

Endangered Species Lesson Plan

Developed by the Endangered Species Coalition and Dr. Wendy Brown

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Additional Resources

(Note: The lesson plan is subject to modification; including the addition of instructional elements and other material.)

Standards

The authors of this Endangered Species Curriculum have made an effort to ensure that it meets the National Science Education Standards developed by the National Research Council, and is appropriate for use by science teachers at many different levels.

Several of the featured lessons could be used across content areas including biology, ecology, environmental science, and the social sciences.

Testimonials

“The Fish and Wildlife Service strongly supports learning opportunities about the conservation of endangered species for students of all ages. By teaching students about endangered species, a connection is made to nature and conservation. This curriculum provides an effective tool to help teachers incorporate the study of nature in a way that is comprehensive, meaningful, and fun. “

Gary Frazer, Assistant Director, Endangered Species Program, Fish and Wildlife Service

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“This curriculum contains solid background information, lists of resources, and a diversity of activities that can engage students especially those in middle school through college level. The suggestion for the use of local examples and resources brings endangered species from an idea to a personal encounter.”

Pat Waller, former president of the National Association of Biology Teachers, and a long-time biology teacher. She has taught students in grades 5-12 and instructed pre-service science teachers.

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***Introduction**

This Lesson Plan was developed to provide elementary through high school teachers with a special resource to facilitate their classroom instruction of endangered species conservation. It is part of the Endangered Species Coalition's (ESC) and U.S. Fish and Wildlife Service's ongoing effort to provide educators with the appropriate resources to enhance their science, social science and related class curriculum.

It has been created with a multiple-lesson format, enabling instructors to cover the subject in a week-long sequence or other appropriate combination.

Each day's topic features three activities, including one or more in-class exercises and one for outside the classroom. Also included are hand-out materials and homework assignments. Suggested resources are provided at the end of the lesson plan.

Lesson Plan/Curriculum

Lesson One: Introduction to Endangered Species

Objective: Students will gain an understanding of the basic definitions of endangered species and why it is important to study.

Content Overview: The rapid loss of species throughout the years has not gone unnoticed. Spurred by decline of numerous species worldwide, Congress passed the *Endangered Species Preservation Act* in 1966, and then a more comprehensive law, the *Endangered Species Act*, in 1973. This legislation allows for the identification, protection, and recovery of threatened and endangered birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. Not only are the organisms/plants protected by this law, but so is the habitat the protected organism requires for survival. The ESA is administered by two federal agencies, the United States Fish and Wildlife Service (FWS) and the National Oceanic and Atmospheric Administration (NOAA).

It has been estimated that a fifth of the world's mammals, birds, reptiles and fish are in imminent danger of becoming extinct. There are more than 1,300 species listed as threatened or endangered in the United States, so designated by the U.S. Fish and Wildlife Service. Under the Endangered Species Act (ESA), species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" species are those likely to become endangered within the "foreseeable future." All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. "For the purposes of the Endangered Species Act, Congress defined species to include subspecies, varieties, and, for vertebrates, distinct population segments" (FWS)

Why do we study endangered species? There are several critical reasons:

*Ecological importance: Healthy ecosystems depend on plant and animal species as their foundations. When a species becomes endangered, it is a sign that the ecosystem is slowly falling

apart. Each species that is lost may trigger the loss of other species within its ecosystem. Humans depend on healthy ecosystems to purify our environment. Without healthy forests, grasslands, rivers, oceans and other ecosystems, we will not have clean air, water, or land. If we allow our environment to become contaminated, we risk our own health.

*Medical value: More than 50 percent of the 150 most prescribed medicines were originally derived from a plant or other natural product. For example, aspirin came from willow tree bark and the cancer drug Taxol was created from the endangered Pacific Yew plant. Only about five percent of known plant species have been tested for medicinal uses and there are thousands of plant species that have yet to be identified. Tens of thousands of Americans die every year from illnesses for which there is no known cure. The cures for these diseases may eventually come from plants, therefore, we must protect all species before they are lost forever from nature's medicine cabinet.

*Agricultural significance: Farmers are often viewed as the original conservationists. Many farmers set aside portions of their land as wildlife habitat and also work in partnership with groups such as Trout Unlimited to restore river and stream habitats for endangered and threatened fish and reptiles. Preserving biodiversity and functioning ecosystems is essential in protecting the health of our country's pollinators, without which we would be unable to maintain our abundant crops.

*Aesthetic/Recreational: The American tourism industry is dependent on plant and animal species and their ecosystems for their multi-billion dollar, job intensive industry. Every year, millions of people visit natural areas in the United States and participate in wildlife-related activities. From woodland hikes to beach going, outdoor activities are the second most popular travel activity (Travel Industry Association of America). The U.S. Park Service logs over 200 million visitors to our National Parks every year. The local economies of these areas benefit greatly from activities associated with these visits. The preservation of our nation's biological diversity is an extremely important facet to the travel industry's well-being.

Thus, it is essential that we understand the importance of endangered and threatened plant/animal species conservation and how as individuals we can make a difference.

Activities

Activity 1: The World of Threatened and Endangered Species

OBJECTIVE

Students will be presented with a scripted slide show which acquaints them with several endangered species in other countries and then an emphasis on species in the U.S. Students will then use this knowledge to play “The World of Threatened/Endangered Species” game with their classmates. Following the completion of this activity, students will:

- Understand that endangered species is a global issue.
- Learn the difference between the terms threatened, endangered, and extinct.
- Learn about and explain the ESA and overall goals of this legislation.
- Learn facts about select endangered species from around the world, with focus on those found in the United States, and be able to discuss.

BACKGROUND

In 2004, the International Union for the Conservation of Nature (IUCN) estimated that extinction rates increased by 100-1,000 times since humans first appeared. Renowned Harvard biologist E.O. Wilson now estimates that the rate will reach 10,000 times higher than background extinction by 2030. Scientists call this the “sixth great wave” of extinction—the greatest die-off of species since the dinosaurs. Recent, likely species extinctions in the wild are: the Yangtze River dolphin, Hawaiian crow, Western black rhino, Scimitar-horned oryx and Spix’s macaw.

MATERIALS:

[Slide show of threatened, endangered, and extinct species](#) (Available as PowerPoint and PDF).

[“The World of Threatened/Endangered Species”](#) Presentation Script

[“The World of Threatened/Endangered Species” Question](#) Cards (Teachers will print and cut out the cards.)

Above materials are provided as attachments.

PROCEDURE

1. Present the prepared slide show to students, using the prepared script to describe each slide.
2. Explain the game rules:
 - a. Two students will start by standing side-by side.

- b. The teacher will ask one of the questions from the question cards.
 - c. The first student to give the correct answer collects the card from the teacher and rotates to the next student
 - d. The next student stands and the two students compete to answer the next question
3. Begin the game.
 4. Continue until all cards have been distributed to the students.
 5. The student who collects the most question cards is the winner of the game.
 6. Collect all cards from students.

EXTENSION

Divide students into groups. Each group should choose five-six endangered species not presented previously. Students should research and create their own scripted slide show. Have each group present their slides to the rest of the class.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. What is one major reason that we study endangered species?
2. How are endangered/threatened species determined?
3. What did you learn about the status of species worldwide?
4. What is the Endangered Species Act and why is it necessary?
5. What is the difference in the terminology of threatened, endangered, and extinct? Give examples of species from each category.
6. What are the consequences of species loss?

Activity 2: Healing Plants (outdoor activity)

OBJECTIVE:

Students will be given a guided tour of the school grounds as the teacher points out and describes the plants that have medicinal value in our society. Students will then characterize the features of the plants described by the teacher. They will:

- Gain understanding of the role plants play in medicines.
- Be able to characterize key features of plants.
- Gain knowledge of the medicinal value of select plants.

- Be able to connect the loss of species to loss in potential medical cures.

BACKGROUND

When in search of medicines to cure a headache, relieve an upset stomach, or soothe a sore throat, most of us turn to our local drug store for a remedy. What you may not realize is that many of the remedies originated from plant materials. Oils, leaves, seeds, roots, and barks from members of the plant kingdom contain the cures for a wide assortment of ailments ranging from headaches and diarrhea to heart conditions and arthritis. According the World Health Organization, as much as 80% of populations in some countries still depend on traditional medicines, such as herbal remedies, as their primary medicinal source. While we don't necessarily have plants with medicinal value nearby the school, there are examples of such plants in our local area.

With the rapid loss of plant species across our planet, potential medicines are becoming extinct before they are ever discovered. Of the 380,000 identified plant species, as many as 1 in 5 are endangered of being lost from our planet forever. Could one of those plants potentially be a cure for a disease?

