Oh Deer!
How does our world affect us?

Summary: This lesson is designed to introduce students to the basic needs of survival and how changes in an ecosystem can affect animal life.
Duration: 1 class period
Setting: Outside
Vocabulary: limiting factors, habitat, drought, fire, deforestation, uncontrolled hunting, population
Standards/Benchmarks Addressed: SC1-E1, SC1-E2, SC2-E1, SC3-E1, SC4-E1, SC4-E2, SC4-E5, SC6-E1, SC6-E2, SC6-E3, SC6-E4, SC6-E5, SC6-E6, SC6-E7, SC11-E2, SC11-E3, SC11-E4, SC11-E5, SC11-E6, SC11-E7, SC11-E8, SC14-E1, SC15-E2, SC16-E1, SC16-E2, SC16-E3

Objectives
Students will:
- identify and describe food, water, and shelter as the three essential components of habitat.
- define limiting factors and give examples.
- recognize that fluctuations in wildlife populations are natural as ecosystems constantly change.
- create a line graph depicting the population cycles as the Oh Deer game is played.

Background
There are many factors that influence the number of plants and animals in a habitat. Climate is an extremely important variable that influences both the diversity of species and the number of plants and animals an area can support. Another important variable is limiting factors. Limiting factors are resources, such as food, water, shelter, and nesting sites, that are in short supply and restrict the population sizes of living organisms. These factors serve to balance the number of plants and animals that can survive in an area at one time.

Other limiting factors like disease, predation, and competition for resources can also impact populations. If any of the limiting factors change the plant and animal populations change as well. Some changes may cause the population to increase while others may cause the population to decrease.

For example, if there are more plants than usual in an area, populations of animals that eat that plant may increase. If one animal's population increases, the population of animals that eat that animal might also increase. Increases in population are not always good. A population could grow too large for the environment to support. Other changes in limiting factors can cause a population to decrease. If a population becomes diseased, the population may decrease and the population of animals that eat the diseased animal will also decrease. In nature, populations usually balance themselves.

Predator and prey relationships also play an important role in animal populations. If the balance between predator and prey is changed, populations are changed. The deer population in some areas has grown too large because there are very few natural predators. Mountain lions and wolves are the natural predators of deer. Wolf and mountain lion populations have decreased due to over-hunting and habitat loss. This loss of a natural predator for the deer, along with other factors, has led to overpopulation of deer in some areas.

Materials

None

Prep

Have two parallel lines on the playground or classroom floor 10 to 20 yards apart.

Procedure

Warm up: Ask the students what living organisms need in order to survive. List their ideas and discuss the basic needs: food, water, shelter, and space. What kinds of things limit the population growth of animals? List ideas and discuss these limiting factors: drought, fires, deforestation, and uncontrolled hunting. Now we are going to play a game to see how these needs and limiting factors affect the wildlife in the environment

Student Handout:
Oh Deer, Here Come the Wolves

Imagine you are a wildlife manager working to restore the population of an endangered species of deer. Currently, the herd is small and your task is to find the best habitat and situation for the population to grow and develop into a healthy herd. Which of the following scenarios do you think would provide the best situation for your herd of deer?

Scenario 1: The herd is currently living in a 100 square mile range in the Bitterroot Mountains of Montana which has been continually inhabited by this species for centuries. Human settlers eradicated wolves (one of the deer's principle predators) over 100 years ago although other habitat changes caused by human development have continued to keep the deer's populations low. Now, the habitat is improving and the deer population is growing slowly but steadily. However, some wildlife managers are planning to reintroduce wolves to your region. They plan to bring in several families of wolves into the area. The deer population is just beginning to rebound and you are concerned about the effects of the wolf introduction on the continued growth of the herd.

Scenario 2: You have the opportunity to move the deer herd and reintroduce it to a new, more favorable habitat. The new area is a deserted island in the arctic region. There is a lot of food (no animal has filled the deer's niche for many many years) and there are no natural predators. The island has 41 square miles of good habitat for the population.

Prediction: Which of these scenarios would produce the fastest growth of the deep population? Which would potentially provide the healthiest long-term situation for the deer?

Graphing: Graph the following data showing the changes in deer population over time for each of the two regions described above. You will make 2 line graphs.

Data Set A:

Year	Deer Population
1975	2000
1976	2100
1977	2060
1978	2010
1979	1980
1980	2000
1981	1840
1982	1710
1983	1590
1984	1440
1985	1400
1986	1290
1987	1300
1988	1260
1989	1310
1990	1360
1991	1290
1992	1330

Data Set B:

Year	Deer Population
1910	25
1915	78
1920	180
1925	100
1930	500
1935	800
1940	2000
1945	700
1950	8
1955	25

Step 2: Describe and hypothesize.

1. What do you see happening to the two deer populations over time?

2. What similarities do you see in the two graphs? What differences?

3. Why do you think the population changes that you see have occurred?

4. At some point, wolves were reintroduced, write a hypothesis explaining when you think this happened (which graph and what year) and why you think it happened at that point.

Before moving to the analysis portion of this activity, obtain the information that shows when and where the wolves were reintroduced from your teacher.

Step 3: Analyze
Answer the following questions:

1. Look at graph B. If there were no predators, why couldn't the deer population continue to increase indefinitely?

2. Limiting resources are factors that limit the growth of a population. What are some limiting resources that might control the population of deer?

3. Carrying capacity is the maximum number of individuals an environment can support for an extended period of time. Explain what happened in each of the graphs in terms of carrying capacity.

4. What shape do you think the local ecosystem of graph B was in when the deer population crashed?

5. Did the wolves have the effect that you expected?

6. Do you think the carrying capacity of a region can change?

7. Did the wolves have an effect on the region's carrying capacity?

8. Is reintroducing a native predator species harmful to the local ecosystem?

9. According to wildlife biologist Daniel Pletscher, after wolves were reintroduced, they may have depleted the deer population from between 3% and 12% each year. Why do you think this rate may have varied?

Show world Population
Curves.

Discuss humans hitting
limiting factor and its
Community.