Pre-Visit Activity:

Carrying Capacity

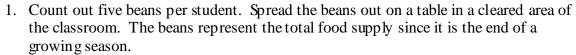**Objective**: Using this *Project Wild* activity students will be able to describe the significance of carrying capacity. They will formulate and test hypotheses related to wildlife populations and carrying capacity.
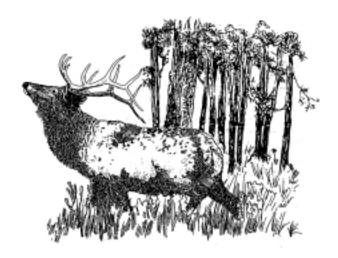
Materials: You will need: one bag of dried beans, kitchen timer or timekeeper.

Procedure: Students become herds of animals seeking food in a physically involving activity.

1. Count out five beans per student. Spread the beans out on a table in a cleared area of the classroom. The beans represent the total food supply since it is the end of a growing season.
2. Divide the classroom into "herds" of five students each, and have them all gather on the periphery of the cleared area.
3. Set the timer to ring at intervals of one minute or less.
4. When you start, all the first people from each herd move at once to get one piece of food, then return to the starting area to tag the next person in their herd. This person then moves to get food, and then tags the next person, and so on. To survive, each elk must get at least 3 beans. Some students won't get to the food supply before the timer rings and the round ends. Any member of a herd going for three rounds without getting enough food dies. (The time interval per round depends on the size of the area you use for the activity as well as the size of your class. For the purposes of this activity, set it up so not everyone gets enough food to survive.)
5. Since the activity was set up so that a significant percentage of the animals would die, discuss the factors that affected each person's (elk's) survival. Would these factors be present for a real elk herd? What other factors might affect real elk herd (deep snow, drought that reduced food supply, health of each animal, predators)? Discuss what could be changed to allow more of the population to live through the "winter" on the food available. Options may include reducing the population to match the carrying capacity. Each option will have costs as well as benefits and each may be controversial. Examples to reduce the herd size might be:
   a. Redistribute some of the population to another area (a pre-winter round-up of elk that are then shipped to another area). For the game: make the herds smaller by creating another herd.
   b. Introduce or increase predator populations to reduce the number of animals in a herd. For the game: have some animals stand out of the game.
   c. Open the area to hunting before winter begins. For the game: assign two students to "hunt" the elk – if the hunter touches the elk, it has to leave the game. The hunter has to escort the elk to a designated area of the room. (Discuss what happens if hunting is not regulated!)
   d. Increase the carrying capacity by bringing in or planting more "food" for the

"herds". For the game: add more beans.

   e. <u>Increase</u> the carrying capacity by adding more land for the elk. For the game: add more beans.

6. Repeat the activity two more times, incorporating two different options the students have discussed. What happens to the number of survivors that live to reproduce the next year?

7. Repeat the activity one more time, incorporating one of the options used above and include five or six young animals born the previous spring. This can be done by designating one student in each "herd" to take food for themselves and an offspring. How does this annual increase affect the population? What must now happen to re-establish the herd size within carrying capacity?

8. Record the number of "survivors" from the various manipulations of carrying capacity on the chalkboard. What can be learned from the numerical representation? Which manipulation was the most successful? How is carrying capacity important to animals? What are examples of both cultural and natural influences on carrying capacity?

9. Ask for a summary of some of the most important things the students have learned about the concepts of carrying capacity.