MATERIALS

- Field Guide or website listing the characteristics of medicinal plants (see suggested reading for resources)
- Medicinal Plant Data Sheet (See handout)
- Clipboards
- Writing Utensils (colored pencils suggested)

PROCEDURE

1. Prior to class, identify the different plants around the school that have medicinal purposes, if appropriate (such plants exist, etc.). Use a field guide or website to identify the history and medical benefits of the plants.
2. Explain to students that throughout early human history, man was able identify those plants that were helpful to their cure their ailments.
3. Explain that in order to remember which plants to return to for a particular medicine, one must have a general description of the plant's structure and growth habit.
4. Review plant characteristics with students – leaf shape, arrangement, attachment, flower arrangement, etc.
5. Pass out the plant data sheets and clip boards.
6. Guide the students through the plants previously identified around the school, telling them the history and medicinal purpose of each of the plants

- Students should fill in their “Medicinal Plant Data Sheets” as you provide them the necessary information. Give students several minutes to observe the characteristics of the plants and to fill in the plant data sheets.

Alternatively, teachers can fill in the Medicinal Plant Data sheets on plants found around the schoolyard. Copy and cut out the individual plant data charts. Working in teams, students go on a plant hunt using the description and pictures found on the data charts. Students collect leaves as evidence of finding the plant. (**Note: students should only gather leaves of plants that are not threatened or endangered.**)

If plants are not readily available around the school grounds, a teacher can bring plants from nearby parks or nature preserves and set them out around the school grounds for examination or on an outdoor table. Alternatively, if plants are not available, a teacher may want to just bring the students outside to a nearby tree and have them brainstorm the different parts of the tree that could potentially act as medicines.

EXTENSION

Have students collect and press the leaves from the plants (**that are not threatened/endangered**) discussed during the nature walk. Students can use their collected data along with the pressed leaves to create a poster board presentation.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

- Many of the plants around you school were not identified as being medicinal plants. Does that mean they have no importance in medicine? Explain.
- What parts of the plant can be used as medicines?
- What are some plants that you may have used or heard of as medicines?
- What connection can you make between species extinction and medicinal cures?

Handout: Medicinal Plant Data Sheet

Name _____ Date _____ Location _____

Common Name:	Sketch of Plant:
Medicinal Uses:	

Description of Habitat:	
Leaf Shape: Leaf Arrangement: Leaf Attachment:	
Additional Features: <i>(Seed description, flower description, color, etc.)</i>	

Common Name:	Sketch of Plant:
Medicinal Uses:	
Description of Habitat:	
Leaf Shape: Leaf Arrangement: Leaf Attachment:	
Additional Features: <i>(Seed description, flower description, color, etc.)</i>	

Common Name:	Sketch of Plant:
Medicinal Uses:	
Description of Habitat:	
Leaf Shape: Leaf Arrangement: Leaf Attachment:	
Additional Features: <i>(Seed description, flower description, color, etc.)</i>	

Common Name:	Sketch of Plant:
Medicinal Uses:	
Description of Habitat:	
Leaf Shape: Leaf Arrangement: Leaf Attachment:	
Additional Features: <i>(Seed description, flower description, color, etc.)</i>	

Common Name:	Sketch of Plant:
Medicinal Uses:	
Description of Habitat:	
Leaf Shape: Leaf Arrangement: Leaf Attachment:	
Additional Features: <i>(Seed description, flower description, color, etc.)</i>	

Common Name:	Sketch of Plant:
Medicinal Uses:	
Description of Habitat:	
Leaf Shape: Leaf Arrangement: Leaf Attachment:	

Additional Features: (Seed description, flower description, color, etc.)	
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Activity 3: Spread the Word -- Endangered Species Trading Cards

OBJECTIVE

Students will research the status of different species in order to create a set of endangered species trading card. These trading cards can then be use cards to educate a younger generation about the worldwide loss of plant and animal species

- Students will learn/explain facts about a select group of endangered species.
- Students will take part in educating others about endangered species.

BACKGROUND

The best way to get people interested in saving endangered species is to spread the word about what is happening to plant/animal species, around the world and in our own country. Conservation of our planet’s biodiversity requires a concerted effort not only from lawmakers and landowners but also from concerned citizens who educate themselves and others about what is happening and what the consequences are of species loss.

There are many ways to generate awareness of endangered species conservation among different audiences. Newsletter and magazine articles, speakers and on-site exhibits are a few options. Another is reaching children with something they are familiar with—trading cards.

MATERIALS

- Endangered species trading card template file or printed copies of the template (Blank and Top 10 species template files are available)
- Computer or printed resources on Endangered Species

PROCEDURE

1. Make arrangements with a K-5 classroom teacher ahead of time so you know language-appropriate level for the cards and how many cards you will need to make

2. Make the Endangered Species Trading Cards file available for the students to download. This will allow students to type information directly into the template. Alternatively, card templates can be printed and the students can handwrite in the necessary information.
3. Tell students they will be creating Endangered Species trading cards to distribute to grade school students. Be sure students understand that the text content must be suitable for the grade school level chosen.
4. Have students research their species and fill in the appropriate information in the trading card template.
5. Have students exchange cards with each other to complete peer editing of their cards.
6. After suggested changes have been made, have students print out and cut out their cards for distribution

Suggestions for Card Distribution: A) Make arrangements for the class to go to the grade school and talk to the students about Endangered Species. B) Ask for a few students to volunteer as Endangered Species Ambassadors and have them talk with students about endangered species; C) Give the cards to the teacher to distribute to their students.

EXTENSION

Have one/more students develop a card that offers a simple definition for “threatened” and “endangered.”

Write an essay about your experience with this stewardship activity and the importance of volunteering to preserve biodiversity

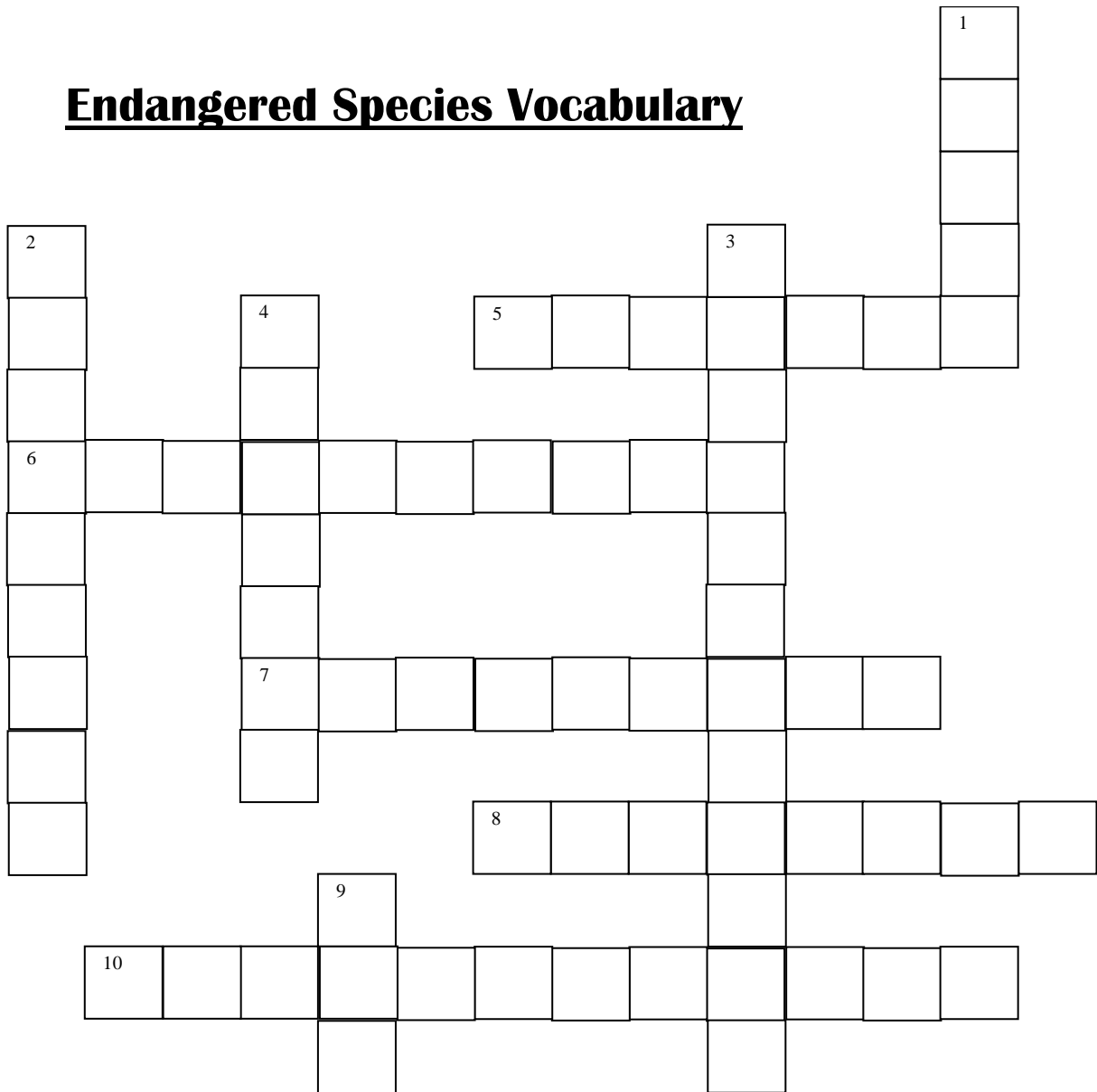
REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. What are some conservation groups that focus on conserving biodiversity?
2. What does it mean to be a steward of the environment?
3. How does this activity relate to species conservation and stewardship?

HOMEWORK—Crossword Puzzle As Attachment

Endangered Species Vocabulary



Use the clue below to complete the crossword puzzle.

1. The environment where the organism lives
2. _____ species are those that are safeguarded by law
3. Refers to the tremendous amount of variety of all living things
4. A group of individuals with a unique evolutionary life history
5. No longer in existence
6. An organism likely to become endangered in the near future
7. An organism likely to become extinct in the near future
8. A collection biotic and abiotic features of a particular area
9. Legislation pass by Congress in 1973 to help protect species from extinction
10. The planned management of a natural resource to prevent exploitation, destruction, or neglect.

Lesson Two: Causes of endangered species.

Objective: Students will understand the primary reasons that animal or plant species become threatened or endangered.

Instruction/Content Overview: While species naturally go extinct at a steady rate, human actions have greatly increased the rate of extinction. In 2004, the International Union for the Conservation of Nature (IUCN) estimated that extinction rates increased by 100-1,000 times since humans first appeared.

Renowned Harvard biologist E.O. Wilson now estimates that the rate will reach 10,000 times higher than background extinction by 2030. Scientists call this the “sixth great wave” of extinction—the greatest die-off of species since the dinosaurs. Recent, likely species extinctions in the wild are: the Yangtze River dolphin, Hawaiian crow, Western black rhino, Scimitar-horned oryx and Spix’s macaw. A number of human activities lead to extinction:

*Habitat destruction. Loss of habitat from commercial development and natural resource extraction has been a major reason. As roads, houses and apartment buildings are built, habitats on which certain species depend for survival disappear.

More recently, global warming has had a significant impact on habitat loss. Global warming is threatening wildlife, fish and plants who are already on the brink of extinction. Melting sea ice, warming ocean and river waters, shifting life cycles and migration are impacting endangered species, including polar bears, penguins, coral, salmon and migratory birds. A recently released report from the United Nation’s Intergovernmental Panel on Climate Change (IPCC) states that 20-30 percent of animal and plant species could be at an increased risk of extinction.

*Commercial exploitation. Many species have been endangered because of overfishing and hunting. The gray whale, alligator, and certain sharks are just a few examples of species whose populations severely declined after being caught at an alarming rate.

*Poisoning. Pesticide and herbicide chemicals often take a long time to degrade and build up in the soils or throughout the food chain. Some groups of animals such as amphibians are especially vulnerable to these chemical pollutants. In addition, predators such as hawks, owls and

coyotes can be harmed if they eat poisoned animals. The Bald eagle and American peregrine falcon became endangered when they ate small birds/other animals that had ingested poison, which often caused eagles and falcons to lay eggs that never hatched.

*Introduced species. The spread of non-native species has greatly impacted native populations around the world. Invasive species compete with native species for resources and habitat. They can even prey on native species directly, forcing native species towards extinction.

Since the Endangered Species Act was first introduced, there has been some disagreement over the causes of species decline. For example, some have emphasized that overfishing has not been a major cause of marine species becoming threatened/endangered or that climate change is not significantly impacting plants and animals. Scientists, conservationists and others dispute these and related claims. Some individuals question the value of protecting endangered species, considering the financial gain that they are able to make via resource extraction and development. Economists, doctors, conservationists and others point to the numerous economic, medicinal and ecosystem service benefits of protecting these species and their wild lands.

Activities

Activity 1: Broken Webs

OBJECTIVE

Students will create a food web of a forest community and then alter their food web based on three scenarios that adversely affect the environment. Students will:

- Gain an understanding (and explain) of the interdependence of species within an ecosystem.
- Be able to identify the causes of habitat destruction
- Describe the connection between habitat destruction and loss of species

BACKGROUND

Within any habitat is an intricate balance of organisms interacting with each other and their environment. A single group of organisms of the same species found within a particular habitat is defined as a population, while all the different species within a given area is referred to as a community. The community along with the nonliving components of a defined area is called an ecosystem.

A community is composed of a vast number of species interacting with each other through competition, predation, mutualism, commensalism, and parasitism. One way to organize all the different populations within a community is to place them into a scheme based on which species feed on each other, generating a food web. This type of scheme reveals the interdependence between the species found within a given area. Loss of a single species within a community can directly or indirectly affect up to 40 other species, drastically altering the dynamics found within the food web.

MATERIALS

- Handouts of “A Forest Web”
- Large sheets of blank paper or white boards
- Writing utensils

PROCEDURE

1. Review the following ecological terms prior to beginning this activity: population, community, food web, trophic level, producers, consumers, herbivores, omnivores, carnivores.
2. Pass out the “A Forest Web” handout and have students read the opening paragraph describing a forest community.
3. Working in groups, have students generate a food web based on the organisms discussed in the story.
4. Have students compare their web with other groups and make any new connections they see necessary.
5. Discuss the answers to questions 1-3 on the handout prior to continuing onto the scenarios.
6. Assign each group one of the three scenarios to investigate.
7. After completing the altered food webs and questions, have students present the scenario and the changes they made to the food web based on the habitat alteration.

EXTENSION

Assign students different types of habitats (desert, wetland, rainforest, etc). Have them write their own story describing the interactions among the species. Students can then come up with their own scenarios that would alter their chosen environment.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. What are the different forms of habitat destruction?
2. How does habitat destruction lead to loss of species?
3. What are persistent organic pollutants? How might they enter into water sources?
4. Why are some pollutants many times greater in top carnivores than in organisms at the base of the food chain?
5. What are exotic species? Identify some ways exotic species are introduced into a new habitat.

Handout: A Forest Web

A Forest Web

Somewhere in a typical North American forest, a tall, hardy white oak tree drops an acorn which is quickly gathered up by an eastern gray squirrel. A yellow warbler lands on one of the oak's upturned branches as it finishes off its second moth of the day. In the top branches, a great horned owl sleeps, waiting for the darkness to begin its hunt the one of the hundreds of unsuspecting rodents scurrying across the forest floor. An abandoned red fox burrow beneath a nearby fallen tree makes a sufficient home for a family of skunks. Above their home is a cascading stack of shelf mushrooms, one of the many fungi decaying the dead organic matter of the forest. Below their home live the millions of bacteria, worms, and micro- and macro-invertebrates inhabiting the dark, rich, fertile forest soil. In the distance is the howl of a Coyote, which causes a white-tailed deer to lift its head leaving its meal of grass for another time. A red-tailed hawk glides above the trees and gives out its unmistakable shriek, making the eastern cottontail freeze in its tracks. A fox snake beats its tail against a pile of leaves to mimic the sound of a rattle snake in hopes of warding off the predatory hawk. Along the ecotone of the forest, the showy white flowers of the dogwood shrub attract many insects. The bees and butterflies frequent the flowers often to feed on its nectar. A bullfrog leaps from the shore of a pond covered in duck weed hoping to find an insect meal. Through the clusters of cattails, a bass leaps from the water, undoubtedly in search for the minnows that reside in the waters that are murky from the scores of phyto- and zoo- plankton. An osprey soaring above eyes the movement in the pond hoping to score a fish of his own. A female wood duck glides down into the pond from her nest in the adjacent tree, letting out several quacks in an attempt to convince her ducklings to make the 30 foot leap from the nest above into the water. From a tall patch of grass, a grasshopper leaps up only to disappear with the flicker of the bullfrog's tongue.

Working in groups, diagram the interactions of this forest community by creating a food web. Be sure to indicate the flow of energy from one trophic level to the next using arrows.

- 1) Why are these interactions considered a web rather than a food chain?
- 2) Identify a food chain within your web consisting of a) three trophic levels b) four trophic levels and c) five trophic levels
- 3) Within your food web, identify the:
 - a. producers
 - b. consumers
 - c. herbivores
 - d. omnivores
 - e. carnivores
 - f. top carnivores
 - g. Mutualistic interactions
 - h. Predator-prey interactions

- 4) The following are three scenarios in which humans have altered the forest ecosystem, leading to dramatic changes in the food web. Redesign your food web to reflect these disturbances. Be prepared to explain your changes and reasoning to the class.

Scenario 1: Biomagnification of Persistent Organic Pollutants

A pollutant has accumulated in the pond of the forest. Accumulation of this pollutant causes death to the organisms at the top of the food chain. Redesign your food web to reflect the possible effects of the pollutant.

- A. Explain why you chose the changes you did to the food web.
- B. Which organisms are affected directly and indirectly from the toxins?
- C. Which species in the habitat will not be affected by pollutants? Why?

Scenario 2: Fragmentation of habitat (Loss of habitat)

A new six lane highway has fragmented the habitat into two smaller land plots. Redesign your food web to reflect the possible effects from this habitat alteration.

