

## Section

## 5.1

# Vanishing Species

**North Carolina Objectives** Objective 5.03 Assess human population and its impact on local ecosystems and global environments: Sustainable practices/stewardship

## ► Before You Read

Dinosaurs are probably the most familiar organisms that are extinct, or no longer exist. Many plants and animals that are alive today are in danger of dying out. Think of one animal and one plant that would change the way you live if they became extinct. Write the names of those organisms on the lines below and tell why you think each is so important.

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## ► Read to Learn

### STUDY COACH

Mark the Text

**Identify****Threats to Biodiversity**

Highlight all the threats to biodiversity that you read about in this section.

**✓ Reading Check**

1. Where is the most biodiversity found?

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## Biological Diversity

Biological diversity is also called biodiversity. **Biodiversity** refers to all the different species in a specific area. The most common way to measure biodiversity is to count all the species in a certain area. For example, an area of farmland might grow one type of corn. It might also contain hundreds of species of insects and several species of birds and other animals. The same size area of tropical rain forest might include hundreds of different types of plants, thousands of different insects, and hundreds of different types of birds. The rain forest has a greater biodiversity than the cornfield because it has a greater number of species in the same area of space. Areas of the world that have the highest biodiversity are those found in warm, tropical places near the equator. Such places include rain forests, coral reefs, and tropical lakes. 🌿

## What do biodiversity studies tell us?

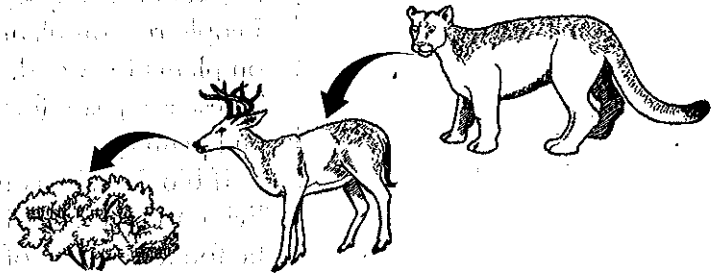
**Studying Biodiversity** For many years, ecologists have studied the plants and animals on islands to learn more about biodiversity. In one study, scientists chose some small islands and counted the spiders and insects on the islands. Then they removed all species from the islands except for the trees. This is what they found.

(1) Insects and spiders returned first. (2) The farther the island was from the mainland, the longer it took for the species to move back. (3) Eventually, the islands had about the same number of species as they had in the beginning. However, some of the species were different. They also found that for the most part, the larger the island, the more species that live on it.

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**Vanishing Species, continued**

Biodiversity research is not easy. Some scientists work for weeks at a time hundreds of meters off the ground in trees in rain forests. Others work counting all the species that live in coral reefs. Still others work in labs studying the DNA of members of different populations. They look to see how or if these populations are changing.



**Importance of Biodiversity**

All living things are interdependent. This means they depend on other living things to stay alive. For example, animals need plants to survive. Most animals either eat plants or eat other animals that eat plants. Also, many plants need animals to survive. Some plant species, for instance, need bees or other animals to take their pollen from one plant to another so that the plants can reproduce. This is just one example of how plants need animals to survive. ✓

**✓ Reading Check**

2. What does it mean to say that all living things are interdependent?

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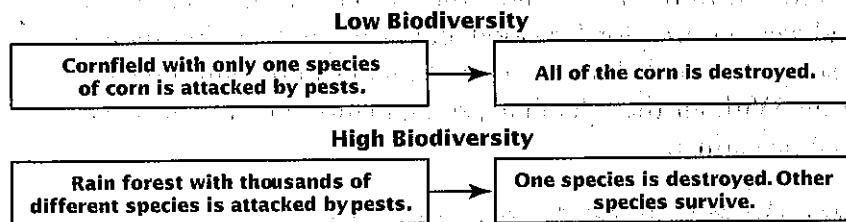
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**How do species depend on each other?**

Species that live together in the same area often depend on each other. They form symbiotic relationships. Symbiotic relationships, you will remember, are close, permanent, dependent relationships between two or more organisms of different species. Because of this dependence, when one species permanently disappears, it affects the species that remain. An organism suffers when a plant or animal it feeds upon is permanently removed from a food chain or food web. A population may exceed the area's carrying capacity if its predators are removed.

