**The Lesson of the Kaibab Deer**

**Objective**: To observe the effects of human intervention on the ecology of the Kaibab Plateau in Arizona by:

* Graphing the data provided of the Kaibab deer population of Arizona from 1905-1939
* Determine factors responsible for the changing population
* Relate population change with carrying capacity.

**Introduction:** An ecosystem may be altered by forces within the biotic community as well as by relationships between organisms and the physical environment. The **carrying capacity** of an ecosystem is the maximum number of organisms that an area can support. The density of a population may produce such profound changes in the environment that the environment becomes unsuitable for the survival of that species. For instance, overgrazing of land may make the land unable to support the grazing of animals that live there.

**Background:** Before 1905, the deer that lived on the Kaibab Plateau in the Kaibab Forest in Arizona were estimated to number about 4,000. The carrying capacity was 30,000 for the deer on the Kaibab. President Theodore Roosevelt thought that the deer found on the Kaibab Plateau were the “finest deer herd in America” and wanted to do something to protect them.

The Kaibab forest was beginning to become overgrazed by other animals that lived there such as sheep, cattle and horses and most of the tall grasses had been eliminated. On November 28, 1906 President Roosevelt created the Grand Canyon National Game Preserve in order to protect the deer herd. Because most of the forest had been already been overgrazed and the grasses were gone, the first step taken to protect the deer herd was to ban all hunting. In addition to banning hunting, in 1907 the forest service began to eliminate all of the predators of the deer. Between 1907 and 1939 816 mountain lions, 20 wolves, 7388 coyotes and more than 500 bobcats were killed.

As early as 1920, signs that the deer population was out of control began to appear. The range was beginning to deteriorate rapidly. Because of this, the forest service reduced the number of livestock grazing permits. Even with the sheep, cattle and horse number reduced the Kaibab Forest was not getting any better. By 1923, the deer were reported to be on the verge of starvation and range conditions were described as deplorable.

The Kaibab Deer Investigating Committee recommended that all livestock not owned by local residents be removed immediately and that the number of deer be cut in half as quickly as possible. During the fall of 1924 hunting was reopened. During that year 675 deer were killed by hunters. However, the number killed only represented one-tenth the number of deer that had been born that spring. Over the next two winters, it is estimated that 60,000 deer starved to death.

Today, the Arizona Game Commission carefully manages the Kaibab area to ensure that the population does not rise above carrying capacity. Hunting permits are issued to keep the deer in balance. Predators are also protected and monitored to help keep the deer herds in balance with food supplies.

Graph the deer population on the data table. Place “year” on the X-axis and “number of deer” on the Y-axis.



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| --- | --- |
| Year | 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 |

1. During 1906 and 1907, what two methods did the forest service use to protect the Kaibab deer?
2. Were these methods successful? Use the data from your graph to support and explain your answer.
3. Why do you suppose the population of deer declined in 1925 although the elimination of predators occurred?
4. Why do you think the deer population size in 1900 was 4,000 when it is estimated that the plateau had a carrying capacity of 30,000?
5. At what year did the deer population reach the highest?
6. It is a criticism of many population ecologists that the pattern of population increase and subsequent crash of the deer population would have occurred even if the bounty had not been placed on the predators. Do you agree or disagree with this statement? Explain your reasoning.
7. Using a color, draw a straight line where the carrying capacity of the deer is and label it.