- A. Explain why you chose the changes you did to the food web.
- B. Which organisms are affected directly and indirectly from the fragmentation?
- C. Which species in the habitat will not be affected by a smaller sized habitat? Why?

Scenario 3: Invasive species

A new arthropod was accidentally introduced into the forest that inhabits white oak trees, eventually leading to their demise. Redesign your food web to reflect the possible effects from the introduced species.

- A. Explain why you chose the changes you did to the food web.
- B. Which organisms are affected directly and indirectly from the exotic species?
- C. Which species in the habitat will not be affected by the exotic species? Why?

Activity 2: Disappearing Habitats

OBJECTIVE: Students comparing three locations around the school to assess the level of habitat destruction and develop a plan to minimize habitat loss. Students will:

- Observe that loss of habitat is a main cause in endangered species, and explain the process.
- Investigate/describe the effect human development has on habitats.
- Use critical thinking skills to balance human inhabitation and habitat preservation.

BACKGROUND

The largest threat to species diversity is habitat loss. Humans have altered approximately 50% of the land on this planet for agriculture, grazing, urbanization, and recreation. Forests are shrinking, deserts are expanding, and wetlands are being filled in. Many times habitat destruction does not cause a complete loss in habitat but rather the land is subdivided into smaller parts. Habitat fragmentation creates small islands of land surrounded by pastures, crops, roadways, or even desolate land. These small plots of land are often too small to support top predators since these organisms require large hunting grounds. Fragmentation also isolates gene pools since of the species that do survive in the areas will not be able to move from the location to mate.

Species loss can also be contributed to the introduction of new species to an area. Introduced or exotic species are organisms that have been brought to a region, either purposefully or accidentally, in which they were never previously found. Some introduced species have a positive or no impact on the habitat but in many instances introduction of nonnative species has caused a decline in certain native species. Since the introduced organisms have not evolved with the native species, they lack the natural predator-prey balance that forms over long periods of time which may lead to an introduced species directly killing off native species. Introduced species may also cause species extinction by outcompeting the native species for resources. When these negative effects happen to the native species, the introduced species is referred to as an invasive species.

MATERIALS

- “Habitat Destruction Data Sheet” handouts
- Clipboards
- Writing utensils

PROCEDURE

1. Prior to class choose three locations around the school (or nearby the school) for students to investigate.
 - a) A location that has been minimally altered.
 - b) A location that has been moderately altered.
 - c) A location that has been significantly altered.
2. Tell students that they will be evaluating three disturbed areas for habitat loss.
3. Before taking the class outside, discuss the following concepts with the students: habitat destruction, biodiversity, native species, introduced/invasive species.
4. Show students the three locations you’ve identified for them to evaluate and have them write down their observations by filling in the data sheet.
5. When students return to the classroom, discuss the differences and similarities among the three locations.
6. Have students work in groups and develop a plan on how they could redesign the significantly altered location to conserve biodiversity while still maintaining its function. The plan should include a description and picture of the newly designed area.
7. Have students present their ideas to the class.

Alternatively, if observable areas are not available around the school grounds and if a trip to nearby sites is not possible, the teacher can display pictures of areas with different levels of destruction for the students to evaluate.

EXTENSION

Have students evaluate one of the areas with different interests in mind – how would this area be assessed if it were designed to benefit only one constituency, such as: a) a mayor, b) a home owner, c) a business owner, d) a fisherman, e) a hunter, f) an eco-tourist.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. Was it easier to find native or introduced species in each of the habitats? Why?
2. What are the consequences to biodiversity when habitats are altered habits?
3. Can there be a balance between nature and development? In what ways can areas be altered to maintain more of the biodiversity?

Handout: Disappearing Habitats Data Sheet

Habitat Destruction Data Sheet

Name _____

Date _____

Location A:	% Altered:
Description of Location:	
Description of Location Prior to Disturbance:	
Native Species:	Exotic Species:

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Location B:	% Altered:
Description of Location:	
Description of Location Prior to Disturbance:	
Native Species:	Exotic Species:

Location C:	% Altered:
Description of Location:	
Description of Location Prior to Disturbance:	
Native Species:	Exotic Species:

Activity 3: The Endangered Debate

Objective

Students debate opposing viewpoints associated with the causes of species becoming endangered. By completing this, students will:

- Have experience researching and presenting a controversial issue.
- Understand and explain the causes surrounding species extinction.
- Learn to work collaboratively within a group
- Use critical thinking skills to defend a point of view.
- Be challenged to question their own strongly held opinions.

Background

“Difference of opinion leads to inquiry, and inquiry to truth.” -- Thomas Jefferson

While the Endangered Species Act has contributed substantially to species and habitat conservation and there have been a number of endangered species recovery success stories (See Lesson 4), there are politicians, businesspeople and others who have disagreed with the way the Endangered Species Act is implemented. These individuals believe that a conflict exists between human interests and wildlife protection. For instance, some reason that butterflies, fish or other species shouldn't be protected if that will negatively impact the development of a commercial building, or that plants, wolves or birds on public lands should not be protected if that interferes with ranchers driving cattle on those lands. Builders, ranchers and other “special interests” often voice their opposition (to Congress, the Fish and Wildlife Service and other agencies) to the Endangered Species Act in general and about specific species being protected.

Of course, biologists, conservationists and others stress that the Endangered Species Act serves a vital role in species conservation and that it must be implemented without the undue influence of “special interests” that lack the scientific background to make the critical decisions. Furthermore, they state that there is no inherent conflict between human and wildlife interests. According to scientists, conservationists and others, by protecting wildlife and wild lands, we provide the greatest benefit to the greatest number of humans—clean air, clean water, medicines, eco-tourism dollars and more.

It is important for students to understand the complete picture and determine their own position based on research and evidence, rather than emotional arguments. In addition, they need to accept that as with other timely issues, there must be open discussion, without disharmony.

Materials

- Debate Rubric
- Computer/LCD (if assigning a PowerPoint slide presentation)

Procedure

1. Assign students into groups of 4-6.
2. Assign students a topic for the debate (below are some suggested topics) or have students come up with their own topic.

3. Students should decide what side of the debate they want to be on. Explain that some students may need to present an opinion opposite of their belief.
4. Pass out the “Debate Rubric” and go over the expectations for the project, along with deadlines for gathering information and presenting.
5. On the day of the debate, both sides will give 5-6 minute uninterrupted presentations explaining and supporting their position on the topic. Each member of the team must equally participate.
6. After both sides have completed their opening statements, the teams will get 2 minutes to work with their teammates to prepare a rebuttal.
7. Students get three minutes to present their rebuttal.
8. Repeat steps 6 and 7 as needed.
9. Open the debate to questions from the rest of the class.

Suggested Topics:

- *Is species extinction a serious threat or natural, inevitable process?*
- *Is global warming a threat to plant and animal species?*
- *Does saving endangered species positively or negatively impact economic prosperity?*
- *Should “special interests” be allowed to interfere with endangered species protections?*

Extension

- A) Have students prepare 2-4 PowerPoint slides to go along with their opening statements.
- B) Have students critically analyze their peers’ presentation by having them fill out the rubric after watching the debate.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. Summarize both sides of the issues debated in class today. Which viewpoint do you agree with and why?
2. Why is it important to know both sides of an issue?

Handout: Endangered Species Debate Rubric

Team Topic: _____

Team Members: _____

	4	3	2	1
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Quality of Information	Relevant, accurate information from a variety of resources	Relevant, accurate information from a limited number of resources	Somewhat relevant, accurate information from a limited number of resources	Non-relevant or inaccurate information from a limited number of resources
Use of Examples /Statistics	Use of many well supported examples and/or statistics	Used some examples and/or statistics	Used very few examples and/or statistics	Facts and statistics were not used or not accurate
Organization	Ideas were well organized; Team was prepared	Ideas were mostly organized; team was mostly prepared	Some ideas were organized; team was a sometimes prepared	Ideas were poorly organized; team was not prepared
Understanding of topic	Connected concepts and showed a clear understanding of the topic	Connected concepts and showed a clear understanding of the topic most of the time	Connected concepts and showed a clear understanding of the topic some of the time	Did not connect concepts, nor showed a clear understanding of the topic
Quality of Rebuttal	Strong, organized, effective rebuttal	Strong, organized, effective rebuttal most of the time	Strong, organized, effective rebuttal some of the time	Poorly organized, non-effect rebuttal
Presentation Skills	Presenters used appropriate eye contact, convincing tone, appropriate body language	Presenters used appropriate eye contact, convincing tone, appropriate body language most of the time	Presenters used appropriate eye contact, convincing tone, appropriate body language some of the time	Presenters did not use appropriate eye contact, convincing tone, appropriate body language

Score _____

Comments/Suggestions:

Lesson 2: HOMEWORK (to be added)

Lesson Three: Local Threatened/Endangered Species

Objective: Students will have a greater understanding of species in their state/county (as appropriate).

Content/Overview: We often hear much about “global” species being endangered/threatened, such as the elephant, rhinoceros and tiger. In the United States, the wolf, bald eagle and California condor are frequently highlighted in discussions of endangered species.

