



SPOTTED KNAPWEED POPULATION

Last summer Mr. Al Oughtamoney, with plans to build a home, hired the ACE road building company to build a road to his property. The road crosses **one mile** of gently sloping native grassland in Natrona County, Wyoming. By the time ACE bulldozed the roadbed, Al ran out of money and has been unable to finish the road or build the house. The road was closed and abandoned. Use the following information to answer the questions about the spread of spotted knapweed.

1. Seed production: Knapweed plants produce an average of 1,000 seeds per plant.
2. Seed germination rate: 4 percent of the seeds in the seedbank germinate (sprout) each year, leaving 96 percent for next year's seedbank.
3. Seedling survival: 25 percent of the seedlings that germinate each year survive to become mature plants. (One percent of the seeds in the seedbank germinate and survive each year.)
4. Knapweed plants on this site live five years.
5. Knapweed seeds remain viable in the soil for eight years.
6. Conditions on this site allow knapweed to germinate, form a rosette, bolt, and produce seed in one year.
7. This site will support three mature knapweed plants per square foot.
8. There are 43,560 square feet in 1 acre.
9. There are 5,280 feet in 1 mile.

Assignment: Although the road builders were very careful not to carry in any knapweed seeds, soon after they quit the project, Cody, a 7th grader at the local school, rode his mountain bike past the locked gate and up the new road to see where it went. On the way he took a short cut through a field, and many knapweed seedheads got caught on his bicycle. As Cody bounced up the road, 100 knapweed seeds fell from his bike to the freshly disturbed roadbed.

Use the above information to **calculate** and **graph**:

1. The number of plants at the beginning of each year for five years from the year after Cody rode his bike up the road.
2. The number of seeds in the seedbank at the end of each year for five years, from the year after Cody rode his bike up the road.
3. If the roadway is 40 feet wide, how many knapweed plants will grow there and about how long will it take before the entire new road is covered with mature knapweed plants?

Extra: If this rate of spread continues, how many acres will be covered with knapweed after 10 years?

KNAPWEED POPULATION EXPLOSION
ANSWER SHEET

1 and 2..

1st year: One plant survives from the seeds Cody dropped. 96 seeds carry over and add to the 1,000 from the one plant.

2nd year: 11 plants survive from seed bank. Add to first year for 12 plants. These produce 12,000 new seeds plus 96 percent of last year's seedbank for 13,052 seeds.

Continue for at least 5 years taking 1 percent of the previous year's seedbank and adding to the previous year's plants for the new number of plants. Multiply plant times 1,000 and add to 96 percent of the previous year's seedbank for the new seedbank. Don't forget that plants only live five years! You must subtract year 1 from year 6, year 2 from year 7, etc. Also, seeds are viable for only 8 years so you must subtract 100 from year 8' s seedbank, year 1' s seedbank from year 9' s, etc.

Here are the numbers over 10 years. The questions require graphs for only five years.

Year	Plants	Seeds
0	0	100
1	1	1,096
2	12	13,052
3	143	155,530
4	1698	1,847,309
5	20,171	21,944,417
6	239,614	260,680,640
7	2,846,408	3,096,661,414
8	33,812,879	36,785,673,858
9	401,667,920	436,982,165,807
10	4,771,469,407	5,190,972,273,123

Answer Sheet (continued)

3. 5,280 feet/mile x 40 feet wide = 211,200 feet²

211,200 feet² x 3 plants/ft² = 633,600 plants. After the sixth year.

Extra: 4,771,469,407 plants after 10 yrs. / 3 plants per ft.² = 1,590,489,802 ft.²

1,590,489,802 ft.² / 43,560 ft.² per acre = **36,513 acres after 10 years !**
(640 acres in a square mile, so that's **57 miles² !!!!!**) How big is 57 miles²? It is about twice as big as the City of Casper!!!!

Food for Thought?

How many acres of native plants would this ten year knapweed infestation displace?

(36,513 acres – 211,200 ft² (or ~ 5 acres for the roadway) = 36,508 acres of native plants)

What animal species might rely (directly or indirectly) on those native plant species?

(elk, deer, antelope, rodents, rabbits, mice, badgers, coyotes, birds, snakes, insects, etc.)

How would it affect those animal species?

(no food for the herbivores, i.e. no food for the carnivores....animals would “move out”....is adjacent habitat “full”?....what would happen to displaced animals?)

How can we help prevent this “biological wildfire” from occurring?

(education, prevention, control of existing infestations, etc.)

HELP KEEP WYOMING NATIVE !!!