Carrying Capacity and Limiting Factors

What Factors Limit Population Growth?

When the living conditions in an area are good, a population will generally grow. But eventually some environmental factor will cause the population to stop growing. A **limiting factor** is an environmental factor that causes a population to stop growing or decrease in size. **Some limiting factors for populations are weather conditions, space, food, and water.**

Climate Changes in climate conditions, such as temperature and the amount of rainfall, can limit population growth. A cold spring season can kill the young of many species of organisms, including birds and mammals. Unusual events like floods, hurricanes, and the tornado shown in **Figure 3**, can also have long-lasting effects on population size.

Food and Water Organisms require food and water to survive. When food and water are in limited supply, they can be limiting factors. Suppose a giraffe must eat 10 kilograms of leaves each day to survive. The trees in an area can provide 100 kilograms of leaves a day while remaining healthy. Five giraffes could live easily in this area, because they would need just 50 kilograms of food a day. But 15 giraffes could not all survive—there would not be enough food. No matter how much shelter, water, and other resources there were, the population would not grow much larger than 10 giraffes. The largest population that an area can support is called its **carrying capacity.** The carrying capacity of this giraffe habitat would be 10 giraffes. The size of a population can vary, but usually stays near its carrying capacity because of the limiting factors in its habitat.

Space Space is another limiting factor for populations. Gannets are seabirds that are usually seen flying over the ocean. They come to land only to nest on rocky shores. But the nesting shores get very crowded. If a pair does not find room to nest, they will not be able to add any offspring to the gannet population. So nesting space on the shore is a limiting factor for gannets. If there was more nesting space, more gannets would be able to nest. The population could increase.

Figure 4 shows how space is also a limiting factor for plants. The amount of space in which a plant grows determines whether the plant can obtain the sunlight, water, and soil nutrients it needs. For example, many pine seedlings sprout each year in forests. But as the seedlings grow, the roots of those that are too close together run out of space. Branches from other trees may block the sunlight the seedlings need. Some of the seedlings then die, limiting the size of the pine population.

Read this first!

Complete the following:

1. Describe carrying capacity & limiting factor
2. List all the limiting factors that can affect a population.
3. Complete the Kaibab Plateau Deer Population Graph (on back)

Kaibab Plateau Deer Population NAME: _____

In the early 1900s, the area in northern Arizona bordering the Grand Canyon was declared a park and all deer hunting was stopped. In order to further aid the deer population, an effort was made to kill off predators. This d[illegible] shows the result of this policy.

Prediction: If the predators of deer were removed, then the deer population would _____.

Predators killed 1906-1931 in the Kaibab Plateau

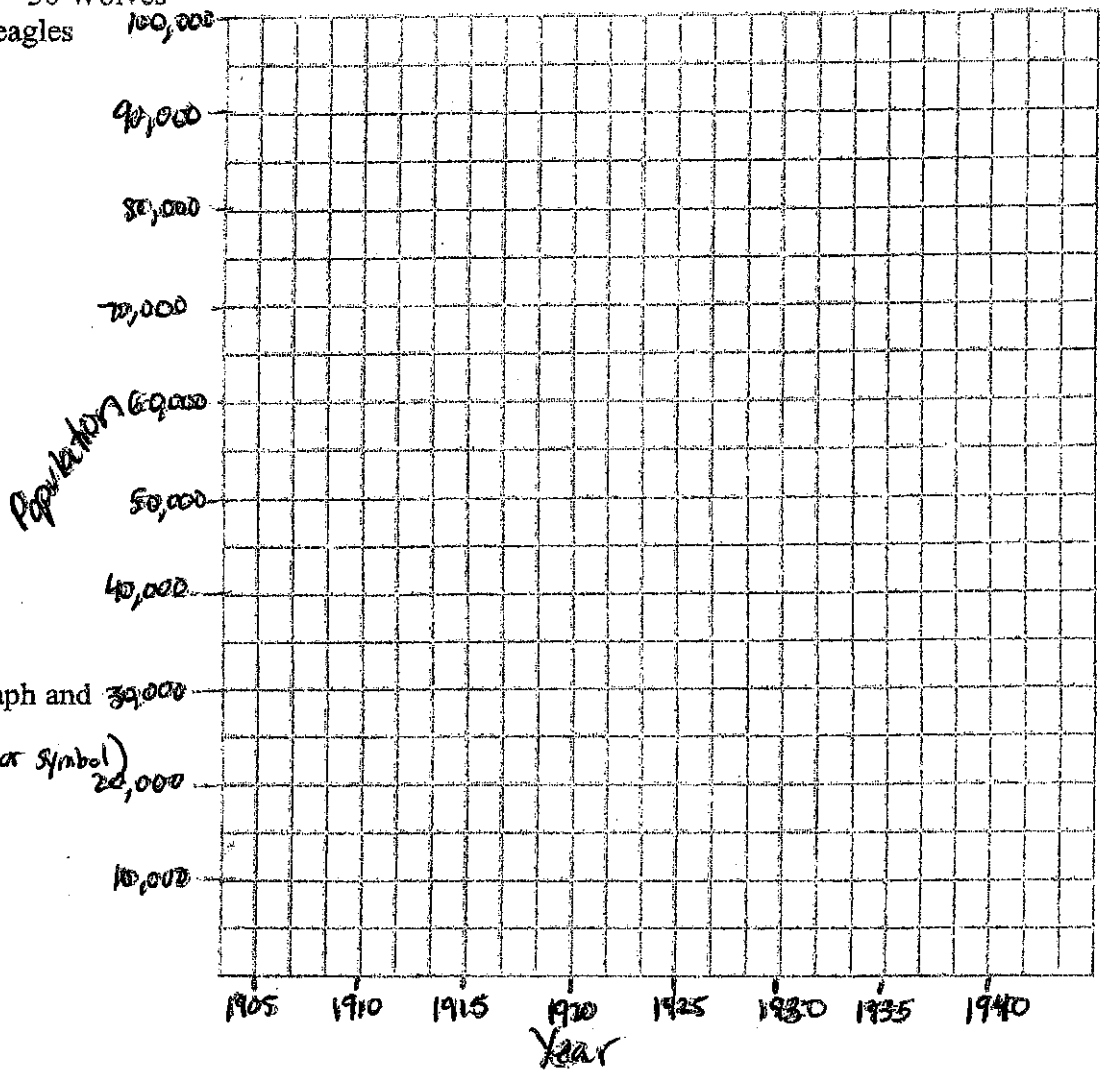
4889 Coyotes	544 Bobcats
781 Mountain Lions	30 Wolves
Unknown numbers of bald eagles	

Make a line graph of the following data:

Year	Deer Population
1905	4,000
1910	10,000
1915	25,000
1920	60,000
1925	100,000
1930	90,000
1935	30,000
1940	10,000

The carrying capacity was:
19[illegible] 30,000 - 1905
19[illegible] 10,000 - 1940

Plot these points on your graph and connect them with a line
(use a different color or symbol)



1. What limiting factors played a role in this change in the deer population and the carrying capacity?

2. How does this activity show the important role of predators in a balanced system?

3. How does removing predators upset the natural balance of an environment of living things?