However, endangered species are found everywhere. In your own state and/or county, there are likely several species currently classified as threatened or endangered. Students will have a greater appreciation of the overall endangered species conservation subject when they are aware of those in their county and state.

(You can obtain information regarding local threatened/endangered species from your museum, zoo, library or Sierra Club chapter, and by checking with the Fish and Wildlife Service’s endangered species listing--www.fws.gov.)

Activities

Activity 1: Going Local

OBJECTIVE

Students will research species that are endangered within their state and/or county and incorporate what they have learned into a poster board presentation. Students will be able to:

- Conduct internet/library research on endangered species
- Understand and explain the connection of endangered species to their own locale
- Identify some of the reasons for species endangerment
- Identify and describe some ways for restoring species populations
- Incorporate written information into a visual presentation

BACKGROUND

Identifying and protecting endangered species occurs at both the federal and the state level. The U.S. Fish and Wildlife Service along with the National Oceanic and Atmospheric Administration (NOAA) oversee the Endangered Species Act which is designed to conserve the biodiversity within our nation. State governments also have a critical role in ensuring species protection and recovery by implementing and enforcing laws within their borders. And most states identify additional state-listed species. In order to protect specific populations, an endangerment of that species has to be identified. The Endangered Species Act lists factors that are used to help determine candidates to add to the Endangered Species list. These listing factors include:

1. The present or threatened destruction, modification, or curtailment of the species' habitat or range;

2. Overutilization for commercial, recreational, scientific, or educational purposes;
3. Disease or predation;
4. The inadequacy of existing regulatory mechanisms; and,
5. Other natural or manmade factors affecting the species' continued existence.

The FWS website, along with State Department of Natural Resources/related websites, provide a great deal of information about endangered species within each state. It is necessary to identify which species are imperiled (and why) before effective measures can be put into place for species recovery. In addition, readily available sources—such as your natural history museum, library and newspaper website/archive—offer additional material on the status of local species.

MATERIALS

- Computers with Internet access
- LCD projector (if available)
- Library or printed resources
- “Local Endangered Species” worksheet
- Poster board

PROCEDURE

1. Prior to class identify the FWS website and a state website (state Department of Natural Resources or other agency) that lists endangered species. The website for the Fish and Wildlife Service Endangered Species Program is: <http://www.fws.gov/endangered/>. Be sure you are able to navigate through these sites prior to showing them to the class.
Note: If using the FWS website, much of the information needed to fill in the worksheet can be found under the “Current Recovery Plan” link for a particular species.
2. Start by asking students to name some endangered species.
3. Ask them to name endangered species that occur in the U.S.
4. Finally, ask them to identify endangered species that occur within their state.
5. Show students where they can find out more information about endangered species that are specific to their state and/or county.
6. Pass out the “Local Endangered Species” worksheet.
7. Explain to students that each of them will investigate an animal and a plant species that are currently endangered within their state/county. (Depending on your state, you may have to look at state-listed species to identify endangered or threatened plants.)
8. Have students fill in the worksheet by summarizing the basic information found at these websites (species name, where found, why threatened/endangered, what is being done to protect it).
9. Students should then choose one of their identified species and develop a poster board presentation. The presentation should include the information from the worksheet, images of the species, and map showing the species' current distribution.

EXTENSION

Have students identify a related species in their area that isn't endangered and determine why. What is the difference between it and the endangered species they have already studied, in terms of population, habitat, and other factors?

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students. (Make sure they are relevant to your area. Not all counties have endangered species.)

1. Did your state have more plant or animal species listed as endangered?
2. Compare your species reason for decline with three other student's species reason for decline. Are they different? How?
3. Identify the number of endangered species within your county. What percentage of the state total does this represent?
4. Are species you reported on found in other states? Are they endangered in these other states?
5. What organizations/agencies in your county/region might have an impact on how species are classified?

Handout: Local Species Worksheet

Local Endangered Species: Animals

Name _____

Date _____

Name (Common): (<i>Scientific</i>):	Status:
---	----------------

Summarize the species' distribution:

Summarize the species' life history:

Summarize the reason for decline:

--

Summarize the action plan for recovery:

--

Local Endangered Species: Plants

Name _____

Date _____

Name (Common): (<i>Scientific</i>):	Status:
---	----------------

Summarize the species' distribution:

--

Summarize the species' life history:

--

Summarize the reason for decline:

Summarize the action plan for recovery:

Activity 2: Local Experts

OBJECTIVE

Students will learn about local endangered species by inviting, listening, and questioning a guest speaker.
They will:

- Research the organization and speaker.
- Develop open ended questions, ask the expert.
- Learn about and explain how to get involved with conservation at a local level.

BACKGROUND

Guest speakers provide an opportunity for students to hear firsthand about a particular group's or agency's knowledge and experiences. National organizations such as the National Audubon Society and the Sierra Club have local chapters that can be called upon to speak about locally endangered species and conservation efforts. Biologists from the regional Fish and Wildlife Service or NOAA office may also be available to speak to your class.

Inviting a speaker to your class will provide yet a different perspective to the students' understanding of endangered species conservation.

MATERIALS

- Necessary arrangements for a guest speaker
- "Guest Speaker" student worksheet
- Thank you cards/letters

PROCEDURE

Making arrangements

1. Find a guest speaker to invite to the class to talk about local endangered species.
2. Brief the guest speaker as to the topic you wish them to cover.
3. Determine any audiovisual equipment needed for the presentation.
4. Confirm the date, times, and locations with the speaker.

Preparing the students

1. Present students with the objective of the presentation.
2. Hand out the "Guest Speaker" student worksheet.
3. Tell students that they should prepare for the guest speaker by researching the mission of the speaker's organization and the background of the speaker.
4. Have students prepare three open-ended questions that they could possibly ask the guest speaker. Inform the students that the questions should not be personal in nature and should result in an open ended response.
5. Have students complete the "Guest Speaker" worksheet.

Prior to the speaker coming

1. Reconfirm times and location with the speaker.
2. Instruct students about appropriate behavior and respect when presented with a guest speaker.
3. Instruct students to take notes during the presentation.
4. Inform students of any assignments they will need to complete (essay, quiz, report, etc.).

Day of the presentation

1. Remind speaker of the amount of time he/she have to speak, leaving enough time for class questions.

2. Introduce guest speaker to the class.
3. Remain in classroom while the speaker is present.
4. Encourage students to ask questions.
5. Thank the speaker for coming.

After the presentation

1. Spend the beginning of the next class period discussing the experience and the information learned with the students.
2. Send a thank you card/letter to the guest speaker.

EXTENSION

Have students take the lead in preparing for the speaker. Assign different groups of students to a) make arrangements with the speaker, b) prepare for the speakers needs, c) introduce the speaker and encourage questions, d) follow up with a thank you letter.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. What were the main points of the speaker’s presentation?
2. What are the most critical conservation-related issues facing local plant/animal species?
3. What are local groups doing to help protect threatened/endangered species?

Handout: Guest Speaker Worksheet

Local Expert/Guest Speaker Worksheet:

Name: _____

Date: _____

Name of Speaker:	Title:	Organization or Agency:
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What is the role of this organization or agency in conservation of endangered species?		
Where is the national headquarters of this organization/agency? Local headquarters?		
What is the role of the speaker within this organization/agency?		
Decide on three questions to ask the guest speaker. The questions should not be closed ended questions (those that result in yes/no responses. The questions should not be personal in nature.		
<ol style="list-style-type: none"> 1. 2. 3. 		

Activity 3 – It’s Your Tour Now!

OBJECTIVE

Students will tour a local natural history museum, zoo, wildlife refuge, NOAA facility, national park, wildlife rehab facility, aquarium or botanical gardens and observe the exhibits that show local species. Students will turn their experience into a guided tour presentation. They will:

- Learn about and describe local animal/plant species.
- Summarize information obtained from the museum displays.
- Check and describe the endangered status of the species.
- Create a guided tour of their chosen species into a poster display.

BACKGROUND

Natural history museums, wildlife refuges, NOAA facilities, national parks, wildlife rehab facilities, zoos, aquariums and botanic gardens offer great venues to develop/enhance an understanding and appreciation of the dynamic natural world.

These resources provide a wealth of information about geology, zoology, marine science, entomology, paleontology, and mineralogy and often life and earth science specimens.

More of these kinds of locations are also creating displays that showcase the region’s threatened and endangered species. In addition, they often have extensive educational programs for both teachers and students.

MATERIALS

- Writing utensils
- notebooks/paper
- cameras
- museum brochures
- poster boards
- permission slips

PROCEDURE

1. Arrange for students to take a field trip to the local natural history museum, zoo, wildlife refuge, NOAA facility, national park, wildlife rehab facility, aquarium, botanic gardens or other appropriate location.
2. Explain to the students that during their tour of the location, they are to identify and characterize 6-8 local species to generate their own guided tour onto poster board.
3. Students should take notes about the exhibits – species, habitat, interesting facts, etc. – and take pictures if available and allowed. Alternatively, images of the species may be obtained from the institution’s website or from the Fish and Wildlife Service’s website.

