive and decelerating between 2002 and 2006. In 2007, retail trade employment gained considerable strength as it expanded by 8.0 percent.

- Transportation, warehousing and utilities posted its first annual-double-digit percentage loss in 2007, declining by 17.4 percent after increasing by 5.3 percent in 2004, by 5.0 percent in 2005 and by 9.5 percent in 2006. There were a total of 190 workers in transportation, warehousing and utilities industries in 2007 in Okanogan County, down 20 from its level seven years before.

- Information and financial activities subsector posted its biggest loss in 2001, declining by 26.3 percent compared to the prior year. In 2003, employers added 60 workers, the highest job gain for many years. In 2007, there were 500 workers in the information and financial activities subsector.

- In 2007, the government subsector was down for the third consecutive year. Employers lost 1.9 percent of their workforce after posting a decline of 3.5 percent in 2006 and a 1.6 percent downturn in 2005.

**Population, Labor Force, Unemployment and Commuting**

**Population**

Based on a recently released population data by the Washington State Office of Financial Management (OFM), Okanogan County had an estimated population of 40,100 in 2008, or a one-year increase of 300 residents from 2007 estimates. The city of Omak had the highest population with 4,750 residents, followed by:

- Okanogan, with 2,470 residents;
- Brewster, with 2,195 residents;
- Oroville, with 1,715 residents;
- Tonasket, with 1,000 residents; and
- Twisp, with 985 residents.

From 2000 to 2007, the population increased by an average of 236 residents, a 0.6 percent growth rate, whereas the state had a population increase of 10.0 percent over the same time period. Okanogan County was also the 24th most populous county in the state, according to the U.S. Census Bureau estimates.

**Race/Ethnicity**

- In 2008, the Okanogan County population was:
  - 68.4 percent White non-Hispanic
  - 17.9 percent Hispanic of any race, and
  - 10.9 percent American Indian and Alaska Native.
- Compared to the state, that had:
  - 76.8 percent White non-Hispanic

- 8.9 percent Hispanic of any race, and
- 1.4 percent American Indian and Alaska Native.

**Unemployment**

In 2007, annual average unemployment rates were:

- 6.3 percent for Okanogan County;
- 4.5 percent for the state; and
- 4.6 percent for the nation.

**Industry Employment by Age and Sex**

The latest projections by the Employment Security Department indicated that nonfarm employment will reach a total of 13,160 workers in 2011, or a 5.4 percent increase compared to 2006 estimates. Based on the same projections, durable goods, wholesale trade and transportation, warehousing and utilities employment are expected to decline, whereas nondurable goods, natural resources and mining, retail trade, financial activities, leisure and hospitality will show a positive growth rate.

At the end of 2007, the number of employed Okanogan County residents decreased to 19,270, down from 19,310 the prior year. Agriculture and government sectors were, and will be for the foreseeable future, the main driving force of the Okanogan County economy. With most of the tree-fruit processing plants located in North Central Washington, many local job seekers can count on these firms to provide them with employment. An employee at Kettle Valley Dried Fruit Company, a food processing plant, and a worker at Nordang Art Trucking, a trucking company, can expect to have a job as long as the demand for tree fruit does not decline. Still, more will need to be done in order to strengthen the long-term prospects of one of the state's poorest counties. Farming and crop production is labor intensive, and one of the main concerns of growers for many years, especially over the last months, has to do with the best way to address the labor shortage that can delay or even cripple production. Other challenges facing the farming community are housing availability for migrant farm workers and education to help them transition into other industries during the off seasons.

A strong and sustainable labor force usually rests on the skill levels of the workforce. Although the Okanogan County economy is led by farming and the agriculture industry, which does not require higher education for its workforce, the percentage of residents with high school diplomas is still low compared to the state's average. To attract and retain nonfarm businesses, more young residents need to complete their college education.

**Employment by Industry and by Age in 2007**

- Agriculture, forestry, fishing and hunting industry for 25-44 age group:
  - 39.1 percent in Okanogan County,
  - 41.0 percent in the state.

- Construction industry for 25-44 age group:
  - 45.0 percent in Okanogan County,
  - 51.0 percent in the state.

- Wholesale trade industry for 25-44 age group:
  - 40.3 percent in Okanogan,
  - 48.6 percent in the state.

- Health care and social assistance industry for 25-44 age group:
  - 38.0 percent in Okanogan County,
  - 44.3 percent in the state.

**Age**

In 2008, the percentage of residents by age:

- Age 20 to 39:
  - 20.8 percent in Okanogan County,
  - 27.7 percent in the state, and
  - 27.5 percent in the nation.
- Age 40 to 59:
  - 29.7 percent in Okanogan County,
  - 28.6 percent in the state, and
  - 27.9 percent in the nation.
- Age 60+:
  - 21.5 percent in Okanogan County,
  - 16.9 percent in the state, and
  - 17.4 percent in the nation.

**Educational Attainment**

According to data for the 2000 census:

- Those with no high school diploma:
  - 23.4 percent in Okanogan County,
  - 12.9 percent in the state, and
  - 19.6 percent in the nation.
- Those with a Bachelor's Degree:
  - 10.0 percent in Okanogan,
  - 18.4 percent in state, and
  - 15.5 percent in the nation.
- The total of those with Master's Degree or higher:
  - 5.9 percent in Okanogan,
  - 9.3 percent in the state, and
  - 8.9 percent in the nation.

**Wages and Income**

In 2007, agriculture, forestry, fishing and hunting paid an annual average of $35,305, while workers in the construction sector had a mean wage of $34,474, manufacturing workers earned $37,302 and employees in wholesale trade made $28,082 over the same period.

Based on nonfarm employment projections compiled by the Labor Market and Economic Analysis branch of the Employment Security Department, Okanogan County is expected to have an average of 12,930 nonfarm jobs by the second quarter of 2009, a 0.7 percent annual growth rate in the county compared to 0.9 projected growth rate statewide over the same time period.

In 2006, per capita income adjusted for inflation was:

- $27,841 in Okanogan County,
- $38,212 in the state,
- $32,378 in the state less King County, and
- $36,714 in the nation.

In 2007, the median hourly wage adjusted for inflation was:

- $11.89 in Okanogan County,

- $18.65 in the state.

In 2007, the Average Annual Wage was:

- $24,644 in Okanogan County,
- $43,904 in the state, and
- $36,597 in the state less King County.

Percentage of population below poverty line in 1999:

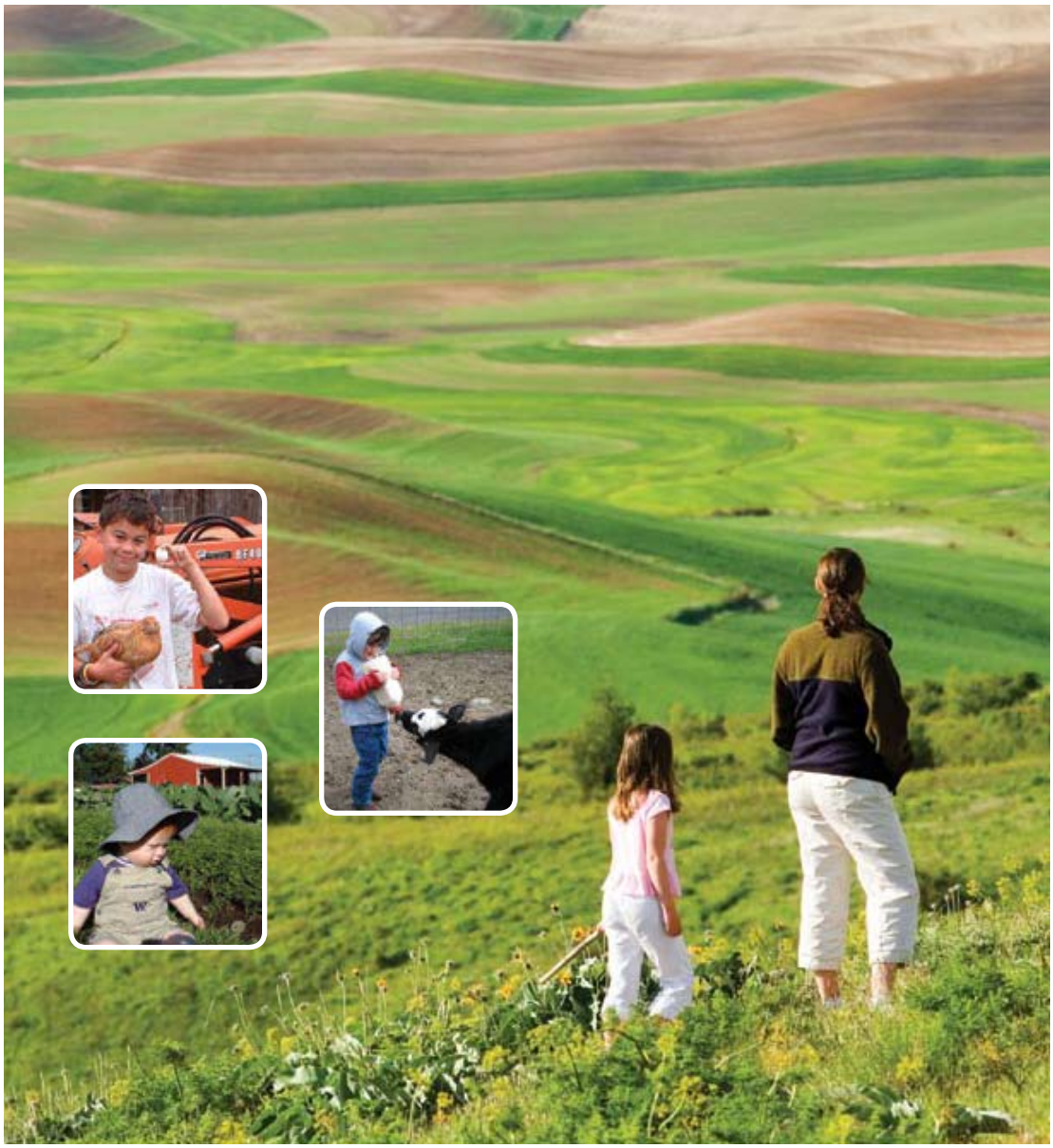
- 21.3 percent in Okanogan County,
- 10.6 percent in the state, and
- 12.4 percent in the nation.

Percentage of households paying 35.0 percent or more of their income for rent:

- 35.1 percent in Okanogan County,
- 32.7 percent in the state, and
- 31.9 percent in the nation.

# WASHINGTON Agriculture

## Strategic Plan 2020 and BEYOND



WSDA WASHINGTON STATE DEPARTMENT OF AGRICULTURE

Future of Farming

Agriculture is the cornerstone of Washington's economy in both rural communities and metropolitan areas. Agriculture is woven into the fabric of Washington State's heritage and has been an important cultural institution in Washington since the earliest days of territorial settlement. Farmers and ranchers provide environmental stewardship to 15 million acres of the state's lands. ***The Future of Farming: Strategic Plan for Washington Agriculture 2020 and Beyond*** is intended to ensure that agriculture remains vibrant and prosperous for generations to come.

The Washington State Department of Agriculture developed this strategic plan from the experience, expertise and diverse opinions of hundreds of study participants. The Future of Farming project did not seek to achieve consensus, rather, it documents the input of producers, processors and other industry specialists. On behalf of WSDA, I would like to acknowledge the contributions of Jennifer Harte, Carrie Coineandubh, Dr. Desmond O'Rourke and the Future of Farming Steering Committee, as well as the hundreds of others who participated in the study.

This report does not offer prescriptive solutions for securing the future of agriculture, but provides a road map by which to navigate. Now we must focus on developing the public policies that respond to the needs. Although this plan was written at the direction of the Washington State Legislature, the recommendations can and should be leveraged by advocates for agriculture, private and public, at every opportunity.

Washington agriculture is fortified by the depth of our farming roots and the innovation of our industry. By making agriculture a priority, policy makers can ensure that the farmers and ranchers of tomorrow will remain competitive in the global marketplace and preserve the proud heritage that is Washington State agriculture.

Sincerely,

Robert W. Gore
Acting Director

[ Executive Summary ]

# WASHINGTON Agriculture

## Strategic Plan 2020 and BEYOND

### Categorized Areas of Recommendation

**Category #1 Make Agriculture a Priority**

– *critical to socio-economic vitality*

- Business environment conducive to success
- Assemble agency and industry leadership
- Economic development program

**Category #2 Eliminate Regulatory Barriers**

– *promote competitiveness*

- Blue Ribbon Panel to evaluate the impact of regulations
- Agencies provide outreach and meet to improve consistency
- Construct a model Agricultural Impact Statement

**Category #3 Protect Resources**

– *availability and access*

- Land
- Water
- Labor
- Energy
- Capital and credit

**Category #4 Strengthen Supportive Services**

– *assure competitiveness*

- Education
- Transportation
- Science, technology, research and development
- Processing and preparation
- Marketing services
- Information, communication, and outreach
- Producer associations and formal commissions

**Category #5 Harness Emerging Opportunities**

– *identify, monitor and respond*

- Organic, sustainable and local
- Multi-year farm bills
- Food safety and food security
- Climate change
- Risk management

***Strategies for the future:***
*Analyze, Respond, Allocate and Improve*

Future of Farming

# Current Importance of Agriculture to Washington

Agriculture contributes extensively to Washington's economy and society. It generates a rich diversity of food, fiber, forage, and fuel for the state, nation, and the world. It generates income and employment on 33,000 farms in all 39 counties. It underpins a large food processing industry and supports many supply and marketing services in machinery, transportation, packaging, and more. Agriculture is the pillar of many rural communities, generating tax revenues for roads, schools and other services; injecting new technologies; and providing leadership in organizations. The quality and safety of Washington's agricultural products continues to raise the state's reputation around the world. Farmers are stewards of the state's private lands, protecting streams, lakes, birds, and wildlife, and maintaining the aesthetic appearance that casual observers enjoy.

"The quality and safety of Washington's agricultural products continues to raise the state's reputation around the world."

The economic impact of agriculture in Washington is considerable. Cash receipts at the farm level in 2007 were a record $8.4 billion. Each dollar of farm cash receipts multiplies itself throughout the state's economy. Overall, agriculture boosted state economic activity by approximately $21 billion in 2007.

There is a strong symbiotic relationship between agriculture, the many ancillary business activities it stimulates, and the social effects it generates. In 2007, the food processing industry had 937 establishments employing 34,000 workers and grossed $9.1 billion. Agriculture also drives extensive activities for cleaning, packing, and preparation of fruits, vegetables, grains, legumes, and other specialty products. The rural communities that supply the land, water, and people of agriculture could not flourish without farming. That is why the Future of Farming project is so vital to the stability of Washington's socio-economic health.

# Genesis of the Future of Farming Project

Washington agriculture went through a difficult decade between 1995 and 2005. Prices and profitability were weak and many producers left the industry. Competition intensified in both domestic and international markets and competition for resources such as land, water, and labor also rose. Proliferating regulations and non-governmental requirements added many new costs.

In response to widespread concern about the future of Washington agriculture, the 2007 Legislature directed the Washington State Department of Agriculture (WSDA) to conduct an industry-guided evaluation of the strengths, weaknesses, opportunities, and threats to agriculture. The project sought input on the present conditions and future challenges of Washington agriculture from as many industry segments as possible. It was one of the most inclusive efforts ever conducted in any state. Agriculture is a geographically encompassing and product-diverse industry, so the priorities that emerged do not apply equally to all segments.

This study reports the agriculture community's recommendations to the 2009 Legislature that will keep farming strong for years to come. The plan is not the official policy or position of the WSDA, but rather represents a compilation of input from about 2000 participants. The working papers and other appendix materials represent the viewpoints and expertise of their authors. Their inclusion does not constitute approval by the WSDA or by all the project participants.

"This study reports the agriculture community's recommendations to the 2009 Legislature that will keep farming strong for years to come."

# Need for a Globally Competitive Washington Agriculture

To survive in agriculture, farmers and agribusinesses must be globally competitive. Consumers are increasingly discriminating, and retail buyers more demanding. Products must meet many new government and non-government standards. Some countries can deliver products to U.S. customers more cheaply than can Washington.

All products compete in a constantly evolving social, economic, and politically driven global market system. The future of farming in Washington will be heavily influenced by the various factors that either enhance or reduce competitiveness. These factors fall into three main categories; the burden of regulation, the availability of resources, and the vitality of support services.

## Category 3 - Protect Resources

Policymakers need to ensure that farming has access to the key resources necessary to keep it viable. Among these the most critical are: land, water, labor, and electricity and other energy sources.

### 4.1 Factor 1 - Land

The availability of productive and affordable land is essential to the continuation of agriculture:

- Support the work of the Office of Farmland Preservation (OFP)[33]
- Protect Open Space Taxation for farmland
- Encourage county efforts under GMA to maintain and enhance natural resource-based industries
- Improve enforcement and outreach consistent with the intent of Right to Farm Laws
- Increase the understanding by public officials of the long-term negative fiscal impact of farmland conversion
- Ensure that state-owned and managed working lands use agricultural Best Management Practices to protect adjacent farms and ensures environmental stewardship

### THE LAND RESOURCE

Agriculture requires large areas of land for most of its productive activities. About one third of the land area of Washington, 15 million acres, is classified as agricultural, another one third as forest land, and the remaining one third is public land owned by federal or state governments. Other participants report that up to 50 percent of Washington's total land is owned by federal, state or county governments. Most housing and other development is on former agricultural land. In recent years, more people have been moving into what was once forest land.

Agricultural land varies widely in quality. Almost half of all agricultural land is classified as rangeland or pastureland that is normally unsuited for cultivation. Of the remaining 7.7 million acres, about 1 million acres are in the Conservation Reserve Program, indicating that they are of marginal productivity. About 2.3 million acres are classified as prime cropland, but less than one million acres of these are irrigated. There are small amounts of prime farmland included under forests or public ownership, but it would be difficult to make that land available for agricultural uses. The future of farming in Washington is heavily dependent on agriculture's ability to maintain the land resource that is currently available to it.

However, that land base is under constant threat of erosion since privately-owned agricultural land is also in heavy demand for non-agri-

cultural uses such as roads, houses, industry, commerce, and schools and other public services, especially on urban fringes. That demand is tied closely to population changes. If the population of Washington increases by one third to 8 million people by 2025, as currently forecast, it would lead to a commensurate increase in non-agricultural demand for land. As land is progressively lost, the core infrastructure for farming in the region falls below its critical mass, increasing costs to the remaining farmers and encouraging future conversion to other uses.

Particularly on the urban edge and other locations attractive for retirement, industry, or recreation, the per acre production value of land for agricultural use is almost always much lower than for non-agricultural use. If no social or environmental stewardship values are taken into consideration, non-agricultural uses consistently outbid agricultural uses for available land. The value of land in agriculture is derived from the value of the farm products that can be produced on that land. Similarly, the demand for land for an intensive centralized manufacturing facility is derived from the demand for the (per acre) relatively high-value products of the facility. Thus, based solely on business feasibility, non-agricultural activities can typically afford to bid high prices for the relatively small amounts of land that each operation needs.

The American Farmland Trust (AFT) estimated that agriculture used 50 percent of Washington agricultural land (17% of total land in the state) to generate two percent of the state's gross domestic product (at the farm gate). Allowing for multiplier effects, the total economic impact of agriculture is about 13 percent of state GDP. AFT estimated that in 2006, the value of Washington land in agricultural use was less than $4 billion, compared to a total fair value in all uses of $14 billion. In every county in the state, the current use value of land in agriculture was less than the "fair value" by a substantial margin. There is a strong financial incentive for cities and counties to permit development on agricultural lands, both to gain the benefits of increased economic activity and to capture the increased property taxes (Land Stats paper[34]). Some would argue that the gain from the decision to develop agricultural lands is merely short-term due to the commensurate increases in services and infrastructure required to serve the increasingly dispersed population. Clearly, the importance of extra-market policy preferences for agricultural lands, such as open space programs, is critical for agricultural production over the long term.

Some development practices lead to the removal of land from farming. For example, a developer wishing to build on wetland in an urban or suburban area can win approval by buying farmland in an outlying area and converting (or attempting to convert) it into the equivalent area of wetland. In addition, governments at every level have used the power of eminent domain to take over farmland for various public purposes.

It can be difficult for the general public in Washington to see any immediate positive or negative impact in the conversion of land from agricultural to non-agricultural uses. Three quarters of the production of Washington farms goes to consumers in other states and countries. Over time, declines in production due to loss of land have not been apparent because increases in yield per acre have more than offset reduced acreage. Since Washington imports large amounts of food, consumers do not tend to consider if a reduction in production from Washington farmland would be reflected in a reduction in food supplies or an increase in food prices in their grocery stores. Therefore, educating voters and policy makers about the social and economic benefits of agriculture may increase the desire to take a proactive long-term vision for the future of agriculture.

On the other hand, urban dwellers may see short-term benefits from stopping the agricultural activities around them. As urban activities encroach into agricultural areas through subdivisions, individual home sites, and businesses or shopping clusters, the newcomers may become critical of, or hostile to, normal agricultural activities that create smells, noise, dust, machinery activity, use inputs, etc. There has been a tendency for urbanized societies to impose additional regulations and restrictions on normal agricultural activities. This increases costs and threatens the survival of agricultural enterprises. Over time, many agricultural operations move out of these mixed-use neighborhoods. However, once land moves out of agricultural use, its reversion to farmland becomes difficult or impossible. Decision-makers are increasingly aware that short-term development benefits do not make up for the long-term reduction of productive agricultural capacity and its inherent stewardship role.

During listening sessions FOF participants made clear their desire for public officials to realize that farmland conversion has a negative fiscal impact. Local officials frequently think in terms of the gains from bringing in new industry and business, however, they often do not factor in the costs associated with the new residential development that will be necessarily associated with that new industry. According to Don Stuart with the American Farmland Trust (AFT) there have been over 100 Cost Of Community Services (COCS) studies around the country, done by planning departments, universities, consultants, and others. All have come to the same conclusion: development of farm and forest land is an overall net loss to the fiscal well-being of

local communities. Fuller explanation is found in an AFT Fact Sheet on COCS studies and a list of the studies that have been done around the country.[35]

AFT has done COCS[36] studies locally in Skagit, San Juan, and Okanogan counties. Skagit is a perfect example. For each $1 paid in taxes by farm and forest lands in that county, those lands received back about 51 cents in services, contributing a 49 cent subsidy for the rest of the taxpayers in the county. For every $1 paid in taxes by residential properties, those properties received $1.25 in public services. This is quite typical. As farm and forest land disappears, this subsidy also disappears. Industrial and commercial uses also, typically, pay more than they receive, but unlike agriculture and forest lands, they almost always require ancillary residential growth, so their excess contributions are offset by the deficit county governments run on residential growth.

## AGRICULTURE AS LAND STEWARD

Farmers play a major role in the stewardship of the state's land. Farmers work in daily contact with streams, lakes, birds, and wildlife. Farmers have a vested interest and associated skills to maintain the productivity of the lands they operate, in a way that urban dwellers with small plots of land often do not. Pesticides used by farmers are much more heavily regulated than those used by homeowners; correspondingly the pollution caused by homeowner use of pesticides is much greater.

Farm practices affect the soil, air, water, and esthetic appearance of the countryside. They also tend to be heavily impacted by various environmental laws. While these laws were often initially prescriptive, it has become increasingly clear that current farmer efforts can be more effective when regulators, environmentalists, and farmers are better educated and willing partners in meeting the goals of laws. Although the approach is slowly changing from punitive toward collaborative and incentive based, the laws as interpreted by the courts are considered by some producers to contain little room for logic or practicality.

The changing view on the role of farmers and farming has been reflected in the decision by the Washington Legislature to set up a new state entity, the Office of Farmland Preservation[33], within the Washington State Conservation Commission. That Office is still exploring strategies for carrying out its primary mission of farmland preservation. Importantly, the office acknowledges that if the farm is not profitable it is unlikely to stay in the family or be purchased by another farmer. Their actions may include the following:

1. Create grants for local strategic agricultural planning with staff support for farm advisory committees
2. Hire a state agriculture planner
3. Provide farm transition or succession programming
4. Work toward programming for purchase of development rights & transfer of development rights--long-term farmland retention programming
5. Explore other farmland preservation tools such as: linking existing and new farm incentives or benefit programs to existing GMA agriculture zoning or to properties protected by easement, agricultural enterprise district concepts, and methods to retain water with arable land

## PRESERVING FARMLAND

A number of programs already exist at the federal, state, and local level, either to sustain farmers in farming or to maintain land in farms. The most widely available aid is provided through reduced levels of property taxes for land used in farming. The farm loses that tax concession if the land is sold for non-farm uses. In addition, the farmer must pay back-taxes for the difference between the non-agricultural and agricultural taxes.

As a local example of farmland preservation, beginning in the 1970s King County provided a pool of money that could be used to buy farmers' development rights. Farmers were paid the difference between the value of their land in farming and in development, but had to commit to maintain their land in farming. That program was limited when funds ran out. There are a number of federal, state, and local sources of funding, and some private funds, available for purchase of development rights from farmers. However, the funds available tend to be limited and intermittent. The Growth Management Act and zoning laws have limited the transfer of land from agricultural to nonagricultural uses, but zones are vulnerable to change under political pressure.

Despite these various measures, there has been a small but steady reduction of the total area of agricultural land in the state. The NASS statistics show that the number of acres in agriculture in Washington has decreased by an average of 67,860 acres per year over the last 10 years.[12] Exact data are not available on how much *prime* farmland is being lost

to non-agricultural uses. However, anecdotal evidence on where urban development has been taking place suggests that the losses of prime farmland are substantial. Given the financial strength of the non-farm sector in the state and the pressures from expected population growth, agriculture will not be able to maintain its current land resource without major intervention by state government (Land Protection Programs[37]). There is much to learn from the successes and failures of the many entities protecting land both nationally and globally. Above all, interventions to preserve land must be well thought out in order to prevent an additional maintenance burden on the state.

## 4.2 Factor 2 - Agricultural Water

Competing demands threaten to reduce farming's access to the water needed to produce, pack, process, and distribute the state's farm products:

- Conduct a state-wide assessment and prioritize projects for investment readiness; identify and apply for appropriate funding
- Change relinquishment statute to reward irrigation efficiencies and other best practices without removing water from agricultural land
- Develop watershed and other local level water resource management programs to continue water conservation, drainage, transfers, and irrigation efficiencies
- Upgrade and improve the antiquated water distribution, drainage, and irrigation infrastructure
- Continue current efforts to identify, evaluate, and develop increased water availability including storage capacity, flexibility, and reuse

### WATER: THE LIFEBLOOD OF AGRICULTURE

Water is a critical ingredient of agricultural production. According to the 2002 census, over 75 percent of Washington's harvest by value was from the 11.9 percent (1,823,155 acres) of Washington farmland that was irrigated. While all water originates from rain or snowfall, it becomes available for human uses through many different intermediaries including rivers and lakes, wells and aquifers, and dams and other artificial storage systems. In general, agriculture that must depend on the natural cycle of precipitation is limited to the crops or pasture that can flourish in those natural conditions. For example, cool season legumes in Western Washington and grain in Eastern Washington. There is nothing that the producer can do to alter the volume or timing of this precipitation. In contrast, water drawn by users from wells, aquifers, dams, or

storage catchments can be controlled in volume and timing to suit the needs of a wide variety of crops. However, that same water is also desirable for numerous non-farm uses such as individual consumption and other municipal use, power generation, industrial uses, tribal needs, environmental goals, and transportation. Analogous to what goes on with land, more economically intensive non-agricultural users of water are able to outbid agriculture for transferable water rights. The implication here, similar to that in the discussion of agricultural land above, is that in the long-term agriculture is durable only if state government intervenes in the interest of long-term agricultural production and associated competitiveness policy.

Excess water can also be a problem, especially on the wetter west side of the state. It can bring problems of flooding, property damage, erosion of riverbanks, and increased flow of sediment into rivers and the ocean. Drainage systems and other controls of excess water remain important in Western Washington.

As the economy of Washington has developed, the number of claimants for the state's water resources from all sources has continued to grow. In some cases the perception of both agricultural and non-agricultural water users is that demand may have already outstripped available supplies. While access to water is particularly contentious in the state's desert areas, the growth in demand has increased the cost of access to new sources of water throughout the state. Thus, within the current structure of state water code, it has become more difficult for new producers to acquire existing water rights and for farms to expand operations. On the other hand, division sometimes occurs within the industry because the realizable value of water rights owned by farmers is going up, increasing incentive to sell those rights. Some specialists believe that the current situation regarding supply, demand, and increasing costs for water is to some degree an "artificial creation" within the state-controlled water supply.

However, participants are fairly unified in their opinion that the first and easiest place to find and "create" new water is to encourage conservation of that which they already have through incentives and changes in relinquishment laws. Decisions on how water will be allocated have become major public policy issues for federal, state, and local governments, public utilities, and other entities with control over various aspects of water use. Powerful groups representing different interests attempt to influence public policy outcomes on water.

## WATER RIGHTS

Farms were among the earliest users of water in the state and many current water rights on farms derive from those early rights. Water ownership is governed by Western Water Law (first in time, first in right). Water rights are a property owned by the farmer or other land owner and are administered by the Washington State Department of Ecology. A key element of this water law is that failure to use all the

water available in a water right in at least one year out of five results in the permanent loss of that unused part, the "use it or lose it" principle. Farmers feel under threat that their water rights may be reduced, encroached upon, or lost under rules that have gradually been imposed upon them. Moreover, disincentives for conservation are cited by every type of FOF participant. They describe various ways that the inflexibility of current laws leads to inefficient use of water and prevents economic transfers of water both within agriculture and between agricultural and non-agricultural uses.

"The assumption is that somehow if we take water and farms away we'll just import what we need to eat."

Farmers are generally supportive of policies that would increase the total supply of water available. They have been strong supporters of retaining existing dams and irrigation systems, of enlarging those systems, and of providing additional storage facilities from which water can be drawn when needed. However, a number of environmental groups, tribal governments, and others either oppose expansion or favor reduction of the existing systems for providing water, such as by removing dams. Farmers are generally supportive of policies that would stretch the available water resources. A few examples of this are: improving the infrastructure for water delivery, increasing efficiencies in irrigation methods, increasing opportunities for the catchment of rain water, recapturing or treatment of waste water, and injecting greater flexibility into water regulations so that farm activities can be adapted to agricultural product demand, current conditions, and constraints.

## REASONED WATER MANAGEMENT IN WASHINGTON

Decisions about water use in Washington are made by multiple agencies with conflicting goals and practices. These include federal agencies such as the Army Corps of Engineers and the U.S. Fish and Wildlife Service. More importantly from the standpoint of this state FOF project, Washington entities include the Washington State Departments of Ecology and Fish and Wildlife; Public Utility Districts and private power companies; conservation districts; irrigation districts; tribal governments; counties; and municipalities. Each of these has its own goals, missions, policies, and procedures. None have a specific mandate to ensure that agriculture's water needs are protected.

Participants in the Future of Farming project believe a more rational fact-based approach to the current supply and allocation system for water in the state could solve many of the most pressing problems. Many FOF participants, from producers through specialists, want to see more WSDA and other agricultural industry expertise in venues such as the Water Resources Advisory Committee (WRAC), watershed planning, the Columbia River Implementation Team (CRIT), and other state water planning efforts.

