LEVEL: Grades 4-8

SUBJECTS: Science, Social Studies.

PROCESS: Through becoming advocates for endangered species of plants or animals (creating "public relations campaigns" on behalf of these species), students observe patterns of the diversity of species on Earth.

OBJECTIVES: The student will:
1. *Identify environmental factors that can cause species to become endangered.*
2. *Research the current status of several endangered plants or animals.*
3. *Present persuasive arguments for the protection of a particular plant or animal species and write a report.*

TIMEFRAME: Preparation: Several days to gather information. Activity: Part A: 45 minutes; Part B: 50 minutes.

SKILLS: Analyzing, creating, researching, synthesizing.

MATERIALS: Activity: large sheets of colored construction or copy paper, paper and pencils for recording and reporting, copies of Student Pages 1-3. Variation: brown, white, and blue paper.

VOCABULARY: Blue whale, bobcat, endangered species, exploit, extinction, giant armadillo, in-cubate, primate, rare species, sol-itary, threatened species.

LIFE ON THE EDGE

OVERVIEW: Fossil records show us that the number and type of species that live on the Earth have changed regularly and continuously through time. There have been several periods of mass extinction in the Earth's history. In these events, individuals of a species were not able to adapt to large-scale changes such as climate change. The geological record shows that species extinction has been nearly as common as species origination. It is difficult to determine if the extinction rate we are observing today is normal or a sign of a global problem. While we know change is normal, some people think many of the changes brought about by humans today are causing larger numbers of animals to become extinct, and at a faster rate than is healthy for the planet.

In most places where animals are threatened with extinction, it is because of habitat destruction. A habitat is made up of both the living and non-living factors on which an animal depends. Habitat loss is the single greatest obstacle to helping many endangered plants and animals recover.

Scientists are working to find out more about how much habitat each species needs to survive, how we can restore habitats that have already been lost, and how we can balance human needs with the needs of other life on the planet. Ecosystem Managers have an awesome task.

Besides direct destruction of habitats by humans, other threats to plants and animals and their habitats include air pollution, destroyed watersheds, herbicides, pesticides, as well as exotic species that are introduced and that outcompete the native species. (Definitions for Endangered, Threatened, and Rare Species are provided on Student Page 1.) A lot of attention is focused on endangered animals, but we should not over-

Student Page 1. Sample species profiles are provided on Student Pages 2 and 3.

2. Students then take the role of an advocate for the species they selected. They imagine that they work for a public relations or advertising firm that has been hired to communicate to the public that the species is endangered and the public needs to take action. Teams of students create a campaign that might include slogans, posters, TV commercials, etc.

3. Teams present their campaigns to the rest of the group.

ASSESSMENT:

1. Have each team give a media presentation (skit, TV or radio commercial) that makes a case for protecting the endangered species they researched. They should be sure to include the basic information outlined in the questions on Student Page 1. They should also explain why certain actions should be taken. Tell students to be prepared to discuss trade-offs involved in preserving this species in terms of land, resources, people, money, and so on.

2. Have students create "clue cards" about the species they researched. Each card should have about five descriptive statements of the species, from general to specific. The answer goes on the back of the card. Hold an endangered species "bee" (like a spelling bee) to see who can identify the most species with the fewest clues. The following is an example:

-I live in the tropical rainforest.
-My fur looks green from algae that grows on it.
-My kind gives birth to live young.
-I move very, very slowly.
-My kind has three long toenails.

ANSWER: Three-toed sloth.

Evaluate the "animal clue cards" to assess their knowledge of the species and habitat characteristics.

EXTENSIONS: Have cooperative groups discuss and present examples of each concept to the other groups.

Concept 1:
Organisms change throughout their lifetimes. Species of organisms change over long periods of time.

Concept 2:
Although species become extinct naturally, the increasing number of extinctions in recent history may be linked to the rapid increase in human population.