4. Student should further research their species for additional information and to obtain the species' endangered status if applicable.
5. Students should summarize their information as if they were giving a guided tour of each exhibit.
6. The summaries and images should be displayed into a creative fashion onto poster board.

Alternatively: If a field trip cannot be scheduled, students may be able to take a virtual tour of a museum, zoo, botanic gardens or other facility on their website.

EXTENSION

Students may consider how to enrich the experience of threatened and endangered wildlife in captivity and/or what habitat restoration may help the species in the wild.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. What is the goal of a natural history museum? Based on your museum experience, are they accomplishing this goal?
2. What types of information can be learned from natural history museums?
3. Does your local museum do an adequate job expressing the issues associated with endangered species? What could be done differently to better emphasize this issue?

Homework

Exploring Your State Wildlife Action Plan

Congress asked every state and territory to develop a wildlife action plan to examine the health of wildlife and prescribe actions to conserve wildlife and habitats before they become rarer and more difficult to protect. Each state's action plan and action plan summary can be found at <http://www.wildlifeactionplans.org/>. Examine the summary of your state's action plan and:

- A. Summarize the total number of species found in your state, the number of species in need of conservation in your state, and the number of species listed as threatened/endangered in your state.
- B. Summarize the major habitat types in your state, their current condition, challenges to their integrity, and actions to conserve them.

LESSON Four: Recovery Success Stories

Objective: Students will have an understanding of how there have been positive developments in endangered species protection.

Content: It's important to share the positive news about America's leading role in successfully protecting endangered species. Since it was established, the Endangered Species Act kept an estimated 227 species from potentially going extinct between 1973 and 2004. Of the approximately 1,800 species ever listed under the Act, only 9 have been declared extinct—a 99% save rate. Here are four good examples of species recovery.

*Bald Eagle: The bald eagle was once on the brink of extinction due to habitat loss and the use of pesticides such as DDT. In 1963 there were less than 500 breeding pairs in the lower 48 states. The passage of the Endangered Species Act in 1973 led to the eagle being listed as endangered in 1976. Since that time, the eagle has benefited greatly from that protection and was reclassified from endangered to threatened in 1995. It has since recovered sufficiently that it was de-listed entirely on June 28th, 2007.

*Peregrine Falcon: Once listed as endangered, the peregrine falcon population has increased in response to reintroduction and habitat protection, as well as the elimination of other threats such as pesticide use. There are currently an estimated 1,650 breeding pairs in North America. The peregrine falcon is found on every continent except Antarctica and lives in a variety of habitats.

*Sea Turtle: All seven species of marine sea turtles are listed as either threatened or endangered, in part due to the enormous level of capture by shrimp trawlers in the Gulf of Mexico and Atlantic oceans. Through the enactment of regulations to protect sea turtles including the protection of nesting beaches and mandatory installation of turtle excluder devices on shrimp boats, there has been a steady increase in annual nest counts of most species.

*Southern Sea Otter: Recognized as an umbrella species for the conservation of California's near-shore coastal ecosystem, the southern sea otter was listed as threatened with the federal Endangered Species Act (ESA) in 1977. Its population once numbered over a million but was hunted to near extinction by the fur trade. Due to the Act's protections, sea otter numbers greatly

increased. Although it is considered one of the best marine conservation success stories, the otter remains listed as Threatened because some of its population numbers have plateaued or declined. There are now about 2,800 otters on the California Coast.

Activities

Activity 1: They're Back!

OBJECTIVES:

Students will work in groups to research an endangered species success story and create a presentation to inform the rest of the class about the reasons for the loss and return of the species and continued issues facing the species. Students will:

- Conduct research using reputable sources and present that research.
- Describe how humans have affected species in both negative and positive ways.
- Identify and explain methods for recovering species populations.

BACKGROUND

As a result of the actions initiated from the Endangered Species Act (ESA), the U.S. Fish and Wildlife Service, NOAA, conservation groups, and many committed individuals, numerous species are now on the road to recovery. According to a study by the Center for Biological Diversity, 93% of the species listed by the ESA have increased or remained stable in population. Some of the success stories in the United States include the:

- Bald Eagle
- Peregrine Falcon
- Manatee
- Green Sea Turtle
- Southern Sea Otter
- Maguire Primrose
- Black-Footed Ferret
- Gray Wolf
- Grizzly Bear
- Red-Cockaded Woodpecker
- Whooping Crane
- Brown Pelican
- American Alligator
- California Condor
- American Bison
- Kirtland's Warbler
- Aleutian Canada Goose

Optimistically, this is only the start to the continued repopulation of the many species currently in danger of extinction.

MATERIALS

- Research materials (internet, books, magazines, etc.)
- Presentation materials (Overhead projector, poster board, computer, LCD projector, etc)

PROCEDURE

1. Ask students if they know of any success stories of species recovery.
2. Share some additional stories with the class.
3. Tell students they will be working in groups to present a success story of a recovering species to the rest of the class.
4. Inform students that their presentation must include the species':
 - Current status
 - Life history
 - Natural habitat
 - Past and present range
 - Reasons for decline
 - Approach to recovery
 - Issues associated with recovery
 - Continued threats to species
5. Have the groups decide on a species from the list above and prepare a 5-10 minute presentation for the rest of the class.

EXTENSION

Have students convert their presentation into a skit that can be performed in front of the class. Students can take on roles of narrator, conservationists, landowners, hunters, etc. to explain the decline and recovery of the species.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. Why are many endangered species on the rebound?
2. What local species have recently improved?
3. Can you suggest key issues that have hindered (or may do so in the future) local species recovery?

Activity 2: Making Headlines

OBJECTIVES

Students will research a species that has been recovered from the brink of extinction and turn the information into a front page newspaper article, describing the reason for species loss and how the species recovered. Students will:

- Learn and explain the importance of the news media for informing the public about a concept.
- Be able to interpret information from different articles and websites.
- Learn the elements that go into writing an effective headline news article.
- Practice concise, active voice, informative writing skills.

BACKGROUND

In order for the public to react to critical events/other developments, they need to be made aware via articles in newspapers/magazines and website/blog articles. For example, media coverage about the loss of species and degradation of their habitat is essential to create understanding and support of actions leading to species recovery. Coverage about successes is equally important to maintain the momentum, letting the public know that all their efforts do have a positive impact.

Of course, there are different formats about which students should be aware. A headline/news article should objectively address the situation—the classification of a species to threatened status, for example. Feature stories don't necessarily cover a specific news event, and also enable the writer to cover the subject (a local group's efforts to restore critical habitat) in greater length. A letter to the editor offers individuals an opportunity to express their opinion about an article they have read or a particular issue.

MATERIALS

- Books, articles, websites about endangered species and their success stories
- Computers to type articles (if available)
- Various newspapers to show examples of effective headlines and article

PROCEDURE:

1. Ask students: What is the purpose of headlines? What makes a good/bad headline?
2. Discuss the elements of an effective headline. Be sure to stress the need for few well-chosen words in large type, tells the main idea of the story, has a subject and a verb, and entices the reader.
3. Ask students: What information should an article contain? Be sure to stress: who, what, when, where, why, and how.
4. Discuss the difference between headline news articles and featured news articles.
5. Ask students what type of writing styles would make an effective news article. Be sure to stress the use of active voice, concise information, and the need to capture a reader's interest at the very beginning.

An excellent teacher/student resource for writing a student news article can be found on the Scholastic website at <http://teacher.scholastic.com/writewit/news/index.htm>

6. Tell students that they will be writing a headline news article about the recovery of an endangered species, and what information must be included in the article (who, what, when, where, why, and how).
7. Have students look over some old newspapers you brought in to get a better understanding of what makes a headline news article effective.
8. Provide students with a list of species to choose from. See the background content of Day 4 Activity 1 for a list of suggested species.
9. Have the students write a 500 word article on the recovery of their chosen species.

EXTENSION

Have students review coverage of endangered species/habitat conservation in several issues of your local newspaper. Ask them to evaluate the overall focus.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. How can news stories influence our understanding regarding critical topics such as endangered species conservation?
2. When you read a newspaper or magazine article that seems slanted in favor of a particular group, do you seek other opinions?

Activity 3: Adopt-A-Species

OBJECTIVE

Students will gain a better understanding of one or more endangered species by “adopting” them and continuing to monitor their progress.

BACKGROUND

Adopting a specific species will further help students learn about the challenges endangered species face and the actions being taken to protect them.

By taking an even greater interest in a particular species, we get an up-close look at their habitat, why they became endangered, critical conservation measures, their chances for recovery and other factors. It can often demonstrate how students/others can take action to help encourage further protection of the species.

While it is natural for students/others to (symbolically) adopt a visible/well known species, it is equally effective to focus on a less recognizable plant or animal.