January 29, 2015

The Honorable Sheilah Kennedy
The Honorable Ray Campbell
The Honorable Jim DeTro
Okanogan County Board of Commissioners
c/o Ms. Lalena Johns, Clerk of the Board
123 Fifth Avenue North, Suite 150
Okanogan, Washington 98840

Dear Chair Campbell and Commissioners Kennedy and DeTro:

**Subject: Comments on the Okanogan County Comprehensive Plan for the February 2, 2015 Public Hearing**
**Sent via email to: ljohns@co.okanogan.wa.us and by U.S. Mail**

Thank you for the opportunity to comment on the update of the Okanogan County Comprehensive Plan. While we appreciate and support that Okanogan County is updating its comprehensive plan, we are very concerned that the county is failing to properly designate agricultural, forest, and mineral resource lands of long-term commercial significance as required by RCW 36.70A.170(1). The comprehensive plan does not meet the minimum requirements of the County Planning Enabling Act, chapter 36.70 RCW. We urge the county to meet these minimum standards and to go beyond them to meet the expectations of county residents.

We very much appreciate that the county is holding public hearing on this version of the comprehensive plan and holding it outside of the holidays. Thank you very much.

Futurewise is working throughout Washington State to create livable communities, protect our working farmlands, forests, and waterways, and ensure a better quality of life for present and future generations. We work with communities to implement effective land use planning and policies that prevent waste and stop sprawl, provide efficient transportation choices, create affordable housing and strong local businesses, and ensure healthy natural systems. We are creating a better quality of life in Washington State together. We have members across Washington State including Okanogan County.

## Comments on Chapter 1: The Okanogan County Comprehensive Plan

### *The Vision Statement should recognize the important role of agriculture in the county economy. Please see page 5 of the 4/28/14 Review Edition*

The Washington State Employment Security Department has documented that the "[a]griculture is a very important sector for Okanogan County, which mainly consists of

various tree fruits and wheat."[1] Agriculture is Okanogan County's largest employer, providing jobs to 16 percent of county residents.[2] "In 2007, agriculture, forestry, fishing and hunting paid an annual average of $35,305 ..."[3] This was a higher annual wage than those in the construction industry, although not as high as manufacturing workers who earned an average of $37,302.[4] Many of these manufacturing workers process agricultural and forest products.

Given the central role of agriculture in the county economy and the need to protect these jobs, the Vision should include protecting the agricultural industry and its land base and the jobs and incomes those lands generate.

### *Please clarify the "Rural Resource/Low Density Lands" and the "Rural/High Density Lands." Please see page 7 of the 4/28/14 Review Edition*

The "Rural Resource/Low Density Lands" and the "Rural/High Density Lands" are not shown on the Okanogan County Comprehensive Plan map. They also reference a "Map 2," which is unclear. They also do not include criteria for these comprehensive plan designations nor do they include densities as the Planning Enabling Act requires. We recommend that these designations have designation criteria in the comprehensive plan, be mapped on the comprehensive plan map, and include the required densities.

### *Please clarify the text of the comprehensive plan designations and the comprehensive plan map. Also include comprehensive plan designations for the natural resource lands. Please see page 8 of the 4/28/14 Review Edition*

The text of the comprehensive plan includes a "Tribal Lands" designation, but the comprehensive plan map includes a mapped "Reservation" designation. It would be clearer to include the same land use designations in the text of the comprehensive plan and the comprehensive plan map.

Page 8 of the comprehensive plan text provides that there are four categories that "constitute the entirety of the lands within Okanogan County and provide the framework for implementing the goals and policies of this Plan."[5] But the comprehensive plan map includes two other designations: "Resource" and "Mineral Resource." Since the county is

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[1] Mark A. Berreth, *Okanogan County Profile* p. 1 of 5 (Washington State Employment Security Department: Updated May 2012) accessed on June 20, 2013 at: https://fortress.wa.gov/esd/employmentdata/reports-publications/regional-reports/county-profiles/okanogan-county-profile#overview and enclosed with Futurewise's June 21, 2013 letter to the Okanogan County Planning Commission.
[2] Marcy Stamper, *County to use public land base to satisfy state call for agriculture, resource lands* Methow Valley News Online (09-28-2010 | Volume: 108 | Issue: 19).
[3] T. Baba Moussa, *Okanogan County Profile* p. 5 of 6 (Washington State Employment Security Department: January 2009) enclosed with Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County.
[4] *Id.*
[5] The Okanogan County Comprehensive Plan 4/28/14 Review Edition p. 8.

required to designate agricultural, forest, and mineral resource lands of long-term commercial significance, comprehensive plan designations should be provided for all three categories with the same name in both the text of the comprehensive plan and the comprehensive plan map.[6] We discuss the designation of these areas later in this letter. Policies and measures to protect these natural resource should be included in the comprehensive plan and development regulations.

We appreciate that the table of land use designations on page 8 is now based on the current comprehensive plan, although the designations should be the same in the text of the comprehensive plan and comprehensive plan map. The table is helpful.

### *Please clarify the comprehensive plan designation of "unincorporated towns." Please see page 9 of the 4/28/14 Review Edition*

Page 9 refers to unincorporated towns and the zoning includes zones for these areas, but there are no comprehensive plan designations for them, unless they are in the cities designation. The designation of these areas should be clarified. If there is not a comprehensive plan designation for the unincorporated towns, one should be added to the comprehensive plan and comprehensive plan map. This would also be more consistent with Chapter 5, Unincorporated Towns and Neighborhood Commercial Centers Land Use.

### *Water Rights. Please see pages 11 and 12 of the 4/28/14 Review Edition*

We are concerned that the "water rights" section does not recognize that within the Methow Watershed, Water Resource Inventory Area (WRIA) 48, and Okanogan Watershed, WRIA 49, "most if not all of the available water has already been allocated."[7] Given this lack of available water and the projected water shortages, the water necessary to serve the large expanses of rural residential land the comprehensive plan provides for will come at the expense of existing water right holders. This is inconsistent with the comprehensive plan's stated objective of protecting first in time, first in right water rights. The comprehensive plan should be made internally consistent by sizing rural development to match the available water resources. This is required by RCW 36.70.330(1) which provides in relevant part that '[t]he land use element shall also provide for protection of the quality and quantity of groundwater used for public water supplies ...."

### *Protection of the quality and quantity of groundwater used for public water supplies*

The comprehensive plan does not include a chapter or section labeled as a land use element. A land use element is required by RCW 36.70.330(1). RCW 36.70.330(1) also requires in part that '[t]he land use element shall also provide for protection of the quality and quantity of

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[6] RCW 36.70A.170.

[7] State of Washington Department of Ecology Water Resources Program, *Focus on Water Availability for the Methow Watershed, WRIA 48* p. 2 (Publication Number: 11-11-052, Revised August 2012); State of Washington Department of Ecology Water Resources Program, *Focus on Water Availability for the Okanogan Watershed, WRIA 49* p. 2 (Publication Number: 11-11-053, Revised August 2012).

groundwater used for public water supplies ....” We were unable to identify any provisions providing for the protection of the quality and quantity of groundwater used for public water supplies.

RCW 58.17.110 also requires that subdivisions make appropriate provisions for potable water supplies. RCW 19.27.097 requires applicants for building permits for buildings that need potable water to provide evidence of an adequate water supply. “[A]ny applicant for a building permit who claims that the building’s water will come from surface or ground waters of the state, other than from a public water system, must prove that he has a right to take such water.”[8] The Washington State Department of Ecology has had to appeal a county subdivision approval because these requirements were not met.[9] The Silver Spur North Ranch originally proposed to create 220 individual lots, a 15-site recreational vehicle park, an equestrian center, and recreational center with swimming pools that would withdraw 18,800 gallons of water per day from permit-exempt wells.[10] “That is well in excess of 5,000 gallons of water per day, the limit allowed by common subdivisions without water rights, as confirmed by the state Supreme Court’s opinion in the ‘Campbell and Gwinn’ case.”[11] In response to Ecology’s appeal, the Silver Spur North Ranch was limited to 5,000 gallons a day from one permit-exempt well serving eleven housing units.[12] Any addition development will require “an off-site source of water ...”[13] There have been other cases where Okanogan County’s planning decisions disregarded these requirements.[14]

Protecting groundwater is important as Okanogan County residents and property owners are highly depended on ground water for drinking water supplies.[15] So we recommend that the following provisions be included in the comprehensive plan’s land use element:

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[8] Attorney General Opinion (AGO) 1992 No. 17 accessed on Jan. 28, 2015 at: http://www.atg.wa.gov/AGOOpinions/opinion.aspx?section=archive&tid=8820#.UbAQCfbn99A

[9] Department of Ecology News Release - March 26, 2010 10-054 *Water concerns prompt appeal of subdivision approval* accessed on Jan. 28, 2015 at: http://www.ecy.wa.gov/news/2010news/2010-054.html and enclosed with this letter and the paper original of this letter.

[10] *Id.*

[11] *Id.*

[12] Okanogan County Resolution 10 – 201 Approving the Development Agreement for Silver Spur North Ranch and Adopting Findings of Fact and Conclusions of Law p. *2 – 3; Development Agreement by and Between Okanogan County and Caribou LLC, for the Silver Spur North Ranch Development pp. 8 – 9 accessed on Jan. 28, 2015 at http://www.okanogancounty.org/planning/Docs%20and%20PDFs/Development%20Agreement-Silver%20Spur%20NR.pdf and cited pages enclosed with this letter and the paper original of this letter.

[13] Development Agreement by and Between Okanogan County and Caribou LLC, for the Silver Spur North Ranch Development pp. 8 – 9.

[14] Washington State Department of Ecology Letter to Okanogan County Planning Re: Eagle Canyon Estates (March 23, 2009) enclosed with this letter and the paper original of this letter.

[15] Tom Culhane, John Rapp, and Dave Nazy, *Permit-Exempt Domestic Well Use in Washington Final Draft* p. 10 & p. 16 (Water Resources Program, Washington State Department of Ecology Olympia, Washington: Nov. 25, 2014) accessed on Jan. 28, 2015 at: http://www.ecy.wa.gov/programs/wr/wrac/images/pdf/11252014-pedwu-finaldraft.pdf and enclosed in a separate email and included with the paper original of this letter.

- Any development proposing to use a permit-exempt well shall be limited to one permit-exempt well withdrawal system limited to withdrawing no more than 5,000 gallons per day.
- Applicants for building permits and subdivisions of land shall demonstrate that sufficient water is both legally and actually available to serve the proposed uses and activities including providing water necessary for fire protection.
- The sources of water for building permits and subdivisions of land shall not interfere with required minimum instream flows and senior water rights.
- The densities adopted in this comprehensive plan shall be consistent with available water supplies.
- Proposed increases in density shall only be approved if sufficient water is both legally and actually available and the sources will not interfere with required minimum instream flows and senior water rights.
- Sufficient water shall be reserved to maintain the agricultural industry in Okanogan County.