Concept 3:
Increased public knowledge of the environment and the need for conservation of natural resources have resulted in lifestyle changes in many cultures.

Concept 4:
International cooperation directed toward conserving resources and protecting environmental quality is beneficial to human health and the well-being of other life forms.

RESOURCES:

An Atlas of Planet Management, Norman Myers (ed.), GAIA, 1984.

**The Wilderness Home of the Giant Panda*, William G. Sheldon, Amherts, MA, University of Massachusetts Press, 1975.

*The National Wildlife Federation, 1400 16th Street, NW, Washington, DC 20036, publishes *National Wildlife, Ranger Rick, Your Big Back Yard, NatureScope, International Wildlife, Conservation Directory.*

*The Nature Conservancy, 1815 North Lynn Street, Arlington, VA 22209, publishes *The Conservancy News.*

*U.S. Department of Agriculture, 14th Street and Independence Avenue, SW, Washington, DC 20250.

*U.S. Fish and Wildlife Service, Department of the Interior, 1849 C Street, NW, Roomm 3445, Washington, DC 20240 or 4401 North Fairfax Drive, Room 452, Arlington, VA 22203.

CREDIT: *Project Learning Tree Environmental Education Activity Guide: Pre K-8* © American Forest Foundation, 1993-1994.

2. Give each student a sheet of colored construction or copy paper. Have students stand about four feet (1.2m) apart on their papers. Students must keep one foot on this spot at all times, since it represents their habitat.

3. Randomly scatter the colored squares (prepared earlier) on the floor around the students so they're about one to two feet (1.2-6.1 m) apart.

4. Tell students they'll be playing a game called "Every Species for Itself!" The object of the game is for each animal to gather as many of the squares as it can. Explain that each colored square represents a necessity for species survival. Brown squares represent food, white signify space, and blue symbolize water.

5. Give the signal to start the first round. Have the "animals" reach with their arms to gather their requirements. Tell them they cannot step off their mats (habitats) at any time.

6. Let students gather requirements for ten seconds. Afterward, have the students record how many squares of each color they gathered. Discuss the results of the first round. Ask:

-How many requirements did each animal get?

-Are any animals lacking a particular requirement?

-What might happen to an animal species that is lacking a requirement? *(It might eventually become extinct.)*

7. Have students stand in groups of two or three per habitat sheet. Gather the requirements and spread them around the room again. Play another round and have students record their results.

8. Compare the results of this round with those of the first. In most cases, more students will be lacking essential requirements. Ask if they can come to any conclusions about what might happen when a species is crowded together. (They are often in competition for essential requirements.) Ask if any of the "animals" "died" because they couldn't get a particular requirement. (You can allow animals to fall down if they haven't received their basic needs.)

9. Ask:

-How might scientists use their knowledge of competition to help endangered species survive?

10. Try several more rounds, comparing the results each time. Here are suggestions for how to set up additional rounds: (As before, students should record their results for each round. Older students can later graph or chart the results of each round and draw conclusions.)

-Have only half the class participate.

-Use fewer water squares (representing drought or water contamination).

-Use fewer space squares (signifying a smaller habitat caused by human encroachment or the introduction of a species not native to the region).

-Use fewer food squares (illustrating less available food, whether caused by disease or natural disaster).

11. Ask students to consider the endangered species they learned about. Which ones do they think are more vulnerable to extinction and why? (Ones that are naturally rare within limited habitat range; ones that require very specialized diets and several habitats that they migrate to; ones that adapt very poorly to habitat or environmental changes.)

PART B SPECIES SPECIFICATION

1. Discuss the definitions of endangered, threatened, and rare species on Student Page 1 with your students. Provide students with a short list of rare, threatened, or endangered species. (Try to get a list of local endangered or threatened species from the state department of natural resources.) Ask students to select a species to research from the list. Instruct them to gather as much information as they can from encyclopedias and other resources, and put together a profile for that species. As students investigate, they consider the questions on

SPECIES PROFILES
(samples)

Giant Panda

Pandas live in the Himalayan range of central Asia, generally at altitudes between 5,000 and 10,000 feet (1,524 and 3,048 meters). It is believed that this territory is only a fraction of their former range. A few thousand years ago, giant pandas roamed throughout much of eastern China. Their range was diminished largely by the destruction of their natural habitat, the bamboo forests on steep mountain slopes.

