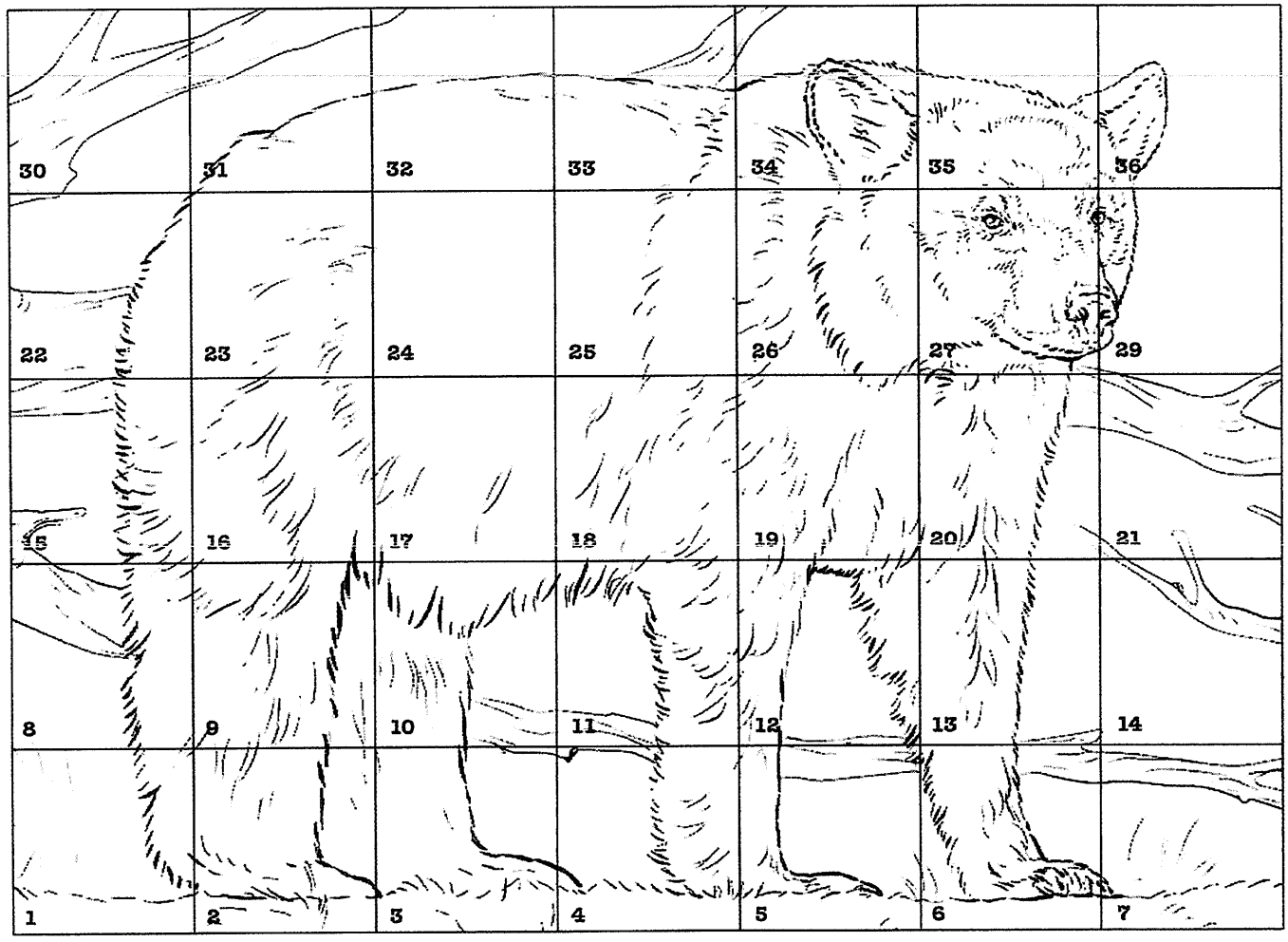
Make a Life-Sized Black Bear!

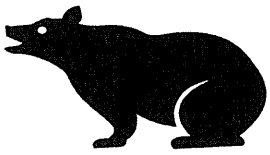
Materials:

- 36, 11" x 11" white pieces of paper
- The black bear grid below cut into individual squares
- Pencils, coloring materials
- Tape measure

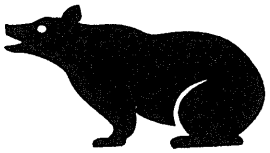
Directions:

1. Divide the 36 grid squares between the number of participants, and give them one piece of 11" x 11" paper for each grid they are given.
2. Instruct participants to orient the grid piece so the number is on the lower left-hand corner. Have them write the grid number in the same position on an 11" x 11" piece of paper.
3. Tell the participants to copy the lines from the grid piece to the 11" x 11" piece of paper using a pencil.
4. Once the participants are finished coping the grid piece, tape the pieces to a wall starting at the bottom with number 1. Place paper pieces in order until the bear is complete. You may have to darken some pencil lines to clearly see the bear outline.
5. Measure the bear. What is the length and height of the black bear? How does this compare to the participants' height?
6. Color the bear!





Compare Yourself to a Black Bear



The average height of an adult male and female black bear standing upright: Male: 6 feet Female: 5 to 5 ½ feet	Your height:
The weight of an adult male and female black bear: Average about 250 pounds Male: 200 – 400 pounds Female: 120 – 185 pounds	Your weight:
The average weight of a one-year-old male and female black bear: Male: 50 – 80 pounds Female: 30 – 50 pounds	Your weight at one year of age:
The average birth weight of a black bear cub: 8 ounces, ½ a pound	Your birth weight:
The average number of cubs a black bear has per litter: 2 Range 1 - 4	Average number of babies your mother had at one time:
The length of time a cub stays with its mother: 18 months	Number of years you will stay home:
The range of a black bear's life span: 20 – 25 years	Average human life span:

How Many Bears Can Live in This Forest?

Objectives

Students will: 1) define a limiting factor; and 2) describe how limiting factors affect animal populations.

Method

Students become "bears" to look for one or more components of habitat during this physically involved activity.

Materials

Five colors of construction paper (a couple of sheets each of red, yellow, green, blue and orange) or an equal amount of light poster board or colored tokens; one black felt pen; envelopes (one per student); pencils; one blindfold; five sheets green construction paper (for extension)

Grade Level: 5-8

Subject Areas: Science, Environmental Education, Mathematics

Duration: one 20- to 45-minute session or longer

Group Size: 10 to 45

Setting: outdoors

Conceptual Framework Topic Reference: WPIIA2b, WPIIA2b1), WPIIA2b2)

Key Terms: limiting factors, habitat, shelter, cover

Appendices: Simulations, Ecosystem

Background

Black bears are the focus of this activity that illustrates the importance of suitable habitat for wildlife. The activity demonstrates the consequences for a population of bears if one or more habitat components is relatively scarce. When any element or factor in a habitat is inappropriate or exceeds the tolerance range for an animal or population, it directly affects the well-being of the animal(s) and may result in death or population reduction. This factor "limits" the animal or population. Limiting factors may include habitat components such as food, water, shelter and appropriate space, as well as life history parameters such as disease, predation and climatic conditions. Limiting factors also may be related to human activity such as development, pollution and hunting. Populations tend to increase in size until limited by one or more of these factors.

Black bear habitat limits black bear populations, especially through the influences of shelter, food supply and the social tolerances or territoriality of the animal. Shelter or cover is a prime factor. Black bears need cover—for feeding, hiding, bedding, traveling, raising cubs and denning. With limits of space, adult bears will kill young bears or run them out of the area. These young bears must keep moving around either until they die or until they find an area vacated by the death of an adult.

When food supplies are reduced by factors such as climatic fluctuations, competition becomes more intense. Some adult bears might temporarily move to seldom-used areas of their home range, sometimes many miles away. They must live on what food is available in the area. These individuals may become thin and in poor

continued

Number of Cards to Make

Paper Color	Label	Represents	Number of Students in Group						
			10-15	16-20	21-25	26-30	31-35	36-40	41-45
Orange	N-20	Nuts, 20 lbs.	2	3	3	4	5	6	7
Orange	N-10	Nuts, 10 lbs.	8	13	17	21	25	29	33
Blue	B-20	Berries, 20 lbs.	2	3	3	4	5	6	7
Blue	B-10	Berries, 10 lbs.	8	13	17	21	25	29	33
Yellow	I-12	Insects, 12 lbs.	2	3	3	4	5	6	7
Yellow	I-6	Insects, 6 lbs.	8	13	17	21	25	29	33
Red	M-8	Meat, 8 lbs	2	3	3	4	5	6	7
Red	M-4	Meat, 4 lbs.	8	13	17	21	25	29	33
Green	P-20	Plants, 20 lbs.	2	3	3	4	5	6	7
Green	P-10	Plants, 10 lbs.	8	13	17	21	25	29	33

condition for winter hibernation or, in the case of young bears, be forced from the area by more aggressive adults.

All possible conditions are not covered by the design of the activity. However, by this simple illustration it is possible for students quickly to grasp the essential nature of the concept of "limiting factors"—habitat components affecting the survival of an animal or restricting the numbers or range of an animal population.

Procedure

1. Make a set of 2″ x 2″ cards from the colored construction paper. Use the chart on this page to determine how many cards of each color to make and what to write on each one.

As shown in the chart, the color of the card determines the type of food it represents:

orange—nuts (acorns, pecans, walnuts, hickory nuts)

blue—berries and fruit (blackberries, elderberries, raspberries, wild cherries)

yellow—insects (grub worms, larvae, ants, termites)

red—meat (mice, rodents, peccaries, beaver, muskrats, young deer)

green—plants (leaves, grasses, herbs)

The number on each card represents the number of pounds of food. For example, a card with the label M-4 represents four pounds of meat.

2. The following estimates of total pounds of food needed for one bear in 10 days are used for this activity:

nuts	20 pounds	(25%)
berries and fruit	20 pounds	(25%)
insects	12 pounds	(15%)
meat	8 pounds	(10%)
plants	20 pounds	(25%)
	80 pounds	(100%)

NOTE: These figures represent the food of a typical black bear in Arizona. The components of an actual bear's diet will vary between areas, seasons and years. For example, a bear in the state of Alaska would likely eat more meat (fish) and fewer nuts than a bear in Arizona. One similarity among black bears everywhere is that the majority of their diet is normally made up of vegetative material.

If the table is followed when making the food cards, there should be less than 80 pounds of food per student, so that there is not actually enough food in the area for all the "bears" to survive.

3. It is also possible to include "water" as a habitat component by making additional squares from light blue paper. To calculate how many water cards to make, multiply the number of students by 1.25 (round to the nearest whole number). For example, for a group of 20 students, make 20 x 1.25 = 25 water cards. Divide the water squares into five equal piles (or roughly equal) and mark each group with the one of following letters: R, L, ST, SP and M. These letters represent all the places where a bear could find water: rivers, lakes, streams, springs and marshes.
4. In a fairly large open area (e.g., 50′ x 50′), scatter the colored pieces of paper.
5. Do not tell the students what the colors, initials and numbers on the pieces of paper represent. Tell them only that the pieces of paper represent various kinds of bear food. Since bears are omnivores, they like a wide assortment of food and the students should gather different colored squares to represent a variety of food.
6. Have each student write their name on an envelope. This will represent the student's "den site" and should be left on the ground (perhaps anchored with a rock) at the starting line on the perimeter of the field area.
7. Have the students line up on the starting line, leaving their envelopes between their feet on the ground. Give them the following instructions: "You are now black bears. All bears are not alike, just as you and I are not exactly alike. Among you is a young male bear who has not yet found his own territory. Last week he met up with a larger male bear in the big bear's territory and before he could get away, he was hurt. He has a broken leg. (Assign one student as the injured bear. He must hunt by hopping on one leg.) Another bear is a young female who investigated a porcupine too closely and was blinded by the quills. (Assign one student as the blind bear. He or she must hunt blindfolded.) The third special bear is a mother bear with two fairly small cubs. She must gather twice as much food as the other bears. (Assign one student as the mother bear.)
8. Students must walk into the "forest." Bears do not run down their food; they gather it. When students find a colored square, they should pick it up (one at a time) and return it to their "den" before picking up another colored-square. (Bears would not actually return to their den to eat; they would eat food as they find it.)
9. When all the colored squares have been picked up, the food gathering is over. Have students pick up their den envelopes containing the food they gathered and return to class.
10. Explain what the colors and numbers represent. Each color is a kind of food and the numbers represent pounds of food eaten. Ask each student to add up the total number of pounds of food they gathered—whether it is nuts, meat, insects, berries or plant material. Have each student write the total weight on the outside of their envelope.
11. Using a chalkboard, list "blind," "injured" and "mother." Ask the blind bear how much food she aquired. Write the amount after the word "blind." Ask the injured bear and the mother bear how much they aquired and record the information. Ask each of the other students to tell how much food they found; record each response on the chalkboard. Tell the students each bear needs 80 pounds to survive. Which bears survived? Is there enough to feed all the bears? How many pounds did the blind bear collect? Will she survive? What about the mother bear? Did she get twice the amount needed to survive? What will happen to her cubs? Will she feed her cubs first or herself? Why? What would happen to her if she fed the cubs? What if she ate first? If the cubs die, can she have more cubs in the future, and perhaps richer, years? (The mother bear will eat first and the cubs will get whatever, if any, is left.

continued

The mother must survive; she is the hope for a continued bear population. She can have more cubs in her life; only one needs to survive in order for the population to remain static.)

12. If the water squares are included, each student should have picked up at least one square representing a water source or they do not survive. Water can be a limiting factor and is an essential component of habitat.

13. Ask each student to record how many pounds of each of the five categories of food they gathered. Ask each student next to convert these numbers into percentages of the total poundage of food each gathered. Provide the students with the background information about black bears so that they can compare their percentages with what are typical percentages eaten by black bears in Arizona. Ask students to guess how healthy their bears would be. How do the bears' requirements for a diet seem to compare with the needs of humans for a balanced and nutritious diet?

14. Ask the students to arrive at a class total for all the pounds of food they gathered as bears. Divide the total by the 80 pounds needed by an individual bear (approximately) in order to survive in a ten-day period. How many bears could the habitat support? Why then did only ____ bears survive when your class did this activity? Is that realistic? What percentage of the bears survived? What percentage would have survived had the food been evenly divided? In each case, what percentage would not survive?

15. Ask the students to determine the amount of food tokens that must be added in order to support all of the bears in this activity. If sufficient food were available for all of the bears would the population likely increase the following year? Have the students support their answers. Other than food, what factors, natural or human-related, might also limit the growth of the bear population? How would each of these factors affect the bear population? Could the bear population increase indefinitely if unlimited food were available? Why or why not?

16. Based on their discussion, ask the students to try to define the term limiting factor. Have them suggest examples of limiting factors, cultural and natural, that would be likely to actually influence the survival of other animals and their populations.

Extensions

1. Cut paper or poster board into 2" x 2" squares. Make five squares per student. For example, with a class of 30 students, you would make 150 squares. Divide all the squares into five equal piles and mark the cards in each pile with one of these letters: B, T, D, H and F. These represent B = bedding sites, T = travel ways, D = dens, H = hiding cover and F = feeding sites. For purposes of this activity, these are defined as follows:

Bedding Sites: Black bears are usually active in early morning and late evening, and bedded most of the rest of the day and night. Bedding sites are usually in areas of dense vegetation, steep topography and/or large trees where the bears feel secure.

Travel Ways: Bears require corridors of cover (made up of thick vegetation and/or steep topography) to enable them to travel between areas of food, water and shelter within their home range.

Dens: Black bears use dens as shelter for hibernation from November to April in each year. Bears have been found denning in hollow logs, caves, holes dug into hillsides, under buildings on top of the ground and even in culvert pipes. Bears often prepare and may use more than one den, and may change dens during the winter because of disturbance or if the den leaks. Bears seldom re-use dens from one year to the next.

Hiding Cover: Black bears evolved as animals that escape danger from predators and other bears by hiding in thick cover.

Feeding Sites: Bears often will use areas with less cover than hiding areas or bedding sites for feeding. Feeding sites are, however, often found close to thick hiding cover to allow the bear to quickly escape danger if necessary.

NOTE: This information is based on actual research data from a study in Arizona. These components of shelter may vary slightly in different parts of North America.