## Chapter 3: Land Use - Resource Lands

Okanogan County, along with all counties and cities in Washington State, was required to designate agricultural lands of long-term commercial significance by September 1, 1991.[16] We urge the county to fulfill these duties now, before the 24th anniversary of this deadline arrives.

This is especially important for Okanogan County, where agriculture is such an important part of the economy. Between 2007 and 2012, the market value of farm products sold by Okanogan County farmers and ranchers increased from $208 million to $287 million, a 38 percent increase.[17]

We are concerned that this chapter is inconsistent the requirements for designating natural resource lands. Those concerns and a GMA compliant method of designating natural resource lands are spelled out in the following sections.

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[16] RCW 36.70A.170.

[17] US Department of Agriculture, National Agricultural Statistics Service, *2012 Census of Agriculture County Profile Okanogan County, Washington* p. *1. Enclosed with the paper original of this letter and accessed on Jan. 29, 2015 at:
http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Washington/cp53047.pdf

***The 2012 Census of Agriculture is available and the numbers on page 15 should be updated and publicly owned land cannot replace private farms and ranches. Please see page 15***

Okanogan County has 129,232 acres in cropland and 78,819 acres in harvested crop land.[18] The county has 1,205,285 acres of land in farms.[19] In 2012, the county had 35,471 head of cattle and calves.[20] The county also had 1,527 head of sheep and lambs,[21] and 3,929 laying hens.[22]

The comprehensive plan on page 15 argues that the county has 1.2 million acres of rural and rural resource lands and this is six times the amount necessary to support the rural and resource industry. But the county currently has 1,205,285 acres of land in farms.[23] In addition, according to page 6 of the comprehensive plan, the rural resource lands are publically owned. Is it the policy of the comprehensive plan to force farmers and ranchers off their land and on to publically owned land? Apparently so since most of the orchards and best farmland in the Okanogan River Valley are designated for development for one acre lots and apartments at densities of 4.5 housing units per acre. Instead of this misguided

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[18] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 8. Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007 p. 274 (May 2014) accessed on Jan. 29, 2015 at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Washington/wav1.pdf and enclosed with the paper original of this letter.

[19] *Id.*

[20] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 11. Cattle and Calves – Inventory and Sales: 2012 and 2007 p. 294 (May 2014) accessed on Jan. 29, 2015 at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Washington/wav1.pdf and enclosed with the paper original of this letter.

[21] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 13. Sheep and Lambs – Inventory, Wool Production, and Sales: 2012 and 2007 p. 309 (May 2014) accessed on Jan. 29, 2015 at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Washington/wav1.pdf and enclosed with the paper original of this letter.

[22] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 19. Poultry – Inventory and Sales: 2012 and 2007 p. 319 (May 2014) accessed on Jan. 29, 2015 at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Washington/wav1.pdf and enclosed with the paper original of this letter.

[23] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 8. Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007 p. 274 (May 2014).

policy, the county should designate agricultural lands of long-term commercial significance as described in the following section.

### *Growth Management Act Requirements for Designating Agricultural Resource Lands of Long-Term Commercial Significance are not incorporated into the comprehensive plan on pages 15 and 16*

The Washington State Supreme Court has held that there is a three part definition of agricultural lands of long-term commercial significance. As the Supreme Court has held:

> ¶ 17 In sum, based on the plain language of the GMA and its interpretation in *Benaroya I*, we hold that agricultural land is land: (a) not already characterized by urban growth (b) that is primarily devoted to the commercial production of agricultural products enumerated in RCW 36.70A.030(2), including land in areas used or capable of being used for production based on land characteristics, *and* (c) that has long-term commercial significance for agricultural production, as indicated by soil, growing capacity, productivity, and whether it is near population areas or vulnerable to more intense uses.[24]

The county no longer has any criteria for the designation of agricultural lands of long-term commercial significance on pages 15 and 16 of the proposed comprehensive plan. There are also no criteria in the county's existing or proposed development regulations. We recommend that criteria be included in the comprehensive plan consistent with the supreme court's holding.

RCW 36.70A.050 directed the agency that is now the State of Washington Department of Commerce to adopt minimum guidelines for the classification and designation of agriculture, forest, and mineral lands. "The GMA provides that these '*minimum* guidelines' apply to all jurisdictions, but also 'shall allow for regional differences that exist in Washington state. The intent of these guidelines is to assist counties and cities in designating the classification of' ..." agriculture, forest, and mineral lands of long-term commercial significance.[25] We recommend that Okanogan County follow the approach in the minimum guidelines for designating agricultural lands of long-term commercial significance. This approach has the advantage of complying with state law, including the *Lewis County* decision.

### *The Approach Recommended in the Minimum Guidelines*

The Washington State Department of Commerce's minimum guidelines for agricultural lands recommend the following process for designating agricultural lands.

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[24] *Lewis County v. Western Washington Growth Management Hearings Bd.*, 157 Wn.2d 488, 502, 139 P.3d 1096, 1103 (2006).
[25] *Manke Lumber Co., Inc. v. Diehl*, 91 Wn. App. 793, 805, 959 P.2d 1173, 1180 (1998).

**1. Identify lands currently used or capable of being used for agricultural production. See WAC 365-190-050(3)(b).**

One source of the land areas used for the production of agricultural products is much of Okanogan County outside the Colville Indian Reservation is *Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County* "Map 2: Private Parcels by Taxable Land Use Code (Agricultural and Other), Study Area" on page 19 of the report.[26]

The Washington State Department of Natural Resources maintains a collection of aerial photographs that can be provided either in hard copies or as digital data. You can find out more at DNR's Photo and Map Services website: http://www.dnr.wa.gov/BusinessPermits/Topics/Maps/Pages/photo_and_map_products_and_services.aspx The county can also use web based applications to identify agricultural land in current use such as Google Earth at: http://www.google.com/earth/index.html

For identifying the location of cropland, the Washington State Department of Agriculture has a 2013 Crop Distribution Geodatabase that identifies those sections, generally 640 acre squares, of land that have crops growing in 2013 and characteristics of those crops. The 2013 Crop Distribution Geodatabase can be downloaded at: http://agr.wa.gov/PestFert/NatResources/AgLandUse.aspx and printouts of the web based version of the 2013 Crop Distribution Geodatabase were enclosed the Methow Valley Citizens' Council and Futurewise's Notice of Appeal Under Okanogan County Code (OCC) 14.040220A.1 and Argument in Exhibit D. For more information please contact: Perry Beale, Senior Crop Mapping Specialist Washington State Department of Agriculture, telephone (360) 902-2065 or e-mail: pbeale@agr.wa.gov

In considering the crop distribution data, it is important to note that the in 2012, cropland made up just 11 percent of the land in Okanogan County farms and ranches.[27] So cropland data cannot be exclusively used to identify the land currently in agriculture.

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[26] Julia Haggerty and Patty Gude, *Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County, Washington* p. 19 (Headwaters Economics, Bozeman, Montana: Nov. 12, 2008). Accessed most recently on June 21, 2013 at: http://headwaterseconomics.org/wphw/wp-content/uploads/HeadwatersEconomics_OkanoganLandStudy.pdf and enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County.

[27] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 8. Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2012 and 2007 p. 274 (May 2014) accessed on June 12, 2014 at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Washington/st53_2_008_008.pdf. This table is included in the *2012 Census of Agriculture Washington State and County Data Volume 1* included with the paper original of Futurewise's June 13, 2014 letter to the Okanogan County Director of Planning.

Additional sources of data on the location of land areas used for the production of agricultural products are the Okanogan County Watershed Plans. The *Level 1 Watershed Technical Assessment Final Report: Okanogan River Watershed Resource Inventory Area 49* found that:

> There are about 80,668 acres of land water-righted for irrigation in WRIA 49, according to the Ecology WRATS/GWIS database. As discussed previously, it is undocumented –and unlikely – that all water rights are fully employed. The County Assessor's parcel database designates a total of 55,321 acres for an agricultural use of some sort. The 1999 Okanogan LFA identified a total of 101,930 acres of crop land in the Okanogan Basin, of which 50 percent (about 51,000 acres) was estimated to be irrigated. This value would agree reasonably well with the County Assessor's data.[28]

WAC 365-190-050(3)(b)(ii) recommends that the United States Department of Agriculture's land capability classification system be used to determine whether land is used or capable of being used for agricultural production. This system is summarized in United States Department of Agriculture's Field Office Technical Guide on page 7 of 9 of Section 2 – Natural Resources Information "1. Soils" enclosed with Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County. The current version United States Department of Agriculture's Field Office Technical Guide and any supplemental material for Okanogan County can accessed at: http://efotg.sc.egov.usda.gov/treemenuFS.aspx (accessed most recently on June 12, 2014).

We recommend using land capability classes 1 through 7 in identifying land capable of being used for agricultural production. Many agricultural areas in Okanogan County meet this criterion. For example, enclosed with this letter is a soil map showing the irrigated agricultural area north and east of Brewster.[29] This area consists of 3,590 acres, 92 percent

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[28] ENTRIX, Inc., *Level 1 Watershed Technical Assessment Final Report: Okanogan River Watershed Resource Inventory Area 49* p. 3-19 (Okanogan Watershed Planning Unit: Sept. 2006). Accessed most recently on June 21, 2013 at: http://www.okanogancd.org/sites/default/files/programs/owp/24_Technical%20Assessment.pdf and enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County. According to the Okanogan Conservation District's Okanogan Watershed Plan webpage the "Okanogan County Commissioners approved the plan as presented in April 2010." A copy of this webpage was enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County.

[29] Okanogan County Irrigation p. 8 accessed on Dec. 18, 2014 at: http://www.okanogancounty.org/planning/Docs%20and%20PDFs/IRRIGATION_DISTRICTS.pdf and enclosed with Futurewise's December 19, 2014 letter to the Okanogan County Board of Commissioners in a separate email.

of which has an irrigated land capability classification of 7 or better and most of which has an irrigated land capability classification of 2, 3, or 4.[30]

Geographical information system data layers and soils data, including the land capability classes, can be downloaded for free from United States Department of Agriculture Natural Resource Conservation Service Web Soil Survey webpage at: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

### 2. Deduct lands already characterized by urban growth. See WAC 365-190-050(3)(a).

*Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County* "Figure 7: Structure Development Series, Study Area" identifies long-term development trends through 2008 for Okanogan County.[31] These areas can also be identified using the aerial photographs discussed above and the county's records for vested development. Consistent with the Washington Supreme Court's *Quadrant Corp.* decision,[32] we recommend that existing and vested development with a density of one dwelling unit per acre or greater and the land immediately adjacent to these areas and suitable for urban development be deducted.