The primary danger to the giant panda's habitat is caused by development. According to some maps, roads now penetrate the deep bamboo forests.

Bald Eagle

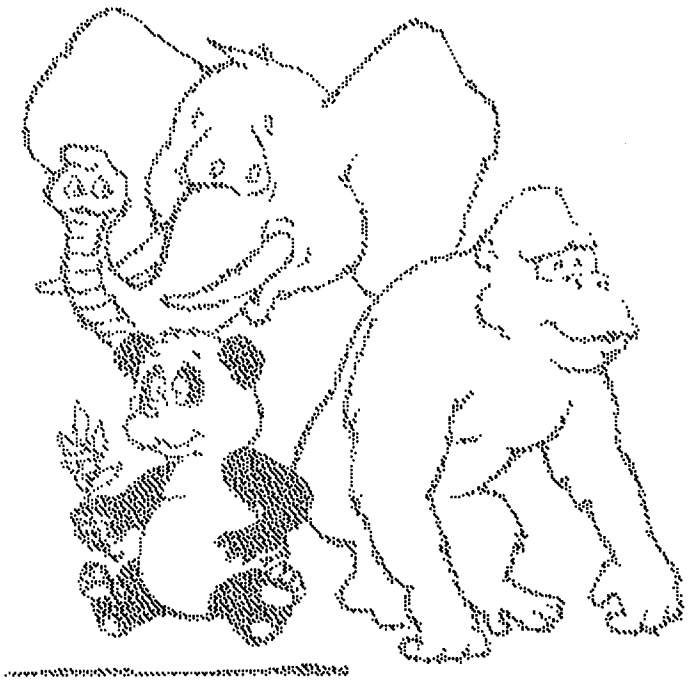
Bald eagles once inhabited most of North America. They frequent conifer forests located near water with abundant supplies of fish. They feed on carrion, rodents, and other small mammals. Bald eagles migrate south in the fall and roost in huge, communal nests they use year after year. Both parents incubate their usual two eggs. The parents share the responsibilities in feeding and caring for the young until they are about four years old.

The debilitating results of DDT poisoning (banned in the United States since 1972), poaching, and habitat loss have left a dwindling population. Bald eagles are endangered in most of the continental United States, except for the stable bald eagle population of 30,000 in Alaska and the threatened population in Washington, Oregon, Minnesota, Wisconsin, and Michigan. With gradual preservation and recovery efforts along with the banning of certain pesticides, the bald eagle has been making a slow comeback.

Key Deer

A subspecies of white-tailed deer, the Key deer of the Florida Keys prefer the hardwood, pine, and mangrove forests by day, but venture into meadows at night to feed. This deer has lived in isolation from the continental United States for thousands of years and exhibits solitary behavior that contrasts sharply with other white-tailed deer, which are communal in nature. About the size of a large dog, the Key deer breeds from September to November when it is three to five years old and usually has one offspring.

Motor traffic and loss of habitat caused by resort development have devastated the Key deer population, reducing it to fewer than 300 members. Strategies for strengthening the deer population include extending the boundaries of the Key Deer Refuge and enforcing lower speed limits at night.



LIFE ON THE EDGE

ENDANGERED SPECIES - A native species or subspecies that is in serious danger of becoming extinct throughout all, or a significant portion, of its range as a result of one or more causes, including loss of habitat, over-exploitation, competition, or disease.

THREATENED SPECIES - A native species that, while not presently threatened with extinction, is likely to become endangered in the foreseeable future if not given special protection and management efforts.