MATERIALS

- “Adopt-A-Species Nomination Form” handout
- Computer with Internet connection; alternatively, select species can be printed off the websites and given to students as handouts
- U.S./World Map to indicate location of species.
- Photos of selected species to mount on bulletin board.

PROCEDURE

1. Share with students some success stories introduced in the introduction of this section.
2. Ask students to brainstorm what is needed to create these success stories.
3. Students can nominate a species by filling out the “Adopt-A-Species Nomination Form.”
4. Choose three species from the nomination forms for the class to vote on to adopt. Consider breaking the class into groups, with each one selecting a different species.
5. During class, have students research their species and prepare a basic description: location, when classified as endangered/threatened, what caused endangered status, and the actions being taken to protect species.
6. On the wall map, indicate current range of species, in addition to any previous location it was also found.
7. Add photos of species to a bulletin board display.
8. Hold classroom discussion regarding the species adoption process.

EXTENSION

Continue monitoring the status of the adopted species throughout the semester/year, with students sharing updates regarding conservation measures and other developments..

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. What is the purpose of adopting an endangered species? What do we gain from this experience?
2. What factors should be considered in select a species for adoption?

Handout: Adopt-a-Species Nomination Form

Name _____

Date _____

Which species do you want to nominate for adoption?

Using space provided, explain why we should adopt this species.

- a. Which species is in need of support.
- b. Why it is necessary to save this species.
- c. What can be done to help ensure its recovery.

Contact information for your state legislators can be found at <http://www.usa.gov/Contact/Elected.shtml>. Use the sample business letter below to correctly format your letter. Turn the completed letter into you teacher for review before sending it to your legislator.

(Date)

The Honorable *(name of legislator)*
Address
City, State ZIP

RE: (Bill # or Subject)

Dear *(Senator/Representative) (Last name of legislator):*

I am writing you today to urge immediate action on the issue of

Sincerely,

(SIGNATURE)

(Your name)
Address
City, State ZIP
Telephone number

Lesson Five: What We Can Do

Objective: Students will have a better understanding of how individual actions do make a difference.

Content: Individuals can make a difference in helping to protect endangered species/habitat preservation. There are several ways to assist in species recovery:

Learn more about endangered species. The first step to protecting endangered species is learning about how interesting and important they are. Teach your friends and family about the wonderful wildlife, birds, fish and plants that live near you. For more information, visit www.stopextinction.org.

Assist with habitat restoration and other Endangered Species activities. National Endangered Species day is celebrated each year on the third Friday in May. Check www.EndangeredSpeciesDay.org as the day draws near for an event near you. Events are also held at zoos, aquariums, botanic gardens, wildlife refuges, parks and other locations throughout the country. See Activity 3 for suggestions.

Minimize the use of herbicides/pesticides on crops and home gardens. For alternatives to pesticides, visit <http://www.beyondpesticides.org>

Develop a backyard wildlife habitat. Provide habitat for wildlife by planting native vegetation in your yard. Native plants provide food and shelter for native wildlife (see the National Wildlife Federation's Garden for Wildlife program at: www.nwf.org/in-your-backyard). Attracting native insects like bees and butterflies can help pollinate your plants (see the Pollinator Partnership's planting guides for your region at: www.pollinator.org/guides.htm). Find details about native plants at <http://www.plantsocieties.org>

Avoid purchasing products made from threatened and endangered species. Overseas trips can be exciting and fun, and everyone wants a souvenir. But sometimes the souvenirs are made from species nearing extinction. Avoid supporting the market in illegal wildlife including: tortoise-shell, ivory, coral. Also, be careful of products including fur from tigers, polar bears, sea otters and other endangered wildlife, crocodile skin, live monkeys or apes, most live birds including parrots, macaws, cockatoos and finches, some live snakes, turtles and lizards, some orchids, cacti and cycads, medicinal products made from rhinos, tiger or Asiatic black bear.

Make your home wildlife friendly. Secure garbage in shelters or cans with locking lids, feed pets indoors and lock pet doors at night to avoid attracting wild animals into your home. Reduce your use of water in your home and garden so that animals that live in or near water can have a better chance of survival. Disinfect bird baths often to avoid disease transmission. Place decals on windows to deter bird collisions. Millions of birds die every year because of collisions with windows. You can help reduce the number of collisions simply by placing decals on the windows in your home and office. For more information on what you can do, check out these tips from the [US Fish and Wildlife Service](#).

Slow down when driving. Many animals live in developed areas and this means they must navigate a landscape full of human hazards. One of the biggest obstacles to wildlife living in developed areas is roads. Roads divide habitat and present a constant hazard to any animal attempting to cross from one side to the other. So when you're out and about, slow down and keep an eye out for wildlife.

Recycle and buy sustainable products. Buy recycled paper, sustainable products like bamboo and Forest Stewardship Council wood products to protect forest species. Never buy furniture made from wood from rainforests. Recycle your cell phones, because a mineral used in cell phones and other electronics is mined in gorilla habitat. Minimize your use of palm oil because forests where tigers live are being cut down to plant palm plantations.

Report any harassment or shooting of threatened and endangered species. Harassing wildlife is cruel and illegal. Shooting, trapping, or forcing a threatened or endangered animal into captivity is also illegal and can lead to their extinction. Don't participate in this activity, and report it as soon as you see it to your local state or federal wildlife enforcement office. You can find a list of state wildlife departments at <http://www.fws.gov/offices/statelinks.html>

Activity 1: Schoolyard Habitat

OBJECTIVES

Students will participate in species conservation by designing, building, and maintaining a schoolyard wildlife habitat. After the completion of this activity, students will:

- Have researched and be able to discuss practical wildlife habitats for a given area.
- Develop a proposal describing the different factors to consider when developing a habitat.
- Understand/discuss the different factors that are important within a habitat.

BACKGROUND

Establishing a wildlife habitat is a great way for students to get involved in not only beautifying their schoolyard but also learning how to directly help maintain local species. A schoolyard habitat creates an interactive setting where students can experience concepts of species interactions, conservation, and environmental stewardship. Designing a habitat starts with understanding the needs of the species you are trying to attract. Proper materials to provide cover from the elements, a source of water containing a correct balance of nutrients and pH, native plants to attract local species, and a food source to maintain the species existence –this is only a start to the many considerations that need to be made to create a self-sustaining home for native species. The National Wildlife Federation supports the development of schoolyard wildlife habitats by providing educational resources for teachers, including instructions on how to build, maintain, and certify a wildlife habitat area on school grounds.

MATERIALS

- How-to Build a Schoolyard Habitat guide from the National Wildlife Federation (<http://www.nwf.org/Get-Outside/Outdoor-Activities/Garden-for-Wildlife/Schoolyard-Habitats/Create/How-To-Guide.aspx>)
- “Schoolyard Habitat Proposal” worksheet
- Funds to purchase plants, ground cover, and other materials
- Contact numbers for local landscaping and natural resource experts

PROCEDURE

Before starting this project, teachers should talk with administrators about the logistics of starting a project at school.

1. Have students brainstorm as a group ideas about a school yard habitat.
 - a. where to place the habitat
 - b. the size the habitat
 - c. the type of habitat
2. After brainstorming, have students break into groups and further develop a plan for the schoolyard habitat. This planning process can result in a very general description that can be

further developed by the teacher or it can be a long term planning process where students can spend time researching plants, experts, materials, etc.

3. Have students put together a proposal of their schoolyard habitat using the provided worksheet. The proposal should include:
 - a. the type of habitat
 - b. where to place the habitat
 - c. the size the habitat
 - d. how much construction will cost
 - e. where the money will come from
 - f. who will build and maintain the habitat (class, volunteers, as senior project)
 - g. what type of plants and animals will be needed
 - h. what will be the water source/food source
 - i. what construction materials are needed
 - j. what type of animals will the habitat attract
 - k. expert contact information
 - l. aerial drawing of the habitat design
 - m. when it will be completed (vacation, weekends)
4. Have students present their proposal to the rest of the class.
5. The teacher can then select the project that is the most feasible for the school grounds.

Based on timing/student-teacher schedules, you can determine which of these students will be directly involved in the development of the habitat.

EXTENSION

Have students create a scale model of their habitat to display along with their proposal.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. What are some advantages of establishing a habitat on school grounds? What are some disadvantages?
2. Why is it important to use native plant species in the habitat?
3. Why is it important to understand soil and water composition within the habitat?

Handout: **Schoolyard Habitat Proposal**

Team Members: _____

A) Describe the type of habitat that will be constructed.

- B) Describe the location of the habitat on school grounds.
 - C) Give a rough estimate for the dimensions of the habitat.
 - D) Estimate the cost of construction. Be sure to show breakdown where the funds will be used.
 - E) What types of plants and animals will be purchase?
 - F) List the construction materials needed for the project and whether they will be available or needed to be purchased:
 - G) Propose an idea of how to raise the funds needed to support the project.
 - H) Propose who will build the habitat and who will maintain the habitat throughout the years.
 - I) What will be the supporting water source/food source for the habitat?
 - J) What type of animals will the habitat attract?
 - K) Make a list of experts needed to complete this project. Be sure to include their contact information.
 - L) Provide an aerial drawing of your habitat design.
-

Activity 2: Environmental Stewardship

OBJECTIVES

Students will gain a deeper understanding of the importance of habitat conservation and species monitoring in saving endangered species by researching and participating in an environmental stewardship activity. Students will:

- Define conservation, restoration, and stewardship.
- Learn about and explain the causes of habitat destruction and the importance of habitat restoration.
- Research different environmental stewardship activities available in their community.
- Participate in an environmental stewardship activity.

