

# How Many Lions Can Live in the Forest?

## Activity 8

### Objectives

Students will (1) define a limiting factor, and (2) describe how limiting factors affect mountain lion populations.

### Method

Students become “mountain lions” to look for one or more components of habitat during this physically involved activity.

### Materials

One stomach (brown lunch bag) for each student. One blindfold. Figure 4-1: Hazard Cards, cut out. Figure 4-2: Token Sheet, cut out. (See Table 4-1: Food Token Allotments for the recommended number of food tokens needed for the size of your group.) Note: you may substitute heavier items, such as “Unifix Cubes” for tokens to prevent your prey from blowing away.

Note: Materials for activities available for checkout in “Cougar Crate” (see appendix B for more information).

Grade Level: 5-8

Subject Areas: Science, Environmental Education,

Math

Duration: one 20–45-minute session or longer

Group Size: 10 to 45

Setting: outdoors

Key Text: pages 7-9

Standards: LS.1; M.1

### Background

This activity focuses on the importance of suitable habitat for mountain lions. The activity demonstrates the consequences for a population of mountain lions if one or more habitat components is relatively scarce. When any element or factor in a habitat is inappropriate or exceeds their tolerance range, it directly affects the well-being of the lions and may result in death or population reduction or out-migration. Limiting factors may include habitat components such as food, water, shelter, and appropriate space, as well as life history parameters such as disease, injury, or climactic conditions. Limiting factors also may be related to human activity such as development, vehicle collisions, and hunting. Populations tend to increase in size until limited by one or more of these factors.

Mountain lion habitat limits lion populations, especially through the influences of food (prey), shelter, and social tolerances or territoriality of the animal. Mountain lions are very territorial. Males will not share territory with other males. With limited territories available, adult male lions will kill young lions or run them out of the area. These young lions must keep moving around either until they die of starvation or until they find an area vacated by the death of an adult.

When food supplies or territory is scarce, competition becomes more intense. Some young male lions must travel great distances to find their own territory. These individuals may become thin and in poor condition. Mountain lions do not always capture their prey; in fact, they often miss. Weakened lions are less effective hunters.

All possible conditions are not covered by this activity. However, by this simple illustration, it is possible for students to grasp quickly the essential nature of the concept of “limiting factors” - habitat components that affect the survival of mountain lions or restrict the numbers or range of lion populations.

## Procedure

1. Distribute food tokens randomly over the far end of a playing field. (See Table 1 for the meaning of the token symbols and to determine how many tokens you will need for your class size.) Do not inform the “mountain lions” (your students) of the significance of the symbols on the tokens.
2. Each participant will act as a mountain lion, finding and collecting “prey” tokens that represent the amount of food a real lion would find and eat over a 2-week period. Each participant is given a numbered sack lunch bag that represents the lion’s stomach. The participants should remember the number on the bag and put all their food tokens into the bag.
3. Assign “hazard cards” to a few of your students. Explain that students who have received a “Hazard Card” must abide by the hazard rules while hunting. The blind mountain lion must be blindfolded—a student or teacher can accompany him/her to prevent injury (the assistant should not help at all in obtaining prey).
4. Students should line up on the starting line at the opposite end of the playing field from where the prey tokens have been distributed. Students should place their bags (“stomachs”) at their feet on the starting line. They must leave their bags at the starting line while they go search for food.
5. Students should walk to the opposite end of the field where the prey tokens are, pick up a **single token**, and return it to their bags. This procedure should be repeated until all the tokens have been gathered and placed into the bags.
6. **For safety reasons**, pushing and shoving is not acceptable, as mountain lions do not fight over prey because they are usually in different territories! A lion with an injury from fighting would not be able to hunt.
7. When all the “prey” has been collected, the game is over.
8. Inform students that the numbers on the tokens indicate pounds of food and the letters represent the type of food. (Or, if using Unifix cubes, the color will represent the food and weights. For example: red = elk, 300 pounds, brown = deer, 75 pounds, etc.) Weights for the animals they kill are as follows:
  - **Turkey: 10 pounds**
  - **Small Mammals: 5 pounds**
  - **Deer: 75 pounds**
  - **Elk: 300 pounds**
9. Have students calculate the total pounds collected.
10. Explain that each lion must obtain enough prey (100 pounds/lion) to live for 2 weeks. Decide how many mountain lions can live in the habitat based on the amount of available food.
11. **Discussion:**
  - ◆ Was there enough food for all?
  - ◆ If not, how many mountain lions can live in this area? Why?
  - ◆ What will happen in the case of too many mountain lions?
  - ◆ Would they all starve?
  - ◆ Which mountain lions would be most likely to survive?
  - ◆ Did anyone “miss” his or her prey? Why would a mountain lion not be successful in pursuit of prey?
  - ◆ How did the blind mountain lion do?
  - ◆ What would eventually happen to it?
  - ◆ What happened to the crippled mountain lion?
  - ◆ If the injury is permanent, what might this mean for that mountain lion?
  - ◆ If the injury heals in two or three months, is it possible for the mountain lion to survive?