RARE SPECIES - A native species that, although not presently threatened with extinction, exists in such small numbers throughout its range that it may become threatened if its present environmental conditions worsen.

Species name:

1. What is its status? (see above)

2. Where does it live?

3. What does it look like?

4. What is its habitat?

5. What is the current range of its population? Has its range changed over the course of history?

6. Why is it endangered, threatened, or rare?

7. Are any current actions being taken to improve its chances of survival? If so, describe them. If not, or if you do not know of any, what can you suggest?

8. What are some ways in which people can reduce or eliminate the threats to the survival of this species?

9. What other species depend on it?

10. Give some reasons why it is important that this species survive.

11. How can you function as an ecosystem management team?

BEDROOM	KITCHEN
bed	refrigerator
dresser	stove
lamp	microwave
table	dishes
clothes	etc.
etc.	
LIVING ROOM	**BATH-ETC.**
sofa	mirror
chair	shower
lamp	vanity
coffee table	toilet
etc.	towels
	etc.

-How is each room in your home different? How are they alike?

2. Divide participants into six groups, one for each biome. Each group will complete a task card for the biome the students are interested in. If there are duplicate groups for some biomes and others aren't represented, have groups draw numbers (1-6) from a box or hat. Highest number chooses first, etc.

Hand out the task cards to each group. Each task card outlines the activity each group will accomplish. Review the process for group cooperation and explain the individual and group assessment checklist found on the back of each task card. The group should reach a consensus on evaluating the criteria for each individual's participation in the activity.

3. Supply one shoebox to each group to make a diorama of the biome the group has chosen. Construct the dominant species of plants found in the biome from construction paper or other materials. (An example of alternative materials may include dried weeds painted to look like the kinds of trees and shrubs in their biome and glued into the diorama for a three-dimensional effect.) Students will check their task cards for the procedure to name plants in the biome. Discuss the following questions with students:

-What kinds of plants did you include in your diorama?

-Why do your plants like living in this biome?

-Show me how your biome looks like a tropical forest, a grassland, a woodland, etc.

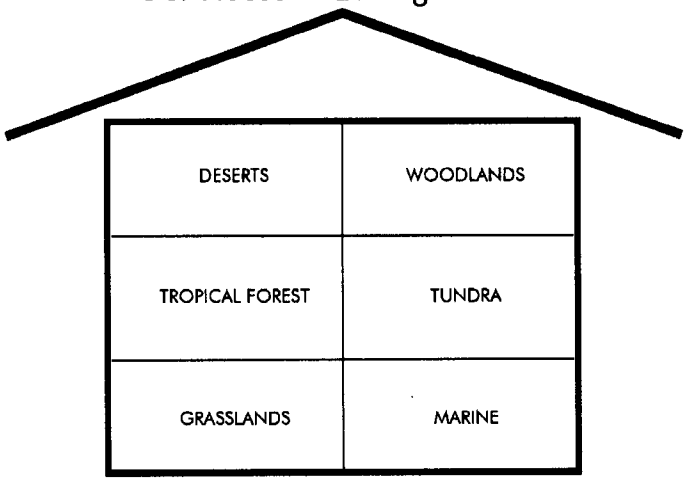
4. Construct the predominate animals found in their biome from clay. Have the students glue the figures into a place so that they are found in the habitat types for that animal in their diorama. Discuss the following questions with each group:

-Why do these animals live here?

-What are some reasons you will find prairie dogs in grasslands and not in woodlands?

5. The groups complete their task cards and the cooperative group work checklists. Each task manager is then ready to report to the class what was learned about the groups' biome and places the biome shoebox in a central location in the room. The biomes are stacked to represent the rooms in our earth home as illustrated below:

Our House = Ecoregion



Ask:

-How is each of these rooms alike? How are they different?

-If you were to choose an earth room (biome) to live in, which one would you like to live in the most? The least? Why?

-Which of the biomes in our earth home