2. In a fairly large open area (e.g., 50′ x 50′), scatter the colored pieces of paper.
3. Have the students line up along one side of the area. Tell them that they are to become "bears" for the purposes of this activity. Review the concept of habitat—that a bear would need shelter, food, water and space in a suitable arrangement in order to survive. Do not tell the students what the letters on the squares of paper represent. Tell them only that they represent one element or component of bear habitat.
4. Direct the students to move as individual "bears" into the area. Each bear must pick up as many of the components of habitat as possible. Some competitive activity is acceptable as long as it is under control. Bears are territorial. Remember that if bears fight, which they seldom do, they can become injured and unable to successfully meet their needs for survival.
5. When the students have picked up all of the squares of paper in the area, have them return to the classroom or be seated in any comfortable area. Ask the students to separate their squares of paper into piles according to the letter on each. Using a chalkboard or large pad for a visual reference, ask the students to predict what the letters on the green cards represent—giving them the clue that each is an element of cover or shelter for a black bear. What kinds of shelter would a bear need? What do these initials represent? Record how many bears aquired at least one of each kind of shelter. How many got only four kinds? Three? Two? How many got only one kind of shelter? For the purposes of this activity, only those bears with at least one of each kind of necessary shelter can survive through one year.
6. Shelter is a very important part of a bear's habitat. A bear needs shelter in which to search for food and water. Bears also need shelter for traveling through their home range, and shelter for bedding, hiding and denning. Ask students why a den is important. (The bear could live from April through October but would not have a secure place to hibernate and might not survive the winter.) Ask the students what would happen if a bear did not have travel ways? (Without travel ways, home ranges become fragmented and bears are not able to reach needed food, water or other shelter. Without suitable habitat, bears move into marginal habitats and get into trouble with people.)
7. In this activity, how many bears survived? What was a limiting factor for this population of bears? (Shelter.) What other things possibly could become limiting factors? (Water and space or territory are two examples.) Could food be a limiting factor for bears? (Yes, however bears are omnivores and can utilize many sources of food.)
8. Ask the students to summarize what they have learned about the importance of suitable habitat for bears' survival. How are the bears' habitat needs similar to and different from the needs of other animals?

Evaluation

1. Define limiting factor.
   a. Describe some of the factors that may limit the survival of an animal.
   b. What might be the consequences to the individual animal and to its population if one of these limiting factors were no longer limiting?

How Many Bears? Idaho Style

The Project WILD activity, *How Many Bears Can Live in This Forest?*, has information related to a black bear living in Arizona. As you may have guessed, black bears in Arizona and black bears in Idaho have difference food supplies. Idaho doesn't have many nuts. Our bears eat other foods. The average Idaho black bear will eat 20 to 25 pounds of food a day. That's 250 pounds in a 10 day period. The breakdown is as follows:

Berries	90 lbs.	36%
Grasses	75 lbs.	30%
Forbs*	35 lbs.	14%
Insects	30 lbs.	12%
Other	15 lbs.	6%
Meat	5 lbs.	2%
Total	250lbs.	100%

While keeping this activity as written, the following number of cards and their values should be:

Food Types	Paper Color	Values (number of cards at lbs. value)
Berries	Blue	5 at 90 lbs. and 25 at 45 lbs.
Grasses	Green	5 at 75 lbs. and 25 at 37.5 lbs.
Forbs	Brown	5 at 35 lbs. and 15 at 17.5 lbs.
Insects	Yellow	5 at 30 lbs. and 25 at 15 lbs.
Other	White	5 at 15 lbs. and 25 at 7.5 lbs.
Meat	Red	5 at 5 lbs. and 25 at 2.5 lbs.

Note: If you like, you may round up the fractions.

This activity can stimulate an excellent discussion on why animals' food requirements are different depending on the environment. Why do Arizona black beat require only 80 pounds of food in 10 days while Idaho black bears require 250 pounds in the same time period? What about black bears living in other states? Nuts are highly nutritious and contain more fat than berries and grasses. So much so that 80 pounds of food in Arizona would be equivalent to 250 pounds of food value in Idaho. Nutritious food even causes cubs to mature more rapidly. For example, in Pennsylvania where nuts are plentiful, a one-year-old cub may enter the den weighing 100 pounds. In Idaho, that 100 pound cub might be around three years old. A large, mature Pennsylvania black bear may weigh as much as 800 pounds. In Idaho, a huge black bear will weigh 300 pounds.