- ◆ How will the mountain lion with the kittens fare?
- ◆ For the mother and her kittens, 200 pounds of prey are needed every two weeks. If less is caught, what will happen? Who will go hungry? What will eventually happen? (The adult will eat first and the kittens will die – how does this work in favor of survival of the species?)

12. Conclude the lesson with a discussion on how any particular habitat can only support so many animals. This is true with mountain lions, porcupines, small mammals, deer, elk, turkey, *and humans*.

### Extensions

1. Have participants construct a bar graph or a circle graph showing the percentages of each food item.
2. Have students map cougar territories.
3. To make carrying capacity more real to students, tape off a section of the classroom floor, measuring 10' x 10', with masking tape. Tell students this area represents the 300 square miles a male lion needs in the Black Hills for his home range. Tell students that 4 to 5 females lions can share one male lion's range. Have one male student and 4 or 5 female students come stand in the 10' x 10' area. They should be comfortable and not touching each other. Then start adding students, one at a time, un-

til they are too crowded and are feeling uncomfortable because they are too close to each other. Relate this to the overcrowding of the lions in the Black Hills and how some of the lions are having to leave the area because there is not enough room for them. To make this even more realistic, when adding females, allow them to stay inside or next to this territory. When adding males, have the first male role play kicking the new males out, and have the new males move across the classroom.

### Evaluation

1. At the end of the activity, have students take out a piece of paper, and give them 2 minutes to write down their definitions of the following terms: population, carrying capacity, and predator, prey. Collect them and evaluate how well students understood the concepts behind the activity.
2. Ask students to predict the effects of adding another predator to the system and to describe how population sizes and the carrying capacity of the ecosystem will act as limiting factors.

*This activity adapted from Project WILD activity How Many Bears Can Live in This Forest? ©2003 Council for Environmental Education. Adapted with permission from Project WILD national office, Project WILD K-12 Curriculum and Activity Guide. The complete Activity Guide can be obtained by attending a Project WILD workshop. For more information, contact the South Dakota Project WILD office – Chad Tussing, SD Game, Fish & Parks, 412 West Missouri Avenue, Pierre, SD 57501; phone (605) 773-2541; e-mail chad.tussing@state.sd.us OR contact Project WILD National Office, 5555 Morningside Dr. Suite 212, Houston, TX 77005; phone (713) 520-1936; website: www.projectwild.org*

<i>Food Type (weight)</i>	<i>Unifix Color</i>	<i>10-14 players</i>	<i>15-18 players</i>	<i>20-24 players</i>	<i>25-29 players</i>	<i>30-34 players</i>
Elk (300#)	Red	2	3	4	5	6
Deer (75#)	Brown	12	18	24	30	36
Turkeys (10#)	Black	15	20	25	30	35
Small Mammals (5#)	Orange	30	35	40	45	50
Missed Opportunity (0#)	Yellow	16	32	48	64	80

**Table 4-1: Prey Token Allotments.** Ideally you want to use a number of food tokens that will allow about ¾ of the participants to obtain sufficient food for survival (100 pounds in this case) with ¼ obtaining less. This table provides the numbers of tokens to be used for each group size.

*Copycat Page: How Many Lions Can Live in this Forest?*

## Hazard Cards

<p>You are a female with two kittens. Each kitten needs 50 pounds of prey to live, plus you need food for yourself.</p>	<p>You were hit by a car and now have a broken leg. Drag one leg throughout the entire game.</p>
<p>You have contracted a feline disease, and are very weak. It will take a while to recover—if you get enough food. For the first three hunts, you must crawl because you are so weak.</p>	<p>You were fighting with another mountain lion over territory. This injured your leg. It will take a while to heal. For the first three hunts, hop on one foot.</p>
<p>You were eating a porcupine and injured your eyes. You are now blind. You must wear a blindfold. An assistant will accompany you to make sure you are safe, but cannot help you.</p>	<p>When hunting a bull elk, you were gored in the side by its antlers. You now have an infection in your leg. You must hop on one foot, and not put weight on it, for the first three hunts, until it heals.</p>

**Figure 4-2: Hazard Cards.** Pick 1 hazard card for approximately every 10 students.

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## Food Tokens

E300	T10	SM5	SM5	M0
E300	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
D75	T10	SM5	SM5	M0
M0	T10	SM5	SM5	M0

**Figure 4-2: Token Sheet.** Copy this page to make the number of tokens needed for your size group