### 3. Determine which of the remaining lands have long term commercial significance. See WAC 365-190-050(3)(c).

After identifying the lands that are being used and are capable of being used for agricultural production and after deducted those lands that are already characterized by urban growth, the county should determine which of the remaining lands have long-term commercial significance. The Growth Management Act, in RCW 36.70A.030(10), defines "long-term commercial significance" to include "the growing capacity, productivity, and soil composition of the land for long-term commercial production, in consideration with the land's proximity to population areas, and the possibility of more intense uses of the land." So the county is required to consider these factors. WAC 365-190-050(3)(c) includes eleven factors that relate to the statutory factors and other considerations. Each of those factors is identified below. We recommend that these factors be considered together as a whole.

> "(i) The classification of prime and unique farmland soils as mapped by the Natural Resources Conservation Service[.]" WAC 365-190-050(3)(c)(i).

Enclosed with Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County are lists of the prime and unique farmlands soils in Okanogan County.

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[30] Soil_Map Irrigated Ag Lands NE of Brewster.pdf; Map Unit Descriptions Irrigated Agricultural Lands Northeast of Brewster.pdf both enclosed with this letter and the paper original of this letter. Map unit descriptions are descriptions of the soils shown on the soils map.

[31] Julia Haggerty and Patty Gude, *Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County, Washington* p. 21 (Headwaters Economics, Bozeman, Montana: Nov. 12, 2008).

[32] *Quadrant Corp. v. State Growth Management Hearings Bd.*, 154 Wn.2d 224, 233 – 41, 110 P.3d 1132, 1137 – 41 (2005).

The soil survey divides the county in four areas, so we provided the lists for all four areas. To help the county evaluate the significance of those soils, we are also enclosed with the April 27, 2011 letter lists of the acreage in each of the soils in the county. All of these lists were downloaded from the United States Department of Agriculture Natural Resource Conservation Service. These lists can be used with the soil GIS data layers that can be downloaded at the Web Soil Survey webpage.

> "(ii) The availability of public facilities, including roads used in transporting agricultural products[.]" WAC 365-190-050(3)(c)(ii).

State Route (SR) 97, which runs through Okanogan County from the Canadian border to Chelan County and beyond is one of the major livestock transport routes in the state.[33] Hay is shipped throughout Washington State, and Okanogan County hay is shipped to Washington State destinations.[34]

The county could also use data from the cities and its own records to indentify public facilities, such as sewer lines, that would indicate that an area would likely convert to other more intense uses.

> "(iii) Tax status, including whether lands are enrolled under the current use tax assessment under chapter 84.34 RCW and whether the optional public benefit rating system is used locally, and whether there is the ability to purchase or transfer land development rights[.]" WAC 365-190-050(3)(c)(iii).

*Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County* "Map 2: Private Parcels by Taxable Land Use Code (Agricultural and Other), Study Area" on page 19 of the report identifies the land classified by Okanogan County Assessor the in the "Agriculture" land use tax code.[35] The county could use data from the County Assessor Office to identify those properties in a current use taxation

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[33] Stephanie Meenach, Eric L. Jessup, & Kenneth L. Casavant, *Transportation and Marketing Needs for the Washington State Livestock Industry* p. 12 (Washington State University, School of Economic Sciences, Strategic Freight Transportation Analysis (SFTA) Research Report #12: November 2004). Accessed most recently on June 21, 2013 at: http://www.sfta.wsu.edu/research/reports/research_paper.htm and enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County.
[34] Stephanie Meenach, Eric L. Jessup, & Kenneth L. Casavant, *Transportation Characteristics and Needs of the Washington Hay Industry: Producers and Processors* p. 10 (Washington State University, School of Economic Sciences, SFTA Research Report #11: November 2004). Accessed most recently on June 21, 2013: http://www.sfta.wsu.edu/research/reports/research_paper.htm and enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County.
[35] Julia Haggerty and Patty Gude, *Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County, Washington* p. 19 (Headwaters Economics, Bozeman, Montana: Nov. 12, 2008).

program. Okanogan County had 541,794 acres in the Farm and Agriculture Current Use Taxation Program in the 2010 tax year.[36]

> "(iv) The availability of public services[.]" WAC 365-190-050(3)(c)(iv).

The county could also use data from the cities and its own records to indentify public services that would indicate that an area would likely convert to other more intense uses. This criterion needs to distinguish between those public services that agricultural areas need, such as fire districts, sheriff services and emergency medical services, and those services that support more intense uses such as urban governmental services like sewer extensions and water systems designed to serve intense uses.[37]

> "(v) Relationship or proximity to urban growth areas[.]" WAC 365-190-050(3)(c)(v).

The county could use its data on the location of city expansion areas to identify them. They are shown on the draft "Land Use Designation" Map.

> "(vi) Predominant parcel size[.]" WAC 365-190-050(3)(c)(vi).

This criterion seeks to identify whether an area has predominate parcel sizes that can be efficiently used for agriculture over the long-term. *Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County* "Map 4: Agricultural Holdings by Size Category, Study Area" identifies the agricultural land in Okanogan County in very large ownerships, holdings 160 acres and larger.[38] This shows extensive areas of large land holdings. The county could also use data from the County Assessor Office to identify the predominate parcel sizes in those lands that may qualify as agricultural lands of long-term commercial significance, such as lots larger than 20 acres, which was formerly the proposed agricultural minimum lot size. It is important to recognize, as *Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County* does that farms and ranches are made up of multiple parcels and that small parcels may be included in agricultural areas because it is not unusual to create a small lot for a house for one of the family members that own or work on a farm or ranch. It

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[36] Washington State Department of Revenue, *Current Use Assessments: True and Fair Value Assessments in 2009 due in 2010: Current Use Detail*. Enclosed with the enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County.

[37] RCW 36.70A.030(18) defines "'[u]rban governmental services' or 'urban services' [to] include those public services and public facilities at an intensity historically and typically provided in cities, specifically including storm and sanitary sewer systems, domestic water systems, street cleaning services, fire and police protection services, public transit services, and other public utilities associated with urban areas and normally not associated with rural areas."

[38] Julia Haggerty and Patty Gude, *Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County, Washington* p. 23 (Headwaters Economics, Bozeman, Montana: Nov. 12, 2008).

is also important to recognize that some forms of agriculture, such as intensively farmed organic farms, often use small parcels. So we recommend using a predominate parcel size of ten and twenty acres and not excluding smaller parcels when mixed in with predominately larger parcels.

> "(vii) Land use settlement patterns and their compatibility with agricultural practices[.]" WAC 365-190-050(3)(c)(vii).

This criterion seeks to identify patterns of urban and rural development that may interfere with agricultural activities long term. *Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County* "Figure 7: Structure Development Series, Study Area" identifies settlement patterns, although some of the buildings show would be farm and ranch homes.[39] Aerial photographs can also be used to identify settlements.

> "(viii) Intensity of nearby land uses[.]" WAC 365-190-050(3)(c)(viii).

This criterion seeks to identify areas of intense uses that may interfere with agricultural activities long term. *Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County* "Figure 7: Structure Development Series, Study Area" shows the intensity of development over time.[40] Aerial photographs can also be used to identify these areas.

> "(ix) History of land development permits issued nearby[.]" WAC 365-190-050(3)(c)(ix).

*Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County* "Figure 7: Structure Development Series, Study Area" shows residential and commercial building permits over time, although some are for farm and ranch dwellings.[41] County building permit records can also be consulted. This criterion seeks to identify areas where permits have been issued for types and levels of development that are inconsistent with long-term agricultural uses.

> "(x) Land values under alternative uses[.]" WAC 365-190-050(3)(c)(x).

*Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County* includes information on prices for ranch land the ranch land buyers.[42] In

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[39] *Id.* at p. 21.
[40] *Id.*
[41] *Id.*
[42] *Id.* pp. 25 – 30.

1993 through 2008, "Traditional Ranchers" were the largest purchaser of ranchland.[43] County real estate data can be used to determine land values under alternatives uses. However, caution must be used in applying this criterion. The Washington State Supreme Court has noted that uses other than agriculture will always be more profitable so that this type of criterion cannot be controlling in determining whether or not land has long-term commercial significance.[44]

> "(xi) Proximity to markets[.]" WAC 365-190-050(3)(c)(xi).

Okanogan County has good access to livestock and hay markets. "Livestock are shipped to three main locations in Washington once leaving producer operations; feed lots, other farms, and slaughter facilities."[45] Livestock arrive at feedlot and producer operations from all over Washington State.[46] Producers received 39.05 percent of their livestock from within 50 miles.[47] The balance, over 60 percent, arrives from 50 miles to greater than 100 miles.[48] State Route (SR) 97, which runs through Okanogan County is one of the major livestock transport routes in the state.[49] Hay is shipped throughout Washington State, and Okanogan County hay is shipped to Washington State destinations.[50] Stockyards are located in Toppenish and Davenport.[51]

### 4. Designing agricultural land sufficient to maintain and enhance the agricultural industry. See WAC 365-190-050(5).

The Growth Management Act establishes as a goal, in RCW 36.70A.020(8), to "[m]aintain and enhance natural resource-based industries, including productive timber, agricultural, and fisheries industries." To help implement this goal, WAC 365-190-050(5) provides that "[w]hen applying the criteria in subsection (3)(c) of this section [the long-term significance criteria discussed above], the process should result in designating an amount of agricultural resource lands sufficient to maintain and enhance the economic viability of the agricultural industry in the county over the long term; and to retain supporting agricultural businesses, such as processors, farm suppliers, and equipment maintenance and repair facilities." The

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[43] *Id.* at p. 28.
[44] *City of Redmond v. Central Puget Sound Growth Management Hearings Bd.*, 136 Wn.2d 38, 52 – 53, 959 P.2d 1091, 1097 (1998).
[45] Stephanie Meenach, Eric L. Jessup, & Kenneth L. Casavant, *Transportation and Marketing Needs for the Washington State Livestock Industry* p. 6 (Washington State University, School of Economic Sciences, Strategic Freight Transportation Analysis (SFTA) Research Report #12: November 2004).
[46] *Id.*
[47] *Id.*
[48] *Id.*
[49] *Id.* at p. 12.
[50] Stephanie Meenach, Eric L. Jessup, & Kenneth L. Casavant, *Transportation Characteristics and Needs of the Washington Hay Industry: Producers and Processors* p. 10 (Washington State University, School of Economic Sciences, SFTA Research Report #11: November 2004).
[51] Julia Haggerty and Patty Gude, *Land Ownership Change and the Ranching Economy in the Okanogan Valley and Eastern Okanogan County, Washington* p. 15 (Headwaters Economics, Bozeman, Montana: Nov. 12, 2008).

*Washington Agriculture Strategic Plan 2020 and Beyond* makes the case that if we are going to maintain our agricultural industry in Washington State we need to maintain our existing land base.[52] So in designating its agricultural lands of long-term commercial significance, Okanogan County should also seek to maintain its farming and ranching land base to maintain and enhance the agricultural industry.