**Biodiversity Brings Stability** Biodiversity can bring stability to an ecosystem. Compare the following ecosystems.



Cornfields contain only one type of plant. Therefore, biodiversity is low and the ecosystem may not remain stable if there is a change in species. Rain forests have many types of plants. They have high biodiversity, which means the ecosystem could remain stable even if there is a change in species.

Section 5.1

Vanishing Species, continued

**Importance to People** Humans also depend on other organisms. People rely on plants and animals for food. People also rely on plants for wood, cotton, and many types of medical drugs. These are just a few examples of how people depend on animals and plants.

If biodiversity continues, people will always have a supply of living things. One day, drugs to cure cancer or HIV might even be found in some of these living things.

**Loss of Biodiversity**

Biodiversity can be lost when species become extinct. **Extinction** (ek STINGK shun) is the disappearance of a species when the last of its members dies. A certain amount of natural extinction goes on all the time. But now it seems that more than usual is occurring. This could be due to a difference between human needs and available resources.

A species is considered to be an **endangered species** when its numbers become so low that extinction is possible. When a species is likely to become endangered, it is called a **threatened species**. African elephants are one example of a threatened species.

**Threats to Biodiversity**

The complex interactions among species make each ecosystem unique. Within each ecosystem every species is usually well adapted to its specific habitat (the place where a species lives). This means that changes to a species' habitat can threaten the species with extinction. In fact, habitat loss is one of the biggest reasons for decline in biodiversity.

**Habitat Loss** One example of habitat loss is in the Amazonian rain forest. In the 1970s and 1980s, thousands of hectares of land were cleared for firewood and farming. Clearing the land destroyed many habitats. None of them can be built up again easily. Without these habitats, some plants and animals may become extinct.

**How does habitat fragmentation affect biodiversity?**

**Habitat Fragmentation** Another threat to biodiversity is habitat fragmentation. **Habitat fragmentation** is the separation of wilderness areas from other wilderness areas. The fragmented areas are similar to islands. They are cut off from other habitats.

✓ Reading Check

3. What is habitat fragmentation?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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**Vanishing Species, continued**

Fragmentation can cause species diversity to drop. This happens when some species leave an area that has become unsuitable for them. Then, other species that depend on these species also leave or die out. When species leave a fragmented area or die out, overall species diversity declines.

Habitat fragmentation can cause members of the same species to become separated from each other. Some members get stuck in one fragmented area while others get stuck in another. Then the two populations cannot interact. This means that the members of one population cannot breed with members of the other population. Genes from one population cannot mix with the genes from another. This is known as genetic isolation.

**Edge and Size** The edge of a habitat is where one habitat meets another. A forest meeting a field or a road cutting through a forest are two examples of edges. Conditions along the edges are different than they are in the middle of a habitat. These different conditions are called **edge effects**. Because of the different conditions, different organisms may live at the edge of a habitat than in the middle of a habitat.

### How does pollution affect the environment?

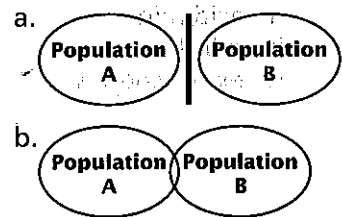
**Habitat Degradation** Habitat degradation is another threat to biodiversity. **Habitat degradation** is damage to a habitat caused by air, water, or land pollution. Air pollution can cause breathing problems. It can also irritate the eyes and nose. **Acid precipitation**—rain, snow, sleet, and fog with low pH values—has damaged some forests, lakes, statues, and buildings. Acid precipitation forms when pollutants in the air combine with water vapor in the air. When these acidic droplets hit Earth, the moisture takes nutrients out of the soil. Without the nutrients, many plants become sick and die.