One other point to remember on all these figures is black bears will eat different foods at different times of the year. More grasses will be eaten during the spring and early summer. Berries are generally eaten during the late summer and fall.

*Forbs are broad-leafed plants such as dandelions and wildflowers.

Parts of Speech Poem

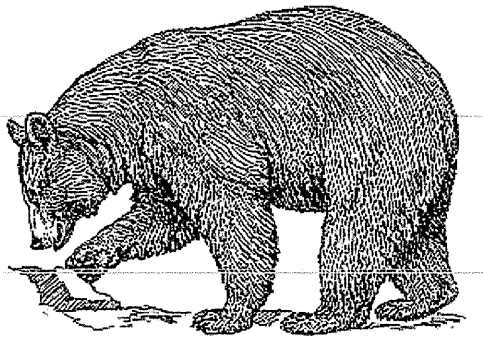
Write a poem about black bears using parts of speech!

Parts of speech review:

Noun: a person, place, thing or idea
Adjective: a word that describes a noun (tells how many, what kind, which one)
Conjunction: a connecting word (and, or, but)
Verb: describes an action or state of being
Adverb: describes a verb or another adverb (tells when, where or how)

Directions for a Parts of Speech Poem:

Line 1: Noun (title)
Line 2: Adjective, conjunction, adjective
Line 3: Verb, conjunction, verb
Line 4: Adverb
Line 5: Rename title



Your turn!

_____

_____ _____ _____

_____ _____ _____

_____

_____

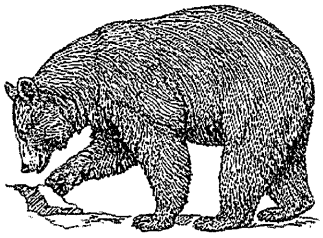
Who's Eating What?

Subject: Science & Art

Objective: Students will be able to create collages and complete a worksheet to identify animals as herbivores, carnivores or omnivores.

Materials:

- Wildlife magazines to cut up
- Scissors
- Construction paper
- *Who's Eating What* worksheet



Procedure:

1. Review food chains with students, and discuss classification of animals as herbivores, carnivores and omnivores.
2. Give students a 12" X 18" piece of construction paper. Have them divide it into three columns. Instruct them to label a column for each of the following: herbivore, carnivore and omnivore.
3. Provide students with magazines for cutting out pictures of wild animals. Have them put pictures in the appropriate columns.
4. Handout *Who's Eating What?* worksheet for classifying animals as herbivore, carnivore, or omnivore.
5. Answer key: 1. B, 2. A, 3. C

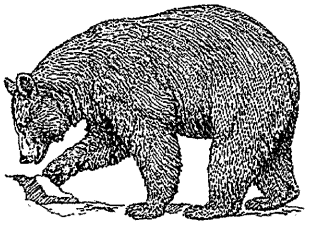
Species	Herbivore	Carnivore	Omnivore
Moose	X		
Black Bear			X*
Gray Wolf		X	
Porcupine	X		
Mule Deer	X		
Coyote			X*
Mountain Goat	X		
Striped Skunk			X
Raccoon			X*
Painted Turtle			X
Magpie			X
Cougar		X	
Longnose Leopard Lizard		X	
Gopher Snake		X	
Wolverine			X*
American Crow			X
Grasshopper	X		
Beaver	X		
Kingfisher		X	
River Otter		X	

*Note to teacher: Animals with an asterisk may be classified in science books as carnivores, but technically they will eat both plants and animals.

Who's Eating What?

Match the following term with the proper definition. Write the correct letter in the blank.

A. Herbivore B. Omnivore C. Carnivore



_____ 1. An animal that eats both plants and animals.
_____ 2. An animal that eats plants.
_____ 3. An animal that eats other animals.

Place an X in the appropriate column.

Species	**Herbivore**	**Carnivore**	**Omnivore**
Moose			
Black Bear			
Gray Wolf			
Porcupine			
Mule Deer			
Coyote			
Mountain Goat			
Striped Skunk			
Raccoon			
Painted Turtle			
Magpie			
Cougar			
Longnose Leopard Lizard			
Gopher Snake			
Wolverine			
American Crow			
Grasshopper			
Beaver			
Kingfisher			
River Otter			