In 2012, Okanogan County ranchers had an inventory of 35,471 cattle and calves.[53] Each cow requires 26.46 pounds of hay to survive.[54] In 2012, Okanogan County's hay yield averaged 2.33 tons, or 4,663.6 pounds, per acre.[55] So to feed the 35,471 cattle and calves for six months, assuming they would graze elsewhere for six months,[56] would require 36,628 acres of hay growing land. However, as near we can tell the county has not designated any crop land as agricultural lands of long-term commercial significance. Nor any orchard land.

Failing to adequately designate agricultural lands of long-term commercial significance will harm the Okanogan County economy and budget. As we have documented, "[a]griculture is a very important sector for Okanogan County, which mainly consists of various tree fruits and wheat."[57] Agriculture is Okanogan County's largest employer, providing jobs to 16

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[52] Washington State Department of Agriculture, *Washington Agriculture Strategic Plan 2020 and Beyond* pp. 50 – 55 (2009). Last accessed on June 21, 2013 at: http://agr.wa.gov/FoF/ and the cited pages enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County.
[53] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 11. Cattle and Calves – Inventory and Sales: 2012 and 2007 p. 294 (May 2014) accessed on Dec. 18, 2014 at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Washington/st53_2_011_011.pdf and in the *2012 Census of Agriculture Washington State and County Data Volume 1* included with Futurewise's June 13, 2014 letter to the Okanogan County Director of Planning.
[54] David L. Scrnecchia, *The Animal-Unit and Animal-Unit-Equivalent Concepts in Range Science* 38 JOURNAL OF RANGE MANAGEMENT p. 347 (July 1985). The Journal of Range Management is peer-reviewed. Society of Range Management Publications webpage both were enclosed with Futurewise's December 19, 2014 letter to the Okanogan County Board of Commissioners in a separate email.
[55] United States Department of Agriculture, National Agricultural Statistics Service, 2012 *Census of Agriculture Washington State and County Data Volume 1 • Geographic Area Series • Part 47 AC-12-A-47* Chapter 2: County Level Data, Table 26. Field Seeds, Grass Seeds, Hay, Forage, and Silage: 2012 and 2007 p. 351 (May 2014) accessed on Dec. 18, 2014 at: http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Washington/st53_2_026_026.pdf and included in the *2012 Census of Agriculture Washington State and County Data Volume 1* included with Futurewise's June 13, 2014 letter to the Okanogan County Director of Planning.
[56] A typical session of use for the federal grazing allotments is less than six months, running from 6/1 to 9/30 with the season varying by two weeks. *Record of Decision Bannon, Aeneas, Revis, and Tunk, Livestock Grazing Analysis United Sates Department of Agriculture, Forest Service, Okanogan- Wenatchee National Forest Okanogan County, Washington* p. R-2 (Nov. 2014) accessed on Dec. 18, 2014 at: http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/87422_FSPLT3_2376222.pdf and cited pages enclosed with Futurewise's December 19, 2014 letter to the Okanogan County Board of Commissioners in a separate email.
[57] Mark A. Berreth, *Okanogan County Profile* p. 1 of 5 (Washington State Employment Security Department: Updated May 2012).

percent of county residents.[58] "In 2007, agriculture, forestry, fishing and hunting paid an annual average of $35,305 ..."[59] This economic data shows that agriculture in Okanogan County has long-term commercial significance.

The Washington State Department of Agriculture's recently completed *Washington Agriculture Strategic Plan 2020 and Beyond* documents to need to conserve agricultural lands to maintain the agricultural industry and the jobs and incomes the industry provides.[60] Given our current economic problems, not protecting such an important part of the state and Okanogan County economies is a bad idea.

Allowing the conversion of Okanogan County's farm and ranch land is also a bad idea for the Okanogan County budget. As the *Washington Agriculture Strategic Plan 2020 and Beyond* documents,

> For each $1 paid in taxes by farm and forest lands in that [Skagit] county, those lands received back about 51 cents in services, contributing a 49 cent subsidy for the rest of the taxpayers in the county. For every $1 paid in taxes by residential properties, those properties received $1.25 in public services.[61]

Converting farmland and forest land to residential development, assuming there are buyers for such land, will blow hole in the Okanogan County general fund budget. It will also harm the county's largest industry and the county residents the industry and related businesses employ.

Comparing the Okanogan County Land Use map with the Washington State Department of Agriculture's 2013 Crop Distribution map[62] shows that most of the crop land and orchards in the Okanogan Valley, the side valleys, along Columbia River, and in the Methow Valley are not designated as agricultural lands of long-term commercial significance. This shows that the county's criteria and their application are flawed. We recommend using the approach from the minimum guidelines summarized above.

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[58] Marcy Stamper, *County to use public land base to satisfy state call for agriculture, resource lands* Methow Valley News Online (09-28-2010 | Volume: 108 | Issue: 19).
[59] T. Baba Moussa, *Okanogan County Profile* p. 5 of 6 (Washington State Employment Security Department: January 2009).
[60] Washington State Department of Agriculture, *Washington Agriculture Strategic Plan 2020 and Beyond* pp. 50 – 52 (2009).
[61] *Id.* at p. 53.
[62] Enclosed with the Methow Valley Citizens' Council and Futurewise's Notice of Appeal Under OCC 14.040220A.1 and Argument in Exhibit D.

### *Failing to include standards of population density and building intensity violates RCW 36.70.330(1) for the Agriculture, Forest, and Mineral Resource Lands designations*

RCW 36.70.330(1) requires that the county's land use element must include "a statement of the standards of population density and building intensity recommended for the various areas in the jurisdiction and estimates of future population growth in the area covered by the comprehensive plan ...." There are no density standards for the "Agriculture" provisions on pages 15 and 16. We recommend that the comprehensive plan include a 40 acre minimum lot size to protect the agricultural land.

It is the same for the Forestry designation on pages 16 and 17. Parcels smaller than 40 acres have much lower timber harvest rates and are more likely to be converted to residential land uses.[63] Parcels smaller than 50 acres have higher than average costs for preparing timber sales, harvesting trees, and reforesting the site.[64] So we recommend that the maximum density for forest land be one dwelling unit per 50 acres.

The Mineral Lands provisions on page 17 and 18 have the same defect. To protect these important resource lands we recommend a 20 acre minimum lot size.

### *Growth Management Act Requirements for Designating Forest Lands of Long-Term Commercial Significance*

There are three required criteria for designating forest land of long-term commercial significance:

1. The land is "not already characterized by urban growth ...."[65]
2. "The land is primarily devoted to growing trees for long-term commercial timber production on land that can be economically and practically managed for such

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[63] Eric J. Gustafson & Craig Loehle, *Effects of Parcelization and Land Divestiture on Forest Sustainability in Simulated Forest Landscapes*, 236 FOREST ECOLOGY and MANAGEMENT 305, 313 (2006). Accessed most recently on June 21, 2013 at: http://nrs.fs.fed.us/pubs/jrnl/2006/nrs_2006_gustafson_001.pdf and enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County. Forest Ecology and Management is a refereed scientific journal, see the Forest Ecology and Management webpage enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County and available at: http://www.elsevier.com/journals/forest-ecology-and-management/0378-1127/guide-for-authors

[64] R. Neil Sampson, *Implication for Forest Production in Responses to "America's Family Forest Owners"* 102 JOURNAL OF FORESTRY 4, 12 (October/November 2004). Enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County. The Journal of Forestry is a peer reviewed scientific journal. See the Journal of Forestry Guide for Authors webpage available at: http://www.safnet.org/publications/jof/guideforauthors.cfm and enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County.

[65] RCW 36.70A.170(1)(b).

production, including Christmas trees subject to the excise tax imposed under RCW 84.33.100 through 84.33.140 ...."[66]

3. "[A]nd that has long-term commercial significance."[67]

Like Agriculture, the Forestry provisions, on pages 16 and 17, do not have designation criteria that comply with these requirements. The land use map also fails to designate important forest lands.[68] We have previously provided the county with the paper *The Nineteenth Annual Two-Day Conference on Washington's Growth Management Act: Goals 8 & 9: Natural Resource Lands and Recreation and Open Space: How We Are Doing, State of the Law, and Helpful Improvements*. This paper provides more detail on designating forest land of long-term commercial significance.

A recent report by the College of Forest Resources of the University of Washington documents the need to protect "anchor forests" and the private forest land near them to maintain the state's forest products industry, including the high paying jobs the industry supports.[69] The University of Washington study identifies many parcels in Okanogan County as at risk of conversion.[70] This puts forest products jobs at significant risk.[71] Properly designating and protecting these lands will protect the land base and the jobs.

## Chapter 4: Land Use - Rural Lands

RCW 36.70.330(1) requires that "[t]he land use element shall also provide for protection of the quality and quantity of groundwater used for public water supplies ...." But there are no policies or other provisions to protect groundwater.[72]

In addition, policies in the rural element will pollute groundwater. The only density is for the Rural Resource/Low Density which claims a "base density of one unit per five acres."[73]

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[66] RCW 36.70A.030(8); *Manke Lumber Co., Inc. v. Diehl*, 91 Wn. App. 793, 805, 959 P.2d 1173, 1179 – 80 (1998).
[67] *Id.*
[68] *Detail Maps of High Conversion Risk, High Value Private Forestland Near Anchor Forests in Washington – North Central and Northeast*. These maps were accessed most recently on June 21, 2013 at: http://www.ruraltech.org/projects/wrl/sfr/maps/index.asp and enclosed with Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County attached to the *Retention of High - Valued Forest Lands at Risk of Conversion to Non - Forest Uses in Washington State* Final Report.
[69] College of Forest Resources, University of Washington, *Retention of High - Valued Forest Lands at Risk of Conversion to Non - Forest Uses in Washington State* Final Report pp. 14 – 15 (Prepared for the Washington State Legislature and Washington Department of Natural Resources: March 25, 2009). Accessed most recently on June 21, 2013 at: http://www.ruraltech.org/projects/wrl/sfr/pdf/RetentionReport.pdf and enclosed with the paper original of Futurewise's April 27, 2011 letter to the Board of Commissioners for Okanogan County.
[70] *Id.* at pp. 8 – 14 & *Detail Maps of High Conversion Risk, High Value Private Forestland Near Anchor Forests in Washington – North Central and Northeast.*
[71] *Id.* at pp. 18 –19.
[72] Comprehensive Plan 4/28/14 Review Edition p. 1 – 36.
[73] *Id.* at p. 21.