The Sun gives off waves, called ultraviolet waves, which can damage living things. Earth has an area in its atmosphere, between 15 km and 35 km altitude, called the **ozone layer**, which absorbs some of these ultraviolet waves before they reach Earth. Pollution has damaged the ozone layer. Today more ultraviolet waves reach the Earth than in the past. Over some parts of Antarctica, the amount of ozone overhead is reduced by as much as 60 percent during the Antarctic spring. This seasonal reduction of ozone is caused by chemicals such as chlorofluorocarbons (CFCs), which are produced by humans. ☺



### Think it Over

**4. Interpret** Which diagram demonstrates habitat fragmentation? (Circle your choice.)



### Reading Check

**5:** Why do more ultraviolet waves reach Earth today?

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**Vanishing Species, *continued*****Think it Over**

6. **Conclude** Which of the following does not threaten biodiversity? (Circle your choice.)
- acid rain
  - rain forests
  - exotic species

**Water Pollution** Water pollution degrades, or damages, habitats in streams, rivers, lakes, and oceans. Many different kinds of pollutants can harm the living things in these habitats. Examples include detergents, fertilizers, and industrial chemicals that end up in streams and rivers.

**Land Pollution** Land pollution comes in many forms. One form is chemicals used to kill plant pests. Many years ago DDT was often sprayed on food crops to control insects. Birds that ate the insects, plants, or fish exposed to DDT had high levels of DDT in their bodies. The DDT passed from the birds to the predators that ate them. Some of the predators, such as the bald eagle, laid eggs with very thin shells because of the DDT in their bodies. The thin shells cracked easily and many of the eagle chicks died. The use of DDT was banned in the United States in 1972.

**Exotic Species** Sometimes people bring new plants or animals to an ecosystem where these organisms have not lived before. In other words, these species are not native to the area. Such species are called **exotic species**. When they begin to live in a new area, they can upset the biodiversity in that ecosystem. For example, many years ago, goats were taken to Catalina Island off the coast of California. There had never been goats on the island. As the goats multiplied, they ate more and more of the plants on the island. Eventually, 48 kinds of plants that used to be on the island were gone. They disappeared because the goats had eaten all of them. When exotic species are taken to a new area they can multiply quickly because they do not have natural predators in the new area.

**After You Read****Mini Glossary**

- acid precipitation:** rain, snow, sleet, or fog with a low pH, which causes damage to forests, lakes, statues, and buildings
- biodiversity:** the variety of species in a particular area
- edge effects:** different environmental conditions that occur along the boundaries of a habitat
- endangered species:** a species in which the number of individuals becomes so low that extinction is possible
- exotic species:** species that are not native to an area
- extinction:** the disappearance of a species when the last of its members dies
- habitat degradation:** damage to a habitat by air, water, and land pollution
- habitat fragmentation:** the separation of wilderness areas from other wilderness areas
- ozone layer:** a region of Earth's atmosphere between 15 km and 35 km altitude
- threatened species:** a species that is likely to become endangered

## Section

## 5.1

**Vanishing Species, continued**

- Review the terms and their definitions in the Mini Glossary on page 48. Circle the terms that refer to things that pose a threat to the biodiversity of an area.
- Use the outline to help you review this section. Use the question clues below and the headings in Read to Learn to fill in the blanks.

## I. Biological Diversity

- (What is it?) \_\_\_\_\_
- (How is it measured?) \_\_\_\_\_
- (Where is the highest biodiversity?) \_\_\_\_\_

## II. Importance of Biodiversity

- (What is true of all living things?) \_\_\_\_\_  
\_\_\_\_\_
- (What can biodiversity bring to an ecosystem?) \_\_\_\_\_  
\_\_\_\_\_
- (What benefit might preserving biodiversity bring humans in the future?) \_\_\_\_\_  
\_\_\_\_\_

## III.

- Extinction can occur
- Species can become endangered or threatened

## IV.

- Habitat fragmentation
- Habitat degradation

- In Column 1 are some new concepts you learned about in this section. Column 2 gives one example of each concept. Write the letter from Column 2 on the line next to the concept that matches the example.

## Column 1

- \_\_\_\_\_ 1. habitat fragmentation
- \_\_\_\_\_ 2. biodiversity
- \_\_\_\_\_ 3. extinct species
- \_\_\_\_\_ 4. land pollution
- \_\_\_\_\_ 5. habitat degradation

## Column 2

- a. all the species in an area of rain forest
- b. DDT
- c. acid precipitation
- d. a road splitting a forest in half
- e. triceratops dinosaurs



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