



Wild Kids

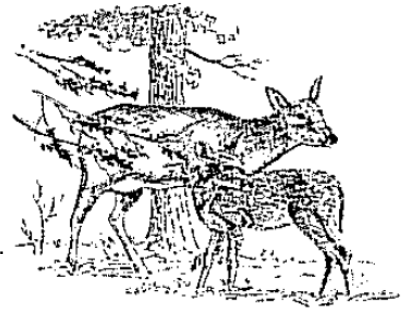
What Happened to the Deer?

STUDENT GUIDE

It is the early 1900s, and you are a scientist. You have just learned that a conservation plan has been implemented to protect some 4,000 deer that live on the Kaibab Plateau, in northern Arizona. One part of the protection plan includes removal of predators from the area by unlimited trapping and hunting. You have made the following observations: Within a few years, the deer population increased to nearly 100,000 animals, and then within another few years, the population decreased to a very small number. As a scientist, how would you explain the tremendous increase in the number of deer, followed by the sharp decrease?

HABITAT - HAVE TO HAVE IT!

What determines the number of animals that can live in an area? The answer is habitat. Habitat provides all the things animals need - food, water, shelter, and space. The amount, and condition, of the habitat on the Kaibab Plateau was a determining factor in how many deer could live there. The events on the Kaibab Plateau (a true story) demonstrate that a given habitat can support only a certain number of animals.



CARRYING CAPACITY - HOW MANY IS TOO MANY?

The number of animals a habitat can support is called the carrying capacity. In the case of the Kaibab Plateau, the carrying capacity for deer appears to be over 4,000 animals but below 100,000. How do we know this? When the population grew to 100,000 deer, a population crash occurred. Why? The crash occurred because there were more deer than the habitat could support. As the deer population grew, they ate all the available food, and many deer died of starvation and disease. In other words, the number of deer exceeded the carrying capacity of the habitat. In this case, food was a key limiting factor of the carrying capacity for deer.

Carrying capacity is in a constant state of change. In winter, when less food is available for deer on the Kaibab Plateau, the carrying capacity decreases.

LIMITING FACTORS - LIMITING GROWTH

Habitat provides the basic needs for wildlife, but it can also limit the number of animals that live in an area. Anything that brings a population down in numbers is called a limiting factor. Human activities such as agriculture, logging, development and pollution can be limiting factors. They might also include natural events like floods, droughts, fires and disease. (A drought in 1924, followed by a hard winter, contributed to the death of many deer on the Kaibab.) Predators can also be a limiting factor.

PREDATOR AND PREY - A CLOSE RELATIONSHIP

On the Kaibab Plateau, in the early 1900s, it was believed that removal of predators would permanently increase the number of deer. Records show that from about 1905 to 1931, a total of 781 mountain lions, 30 wolves, 4,849 coyotes, and 554 bobcats were killed, along with an unknown number of bald eagles. When predators were controlled, deer numbers did increase, but only for a short period of time. As the number of deer increased beyond the carrying capacity, they put too much stress on the habitat and began dying off.

Over time, predators help limit the growth of deer populations, preventing them from reaching maximum potential. By keeping prey population numbers down, predators help curb habitat degradation and the starvation that results from overpopulation.

WHAT DO YOU THINK?

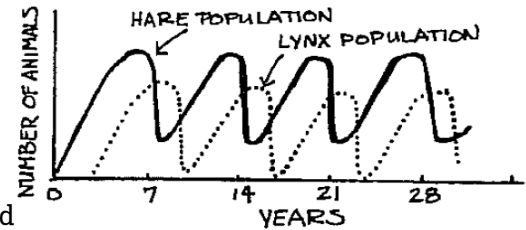
Read each of the statements below. Explain what the statement means to you using examples from the Kaibab deer.

1. Living things tend to reproduce in numbers greater than their habitat can support.
2. A population tends to increase in size until limited by one or more factors.
3. Carrying capacity may vary from season to season and from year to year.
4. Carrying capacity affects and is affected by wildlife behavior.
5. When considering predation, it is important to note that the most intense competition is between members of the same species (between deer and deer), rather than members of different species (between mountain lions and deer).

THE LINK BETWEEN LYNX AND HARES

Read the following paragraph, then use the graph to answer the questions.

The Hudson Bay trappers have records of a hundred years or more of trapping activities in North America. The data collected refers to pelts (hides) of lynx and snowshoe hares shipped from North America to Europe. Researchers have found that snowshoe hare populations peak about every seven to nine years and then crash. It has also been discovered that lynx populations do the same thing - except they do it one year behind the hare population.



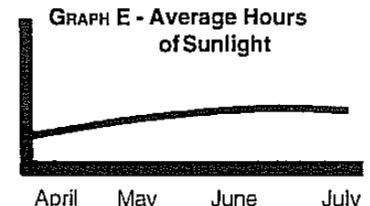
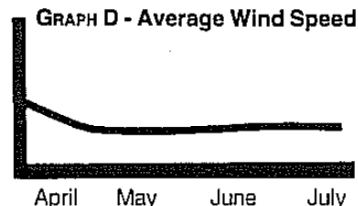
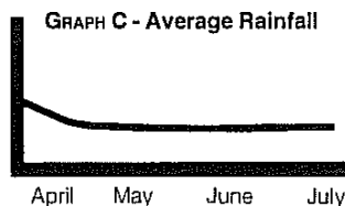
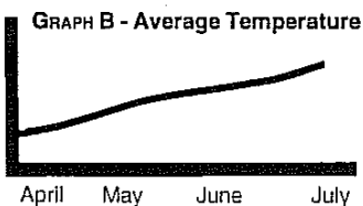
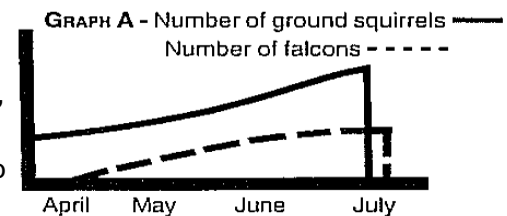
1. Which species is the predator? Which is the prey?
2. Explain why you think the lynx population peaks after the snowshoe hare population.
3. Do you think it is normal for predator and prey populations to fluctuate? Why?
4. What are the limiting factors for the snowshoe hare and the lynx?

THE FALCON AND THE GROUND SQUIRREL

Read the following paragraph, then use the graphs to answer the questions.

Each year in late spring, a large number of prairie falcons nest in the Birds of Prey Natural Area in southwestern Idaho. The birds nest along the cliff above the Snake River, and prey upon a huge population of Townsend ground squirrels that live on the flat land above the canyon. Each year, the populations of the falcons and the ground squirrels change from April through July.

1. Use graph A to answer the following questions:
 - a) What do you notice about the ground squirrel population in April, May, and June?
 - b) What happens to the ground squirrel population in July? What do you think caused this?
 - c) What do you notice about the prairie falcon population in April and May?
 - d) What do you notice happening to the falcon population in July? What do you think may have caused this?
 - e) How do you think these populations are related? State a hypothesis and develop some questions that might help you solve this dilemma.
2. Use the information on graphs B, C, D, and E, to test your ideas and hypotheses.





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TEACHING GUIDE

Overview

In this activity, students will read about a famous population case study that is based in Arizona. Then, they will relate that study to other examples to get a more complete picture of carrying capacity and limiting factors.

Suggested Procedures

1. Print the worksheet above. If possible, print it double sided.
2. Have the students read the first page of the article.
3. Ask the following questions to assess understanding:
 - What is carrying capacity? Is it constant? Why or why not?
 - What are limiting factors? Provide some examples.
4. Have students complete the activity under "What Do You Think?" Discuss their answers as a class.
5. Have students complete the activity "The Link Between Lynx and Hares." Discuss their answers as a class.
6. Have students complete the activity "The Falcon and the Ground Squirrel." Discuss their answers as a class.
6. Ask students to reflect on the following questions:
 - In your opinion, what is the greatest limiting factor to a population's carrying capacity? Use examples from the assignment to support your answer.
 - What role does hunting play in the management of wildlife populations?
 - What responsibility do humans have to make sure that wildlife populations do not exceed their carrying capacity?

Grade

High school

AZ Science Standards

- HS+B.L2U1.1
- HS+B.L4U1.2

Science and Engineering Practices

- Develop and use models
- Engage in argument from evidence

Crosscutting Concepts

- Patterns
- Stability and Change

(The story of "What Happened to the Deer?" on the Kaibab Plateau, is an extension of the Project WILD activity "Carrying Capacity." "The Link Between Lynx and Hares" is an extension of the Project WILD activity "Oh, Deer!" "The Falcon & The Ground Squirrel" activity is adapted from the Project WILD activity "Birds of Prey.")