And but most of the rural zones allow multi-family housing at densities of 4.5 dwelling units per acre outside of the Methow Valley.[74] Marylynn Yates, in a peer reviewed scientific journal, analyzed data and cases of ground water pollution from septic tanks. She concluded that septic tanks are major contributors of waste water, septic tanks are the most frequently reported cause of ground water contamination, and the most important factor influencing ground water contamination from septic tanks is the density of the systems.[75] Lot sizes associated with ground water contamination cases ranged from less than a quarter acre to three acres.[76] More recent studies support these conclusions. For example, an "observational study identified septic system density as a risk factor for sporadic cases of viral and bacterial diarrhea in central Wisconsin children."[77] The greater the density of septic tanks the greater the likelihood of diarrheal disease.[78] And the highest septic tank densities were one septic tank per 11 acres.[79] A study of the potential for nitrate pollution of ground water in Cedar Valley, Iron County, Utah lead to a recommendation that the minimum lot size for septic systems should be five areas in one part of the valley and 15 acres in three other parts.[80] So lots allowed by the Rural Chapter will likely pollute the groundwater drinking water sources.

Adverse impacts will also occur because the proposed densities are not matched to the available ground water resources. This is particularly important because a significant

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[74] Methow Valley Citizens' Council and Futurewise's Notice of Appeal Under OCC 14.040220A.1 and Argument in Exhibit E pp. 1 – 2.

[75] Marylynn V. Yates, *Septic Tank Density and Ground-Water Contamination* 23 GROUND WATER 586, p. 590 (1985). Accessed most recently on June 12, 2014 at: http://info.ngwa.org/gwol/pdf/852537546.PDF and enclosed in the Methow Valley Citizens' Council and Futurewise's Notice of Appeal Under OCC 14.040220A.1 and Argument in Exhibit C. Ground Water is a peer reviewed scientific journal. See the Ground Water Peer Review enclosed in the Methow Valley Citizens' Council and Futurewise's Notice of Appeal Under OCC 14.040220A.1 and Argument in Exhibit C.

[76] Marylynn V. Yates, *Septic Tank Density and Ground-Water Contamination* 23 GROUND WATER 586, p. 590 (1985).

[77] Mark A. Borchardt, Po-Huang Chyou, Edna O. DeVries, and Edward A. Belongia, *Septic System Density and Infectious Diarrhea in a Defined Population of Children* 111 ENVIRONMENTAL HEALTH PERSPECTIVES 742, p. 745 (2003). Accessed most recently on June 12, 2014 at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1241485/pdf/ehp0111-000742.pdf and enclosed with Futurewise's June 21, 2013 letter to the Okanogan County Planning Commission. Environmental Health Perspectives is a peer reviewed scientific journal. See the Environmental Health Perspectives Journal Information accessed on March 31, 2011 at: http://ehp.niehs.nih.gov/journal-information/ and enclosed with Futurewise's June 21, 2013 letter to the Okanogan County Planning Commission.

[78] Mark A. Borchardt, Po-Huang Chyou, Edna O. DeVries, and Edward A. Belongia, *Septic System Density and Infectious Diarrhea in a Defined Population of Children* 111 ENVIRONMENTAL HEALTH PERSPECTIVES 742, pp. 745 – 47 (2003).

[79] *Id.* at 747.

[80] Mike Lowe, Janae Wallace, and Walid Sabbah, and Jason L. Kneedy, *Science-Based Land-Use Planning Tools to Help Protect Ground-Water Quality, Cedar Valley, Iron County, Utah Special Study 134* pp. 27 – 28 (Utah Geological Survey, a Division of Utah Department of Natural Resources: 2010). Most recently accessed on June 21, 2013 at: http://geology.utah.gov/online/ss/ss-134/ss-134text.pdf and enclosed with the paper original of this letter.

number of Okanogan County's subbasins and streams are already overappropriated.[81] The Washington State Department of Ecology has also concluded that "most if not all of the available water has already been allocated" in Water Resource Inventory Areas (WRIAs) 48 and 49, the Methow and Okanogan River Watersheds.[82]

The proposed comprehensive plan's decision not to designate and protect private agricultural lands could increase demand for water as the agricultural lands are converted to residential use.[83] This would make these water shortages even worse. The land use element, including Chapter 4, must be revised to protect the quality and quantity of groundwater as RCW 36.70.330(1) requires.

RCW 36.70.330(1) requires that the county's land use element must include "a statement of the standards of population density and building intensity recommended for the various areas in the jurisdiction and estimates of future population growth in the area covered by the comprehensive plan ...." The Rural Chapter does not include any population densities and building intensities except for the Rural Resource/Low Density designation which omitted the apartment density. Again, this violates state law.

## Chapter 8: Circulation Element. Please see pages 29 – 31 of the 4/28/14 Review Edition

The circulation element is a required comprehensive plan element and important to maintain the county's economy.[84] We appreciate that the Okanogan County has prepared a transportation element, however it fails to meet the requirements for a circulation element because it does not include the general location, alignment and extent of major terminal facilities as RCW 36.70.330(2) requires. The circulation element does not seem to be "correlated with the land use element of the comprehensive plan" and the over 10 million apartments it allows.[85] We recommend that an element complying with RCW 36.70.330(2) be included with the comprehensive plan.

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[81] ENTRIX, Inc., *Level 1 Watershed Technical Assessment Final Report: Okanogan River Watershed Resource Inventory Area 49* p. ES-3 (Okanogan Watershed Planning Unit: Sept. 2006).
[82] State of Washington Department of Ecology Water Resources Program, *Focus on Water Availability for the Methow Watershed, WRIA 48* p. 2 (Publication Number: 11-11-052, Revised August 2012); State of Washington Department of Ecology Water Resources Program, *Focus on Water Availability for the Okanogan Watershed, WRIA 49* p. 2 (Publication Number: 11-11-053, Revised August 2012)
[83] ENTRIX, Inc., *Level 1 Watershed Technical Assessment Final Report: Okanogan River Watershed Resource Inventory Area 49* p. ES-3 (Okanogan Watershed Planning Unit: Sept. 2006).
[84] RCW 36.70.330(2).
[85] Methow Valley Citizens' Council and Futurewise's Notice of Appeal Under OCC 14.040220A.1 and Argument in Exhibit E p. 1.

## Chapter 9: Essential Public Facilities. Please see page 32 of the 4/28/14 Review Edition

RCW 36.70.547 provides in relevant part that "[e]very county, city, and town in which there is located a general aviation airport that is operated for the benefit of the general public, whether publicly owned or privately owned public use, shall, through its comprehensive plan and development regulations, discourage the siting of incompatible uses adjacent to such general aviation airport." Chapter 9 on page 32 states that "[t]he Comprehensive Plan creates policy designed to guide zoning and other development regulation to protect airports from incompatible land uses both on-site and on adjacent lands as encouraged by the Revised Code of Washington and required federal regulation." However, the comprehensive plan, other than on pages 10 and 32, contains no mention of airports. Pages 10 and 32 do not discourage the siting of incompatible uses as RCW 36.70.547 requires.

Further, the Okanogan County Comprehensive Plan map designates the Winthrop / Methow Valley State Airport and Anderson Field as rural and which allows residential uses.[86] Residential uses are not compatible with certain areas near airports.[87] We recommend the county consult *Airports and Compatible Land Use: Volume One An Introduction and Overview for Decision-Makers* and include policies and comprehensive plan designations for the airports in Okanogan County that are consistent with those recommendations.

## Chapter 11. SMP AND CAO

The recent Oso tragedy has drawn attend to the risk to lives and property of natural hazards.[88] Areas within Okanogan County are at significant risk for damage from natural hazards including landslides.[89] The *Okanogan County, Washington All Hazards Mitigation Plan* recommends that:

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[86] Washington State Department of Transportation Aviation Division, *Washington State Airport Reference Guide* p. 14 & p. 134 (Sept. 2007) accessed on June 20, 2013 at: http://www.wsdot.wa.gov/NR/rdonlyres/8AC7D85B-F2EE-4751-9621-5979708F553B/0/AirportReferenceGuide.pdf The Washington State Airport Reference Guide pages for each airport in Okanogan County are enclosed with Futurewise's June 21, 2013 letter to the Okanogan County Planning Commission.

[87] Washington State Department of Transportation Aviation Division, *Airports and Compatible Land Use: Volume One An Introduction and Overview for Decision-Makers* pp. 40 – 41 (Revised February 1999) accessed on June 20, 2013 at: http://www.wsdot.wa.gov/NR/rdonlyres/5983B7EF-5061-48FF-8829-1359F783CD10/0/AirportsLandUse.pdf and enclosed with Futurewise's June 21, 2013 letter to the Okanogan County Planning Commission.

[88] Washington State Department of Natural Resources, Significant Deep-Seated Landslides in Washington State p. *1 (5/7/2014) accessed on June 13, 2014 at: http://www.dnr.wa.gov/Publications/ger_list_large_landslides.pdf and included with the paper original of Futurewise's June 13, 2014 letter to the Okanogan County Director of Planning.

[89] Okanogan County All Hazards Mitigation Plan Committee, *Okanogan County, Washington All Hazards Mitigation Plan* Volume I pp. 145 – 158 (Jan. 30, 2009). Accessed on June 12, 2014 at: http://okanogandem.org/documents/AHMP/Okanogan%20County%20AHMP.pdf and enclosed with Futurewise's June 12, 2014 letter to the Planning Director.

> Land-use planning is one of the most effective and economical ways to reduce landslide losses by avoiding the hazard and minimizing the risk. This is accomplished by removing or converting existing development or discouraging or regulating new development in unstable areas. Buildings should be located away from known landslides, debris flows, steep slopes, streams and rivers, intermittent-stream channels, and the mouths of mountain channels. In the State of Washington, restrictions on land use generally are imposed and enforced by local governments by land-use zoning districts and regulations.[90]

However, the comprehensive plan and interim zoning fails to require or encourage development to avoid landslide hazards, allowing apartment buildings with densities of 4.5 apartments per acre throughout much of unincorporated Okanogan County.[91] This chapter should include policies implementing the *Okanogan County, Washington All Hazards Mitigation Plan*.

Thank you for considering our comments. If you require additional information please contact me at telephone 206-343-0681 and email tim@futurewise.org

Sincerely,

Tim Trohimovich, AICP
Director of Planning & Law

Cc: Mr. Perry Huston, Director of Planning via email: phuston@co.okanogan.wa.us
Mr. Sandy Mackie via email: amackie@perkinscoie.com; krentz@perkinscoie.com

Enclosures

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[90] *Id.* at p. 160.
[91] Okanogan County Interim-Zone Map Map 4; OCC 17.06A.060A; OCC 17.21.010 District use chart p. 3; OCC 17.06A.070B; OCC 17.06B.070B; and OCC 17.06C.070B.