BACKGROUND

Saving endangered species goes beyond just protection of species; it must also include restoration of species' habitats. Restoration may be defined as the process of returning a degraded habitat to a condition that resembles its pre-disturbed state. Habitat degradation almost always has a human cause. Drainage of wetlands for housing developments, fragmentation of large land areas for roadways and commercial development, destruction of prairie and forest for agriculture and cattle ranches, logging, mining, oil drilling, and exploiting other natural resources is just the beginning of a long list on how mankind has destroyed or altered natural habitats. As the major cause of habitat loss, we should feel an obligation to ourselves and to future generations to try to restore our natural areas to a state that is healthy to native species.

Stewardship offers a way for people to influence positive change within their community. Stewardship is defined as the careful and responsible management of something entrusted to one's care. Every person has the chance to make a difference in their community by practicing environmental stewardship. Volunteer activities include the removal of invasive species, planting native plants, trail maintenance, participating in bird and butterfly counts, adopting recycling programs, waste clean-up, building and monitoring bird boxes, water quality monitoring, and stream bank, wetlands, marsh and prairie restorations.

MATERIALS

- Depends on stewardship activity
- “Stewardship Opportunity” Worksheet
- Permission Slips

PROCEDURE

1. Ask students to define stewardship. Have them then apply this definition to environmental stewardship.
2. Have them discuss why environmental stewardship is important.
3. Have them brainstorm on local activities that can be done by the classroom.
4. Assign each student to further research and identify at least two possible stewardship activities that the class could possibly participate in. You may want to give the students suggestions on where they can find these activities. Suggestions include local city/county parks department, State Department of Natural Resources, local Sierra Club, local Audubon society, local university extension office, Keep America Beautiful organization (www.kab.org), U.S. Geological Survey bird monitoring resource page (www.pwrc.usgs.gov/birds.html), North American Butterfly Association (www.naba.org/monitoring.html) and U.S. EPA (www.epa.gov/stewardship/).
5. Have students complete “Stewardship Opportunities” handout.
6. Collect the students' ideas and evaluate which ones would be applicable to do as a group during school hours.
7. Contact possible groups to determine if a stewardship activity can be set up for the class to participate in.

8. Make arrangements for activity to be completed.

Alternatively, if the activity cannot be completed as a class project, students can make arrangements to complete a stewardship activity on their own.

EXTENSION

Have students start a notebook where they can begin to catalog stewardship and other volunteer activities. Each entry in the notebook should include date, time, and location of the activity, activities performed, thoughts/perceptions about the activities you performed, and the contact information of the organizer of the activity.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. What is the definition of environmental stewardship? Why is stewardship essential for restoring specie populations?
2. Define “restoration.” Why is habitat restoration necessary to restore specie populations?
3. What is the major cause of habitat loss? Give examples of activities that lead to habitat loss.
4. What are examples of environmental stewardship activities?

Handout: **Stewardship Opportunity Proposal**

Name _____

Date _____

Organization	
Purpose of Organization	
Proposed Stewardship Activity	

Contact Information of Organization	

Organization	
Purpose of Organization	
Proposed Stewardship Activity	
Contact Information of Organization	

Activity 3: Celebrating Endangered Species Day

OBJECTIVE

Students will use their newly gained knowledge of endangered species to promote education and conservation activities prior to, during and following Endangered Species Day (5/20/11). Students will:

- Create educational materials to promote species conservation.
- Inform others about the issues surrounding endangered species.
- Participate in activities that will further generate awareness of the importance of endangered species conservation.

BACKGROUND

Educating others about the consequences of species loss is key to keeping the momentum going towards recovery. There are several annual days of recognition that focus on environmental concerns, including Endangered Species Day. Endangered Species Day was first held in 2006, following the U.S. Senate's unanimous approval of a resolution approving it as a day of recognition. Since that first year, Endangered Species Day has continued to grow, with more activities and events held and an increasing number of people involved. Each year, events and other programs are held at zoos, aquariums, schools, community centers, wildlife refuges, botanic gardens and other locations throughout the country.

Celebrating Endangered Species Day is a great way to get students involved in endangered species conservation. They can use their knowledge gained from the various activities in which they've been involved to make other students aware of the issues associated with endangered species.

MATERIALS

- Art supplies
- Computers/printers
- Sticker paper
- Paper with school letterhead
- envelopes
- State legislator addresses

PROCEDURE

1. Ask students to discuss why it is important to celebrate Endangered Species Day.
2. Have students then brainstorm ideas they can do on a limited budget to celebrate Endangered Species Day in the school and/or community. The Endangered Species Day Website (www.endangeredspeciesday.org) includes suggestions for potential events and a listing of the previous year's activities. *See below for additional ideas that can be used to promote the event.*
3. Pick the five or six most feasible ideas and have students sign up for one of the promotion concepts to put into action.
4. Arrange to have table displays for students to showcase their promotions before school, during lunch, and after school.
5. Determine what other community/group activities in which the students may want to participate.

Additional ideas that can be used to celebrate Endangered Species Day

Create Posters/Banners

- Have students design posters that spotlight different endangered species
- These posters can be made on poster board or can be computer generated and printed

Create “Save Me” stickers

- Using the Avery labels paper or other sticker paper, create computer generated stickers that contain a picture, name, and status of different species that have been listed by the Endangered Species Act. (The ES Day Website also has a sticker format that can be downloaded.)

Create informational fliers

- Create fliers that summarize the information learned about endangered species
 - Which species are endangered
 - Why they are endangered
 - What can be done to protect species

Develop a letter writing campaign

- Draft and make copies of several letters addressed to local and state legislators about saving a particular habitat or species.
- During the Endangered Species Day event, have a student explain what the letters are for and ask students if they would be interested in signing a copy of one of the letters.

Habitat Clean-up Sign-up

- Prior to the Endangered Species Day event, have a student contact the local parks and recreation department and ask them if they could set up a habitat clean up day for the school to participate in. Decide on place, date, time, and goal.
- During the Endangered Species Day event, have students promote the clean-up day and ask people to commit to participating by signing up for the event.

Community Activities

- Also, encourage students to join family members, neighbors and others in one of the planned Endangered Species Day activities during the week of May 20, 2011.

Saving Endangered Species Pledge

- Have students put together a pledge form, focusing on several things individuals can do or change in their lifestyle to help save endangered species. Be sure they are realistic changes that can be made by individual students. Students can also sign on to the pledge developed by the Endangered Species Coalition (ES Day Website).
- Design and hang a “I’ve taken the Pledge” poster on an open wall.
- During Endangered Species Day, have students present the pledge to other students.
- Students can place a name tag on the pledge wall if they agree to make at least one of the designated changes in their life to help save endangered species.

Be sure to register your school/other activity on the Endangered Species Day website.

EXTENSION

In addition to celebrating Endangered Species Day at school, make arrangements to promote the day to the community by setting up booths at the local mall or library the weekend before.

REVIEW QUESTIONS/ASSESSMENT

The following questions can be used as guidelines to develop assessment tools (quiz, essay, etc.) appropriate for your students.

1. Why do you think Endangered Species Day was created?
2. Why is educating others about endangered species important?
3. What other activities can be performed to promote saving endangered species?

HOMEWORK

Conserving Endangered Species Homework

Name _____

Date _____

Define conservation:

Describe three benefits of species conservation:

- 1.
- 2.
- 3.

Describe three issues associated with species conservation:

- 1.
- 2.
- 3.

Identify three things that you can personally do to conserve endangered species:

- 1.
- 2.
- 3.

Identify a local organization that is involved with conservation:

Organization:	
What is their mission?	
How does the organization carry out this mission?	
Which species are affected by this organization?	
Identify a success stories associated with this program	

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Additional Resources

SUGGESTED READING

The Biodiversity Crisis: Losing What Counts

Field Guide to Medicinal Wild Plants
Plants that Heal

Witness: Endangered Species of North America, Susan Middleton, David Liittschwager

The Atlas of Endangered Species: Revised and Updated (Atlas Of... (University of California Press, Richard Mackay (http://www.amazon.com/Atlas-Endangered-Species-University/dp/0520258622/ref=pd_sim_b_2))

Websites

WHO <http://www.who.int/medicines/areas/traditional/en/index.html>

KEW <http://www.kew.org/news/one-fifth-of-plants-under-threat-of-extinction.htm>

Endangered Species Coalition: www.stopextinction.org

U.S. Fish & Wildlife Service: www.fws.gov

IUCN, International Union for Conservation of Nature, www.iucn.org