



## Outdoor Biology Instructional Strategies

# POPULATION GAME

### BACKGROUND

A **population** is a group of organisms of one kind living together in a particular area. The size of a population (the number of plants or animals in the group) may change greatly over a period of time. Among animals such as deer or field mice, populations may double, fluctuate slightly, decrease slowly, or “crash” to a very low number. While many things affect the size of populations, the primary factors contributing to changes are the amount of food and the number of animals competing for the resources.

In *Population Game* the youngsters explore the effects of three factors that can affect the size of a herd of deer; (1) competition for a limited food supply, (2) damage to food resources resulting from overpopulation in an area, and (3) movement of the herd into new feeding territories (dispersal). By participating in this game, the youngsters learn about the dynamic relationship between the population level of a herd of deer and the land’s carrying capacity. The **carrying capacity** of the land is the greatest number of organisms of one kind that the area can support

### CHALLENGE

Find out how many deer can survive in your herd’s home range.

### MATERIALS

**For each youngster:**

- 10 home-range poker chips (one color)
- 6 new-range poker chips (another color)
- 4 plastic sandwich bags

**For the group:**

- Flagging or rope for marking off the home range
- 1 kitchen timer
- 1 data board (see Tool Box 1)
- 1 marking pen

## PREPARATION

1. Mark off a circle approximately two meters in diameter to be the home range. Scatter the home-range chips throughout the circle.
2. Choose two areas that are visually obscured from the home range and at least ten meters away. Scatter half of the new range chips throughout each area. These areas will serve as new feeding ranges (available in the fifth round of the game).
3. Reproduce the “Number of Survivors” chart on the data board.

## ACTION

### Introducing the Game:

1. Explain to the youngsters that in *Population Game* each plastic bag represents a deer. All of the bags together represent a population of deer. Define **population** as a group of organisms of one kind living together in a particular area. Tell the youngsters that the chips in the circle represent the plants that deer eat. The challenge for the youngsters is to collect food for the animals in the herd.
2. For a deer to survive a two-minute “year”, it must have at least five chips. The youngsters may collect more than five food chips per deer, but not more than ten. Sharing or pooling of chips by different players is not permitted in this game.

Note to the leader: At the end of each round you will be collecting the “deer” (bags) that have not survived that round. At the beginning of each new round you will be handing out an additional bag for each deer that survived (simulating reproduction). If any youngsters are left without deer, redistribute the bags among the youngsters so that everyone can participate.

### Playing Round One: The First Year

1. Give each child one plastic bag (one deer).
2. Set the timer for two minutes and turn the students loose in the home range to collect food chips for their deer.
3. At the end of the two-minute period, recall the group and ask how many deer survived.
4. Record on the data board the number of deer that started the round and the number that survived the first year. Collect any “deer” that didn’t survive.

### Introducing the Second Year

1. Explain to the youngsters that populations grow through reproduction. Tell them that they will simulate the effect of reproduction by adding one deer for every deer that survived the last year.
2. Hand out the additional bags. All of the participants should now be collecting food for two deer.
3. Redistribute the collected food chips in the home range.

### **Playing Round Two:**

#### **The Second Year**

1. Explain to the youngsters that they are in the process of determining the carrying capacity of the home range. Tell them that **carrying capacity** is the greatest number of animals of one kind that can survive in a certain area. Point out the number of deer entering Year Two and ask the group to predict the number that will survive. (At this point, you might add a Predictions column to the chart.)
2. Set the timer. On signal, each youngster should try to collect at least five food chips in each of his or her two bags.
3. At the end of the round, add the number of surviving deer to the data board. Compare the number of survivors with the group's predictions of carrying capacity. Collect the casualties.

#### **Introducing the Third Year:**

1. Once more announce that surviving deer will reproduce, and give each surviving deer an additional bag. Some youngsters must now collect food for as many as four deer.
2. Redistribute the collected food chips in the home range.

### **Playing Round Three: The Third Year**

Play the round exactly as Round Two was played, recording the results on the data board.

#### **Introducing the Fourth Year:**

1. Hand out one more bag for every surviving deer.
2. Announce that because of the large number of deer feeding on the range in the last year, the plants that deer eat have been damaged, and food production has been lowered. Remove one-fourth of the food chips and redistribute the remaining chips in the home range.

### **Playing Round Four: The Fourth Year**

1. Point out the number of deer that are entering the round and remind the youngsters of the lowered food supply. Ask for estimates of the carrying capacity of the range under the new circumstances. How many deer do they think will survive now?
2. Set the timer and let the round begin. Record the results.

#### **Introducing the Fifth Year:**

Ask the group what a herd of deer might do when its home range does not produce enough food for most of the deer to survive. If necessary, introduce the idea of dispersal to a new feeding area. Tell the group that in this round, after all the available

food in their home range has been eaten, the herd may disperse and search for new feeding areas.

### **Playing Round Five: The Fifth Year**

1. Hand out one more bag for each surviving deer.
2. Redistribute the reduced number of chips (the same number used in Round Four) in the home range.
3. Let the round begin.
4. At the end of the round, call everyone together and find out how dispersal affected the number of deer that survived.

### **THINKING ABOUT POPULATIONS**

1. In what round of the game was it easiest for each of your deer to survive? IN what round was it hardest? Why?
2. In this game, what two things determined the carrying capacity of the home range? (The amount of food and the number of deer competing for the food.).
3. If a person regularly, and over a long period of time, put out a lot of corn for deer in a small area, what would happen to the carrying capacity of that area for deer? What would be the effect on the deer population? What would happen to the deer if the person moved away?
4. What factors reduce the size of populations? (Predation, starvation, disease.)
5. How is the growth of human populations similar to the growth of other animal populations? How is it different?

### **FOLLOW THROUGH**

#### **Watching changes in real populations:**

The youngsters may wish to maintain a small population of animals and observe changes in the population over a short period of time. Guppies are good subjects for population growth experiments. Starting with three of the little fish (one male and two females) in a properly maintained aquarium, youngsters can follow changes in the size of the population over several months.

### **WHAT TO DO NEXT**

*Bugs, Worms, and Others*

*Adaptation—Predator-Prey*

*Bean Bugs*

*Food Chain Game*

*Variation Game*

**NUMBER OF SURVIVORS**

<b>YEAR</b>	<b># OF DEER AT START</b>	<b># OF DEER THAT SURVIVED</b>
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