

Population Dynamics of the Kaibab Deer

Objectives:

- To graph data concerning the deer population of the Kaibab Plateau from 1905 to 1939.
- To determine the carrying capacity of the Kaibab Plateau before 1905 and after 1930.
- To determine the factors responsible for the fluctuating deer population.
- To link the story of the Kaibab deer to human population growth and carrying capacity.

Introduction:

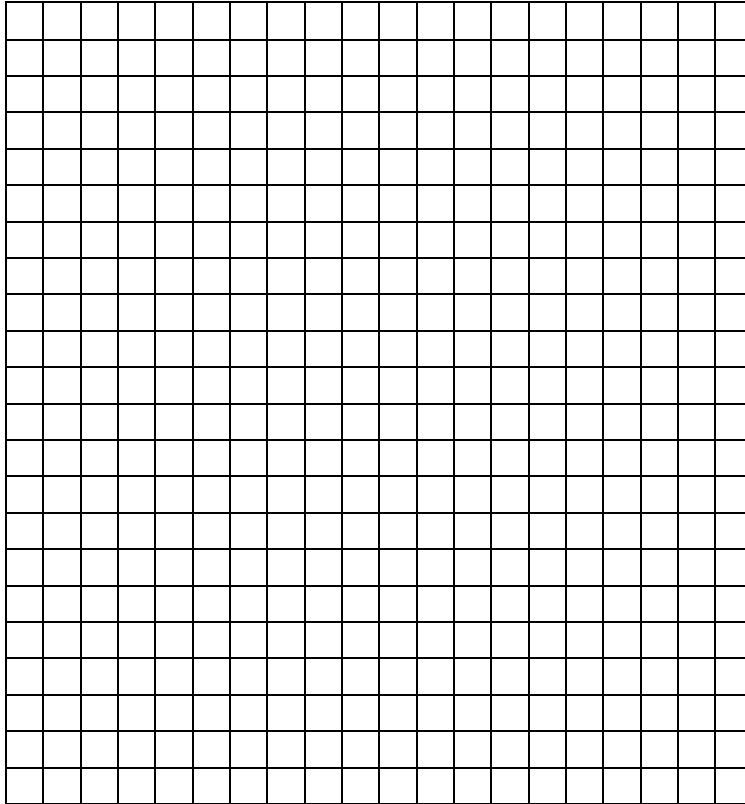
Prior to 1905, the deer population of the Kaibab Plateau was relatively stable and estimated to be around 4,000 in an ecosystem that could support 30,000 deer or more. The Kaibab National Forest did not support only the native deer population, but was also used as the primary grazing land of sheep, cattle and horse ranchers.

Forest Service rangers began to see a decline in both the quality of the rangeland and the deer population by the early 1900s and so took steps to protect the animals. A ban placed on hunting eliminated human predation. Rangers then began a massive campaign to destroy all the natural predators of the deer. Between 1907 and 1923, more than 6,000 coyotes, 700 mountain lions and 12 wolves were killed on the Kaibab Plateau.

By 1915, the deer population had climbed to nearly 25,000 and, soon after, the first signs of severe overgrazing were noted. In reaction, the Forest Service reduced the number of livestock permits for the area. The first signs of deer starvation were seen in 1920; however, the population continued to explode until it reached nearly 100,000 in the early 1920s. Between 1924 and 1926 nearly half the deer population died from a lack of food. Another 600 deer were killed by hunters when rangers began issuing hunting permits in an effort to help the herd and the rangeland recover. All non-local livestock were removed from the Kaibab National Forest and the deer population continued to decline slowly until it reached a stable number of approximately 8,000 in the 1940s. The population has been maintained at this size for the past sixty years through careful regulation of hunting and grazing permits and by protecting the local predator populations.

Results:

Graph the deer population data.



| DATA TABLE | |
|------------|-----------------|
| Year | Deer Population |
| 1905 | 4,000 |
| 1910 | 9,000 |
| 1915 | 25,000 |
| 1920 | 65,000 |
| 1924 | 100,000 |
| 1925 | 60,000 |
| 1926 | 40,000 |
| 1927 | 37,000 |
| 1928 | 35,000 |
| 1929 | 30,000 |
| 1930 | 25,000 |
| 1931 | 20,000 |
| 1935 | 18,000 |
| 1939 | 10,000 |

Conclusions:

1. What was the estimated carrying capacity of the Kaibab Plateau in 1905?
2. Why do you think the deer population in 1905 was so far below the carrying capacity of the rangeland?
3. State (using detailed phrases) and rank the factors that you think contributed most significantly to the explosive growth of the deer population.
 - a.
 - b.
 - c.
4. What was the estimated carrying capacity of the Kaibab Plateau in 1940?

5. Explain how the carrying capacity of a biome can decrease, as it did in this situation.

6. The Kaibab deer story can help us to understand the dynamic change of populations that have the ability to grow quickly. Compare and contrast the Kaibab deer population to the human population in regard to the following topics:
 - a. Potential for growth:

 - b. Predation and competition:

 - c. Speed of population response:

 - d. Carrying capacity of the species' natural environment: