

**FOCUS  
ON  
SCIENCE**

# Interaction Among Populations

Advanced Level



Life Science  
Animals and Plants in Their Environment

**FOCUS**curriculum

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## Interaction Among Populations

### Scientific Inquiry

**Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.**

Use conventional techniques and those of their own design to make further observations and refine their explanations, guided by a need for more information.

Use appropriate tools and conventional techniques to solve problems about the natural world, including: measuring, observing, describing, classifying, sequencing

### Life Science

**Organisms maintain a dynamic equilibrium that sustains life.**

All organisms require energy to survive. The amount of energy needed and the method for obtaining this energy vary among cells. Some cells use oxygen to release the energy stored in food.

The methods for obtaining nutrients vary among organisms. Producers, such as green plants, use light energy to make their food. Consumers, such as animals, take in energy-rich foods.

Herbivores obtain energy from plants. Carnivores obtain energy from animals. Omnivores obtain energy from both plants and animals. Decomposers, such as bacteria and fungi, obtain energy by consuming wastes and/or dead organisms.

**Plants and animals depend on each other and their physical environment.**

Energy flows through ecosystems in one direction, usually from the Sun, through producers to consumers and then to decomposers. This process may be visualized with food chains or energy pyramids.

Food webs identify feeding relationships among producers, consumers, and decomposers in an ecosystem.

Matter is transferred from one organism to another and between organisms and their physical environment. Water, nitrogen, carbon dioxide, and oxygen are examples of substances cycled between the living and nonliving environment.



## English Language Arts

The following is a selective listing of the competencies and indicators addressed in this book.

### Literacy Competencies

#### Word Recognition

- Recognize at sight a large body of words and specialized-content vocabulary

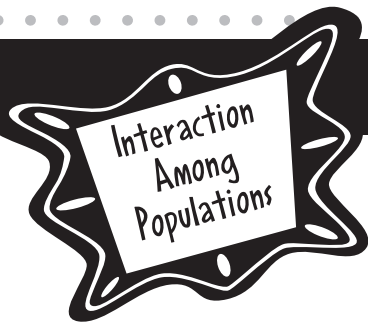
#### Background Knowledge and Vocabulary Development

- Determine the meaning of unfamiliar words by using context, dictionaries, glossaries, and other print resources, including electronic resources

#### Comprehension Strategies

- Ask questions to self-monitor comprehension, to clarify understanding, and to focus reading





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### How to Help Your Students Make the Best Use of This Book

Encourage students to develop nonfiction literacy skills by completing the Active Reader activities. Also encourage them to . . .

- Underline main ideas in paragraphs.
- Circle details that support the main ideas.
- Write down questions as they read.
- Circle key words as well as unfamiliar words.

### Printing Instructions

**Student Book:** print pages 5–28

**Assessments:** print pages 29–32

**Answer Key:** print pages 33–36



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# Interaction Among Populations



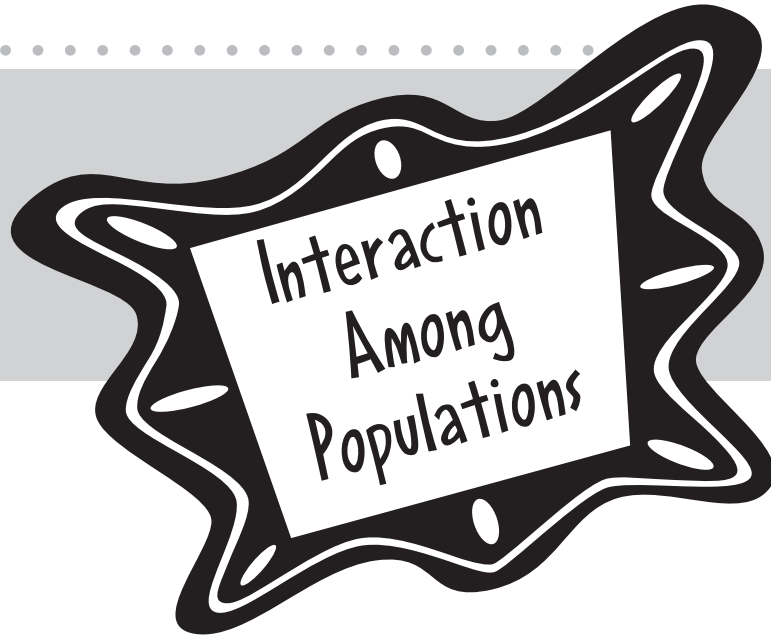
**How does the transfer of matter and energy through biological communities support diversity of living things?**

Plants and animals may not have conversations with each other, as humans do. Yet they live together and depend on each other for their very survival. In fact, no organism on Earth lives completely independent of other living things. Whether fish, fungus, butterfly, bat, or bacteria, if it's alive, it needs other organisms to stay alive.









# Table of Contents

## Starting Points

Build Background .....	8
Key Vocabulary .....	9
Key Concepts.....	10

## Chapter 1 Nature's Roles and Relationships .....

Populations in a Habitat .....	11
<i>Think Like a Scientist: Classify</i> .....	13
<i>Think Like a Scientist: Food Chain</i> .....	15
Competition .....	16
Cooperation.....	17
Stop and Think .....	19

## Chapter 2 The Effects of Change .....

Biotic and Abiotic Factors .....	20
Invasive Species .....	24
Stop and Think .....	26

## Glossary .....

## Assessments .....

## Answer Key .....





## Build Background

### Use Your Knowledge

The world's ecosystems are characterized by climate and weather patterns that are unique to that ecosystem. They also are home to organisms, plants and animals, that are uniquely adapted to the environment. Another word for *ecosystem* is *biome*. On the lines below, list as many different types of biomes as you can.

### Details, Details

Choose one of the biomes you listed above. Draw or list the different organisms and natural features you would find there.

### What's the Difference?

Explain the relationship between a biome and a habitat. If you're not sure, come back to this question after you've read Chapter 1 of this book.





## Key Vocabulary

### Rate Your Knowledge

The words listed below have to do with ecosystems. Each word is important, but some of them may be new. Read each word. Rate your knowledge of each by putting a check or a few words in the appropriate column. After completing this book, come back to this page and write the definitions of words you did not know.

	I don't know it.	I've seen it and I think it means . . .	I know it well. It means . . .
predator			
prey			
host			
biome			
habitat			
interact			
consumer			
producer			
population			

### Related Words

Write as many other words as you can think of that begin with these word parts.

1. *bio-*

2. *consum-*

3. *produc-*

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# Key Concepts

## What Organisms Need

Living things are called organisms. An organism can be a plant, animal, fungus, or micro-organism such as a bacteria.

### Habitat

All organisms live in a particular habitat. This is their natural environment. For example, most dolphins live in a marine habitat, generally in shallow seawater. A few types of dolphin, however, live in freshwater rivers.

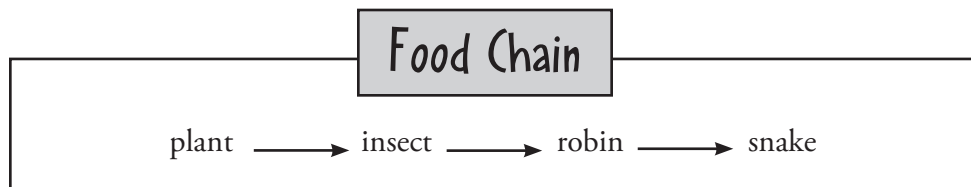
The habitat an animal lives in must be able to support that animal's life. It needs to contain sufficient food and water, and provide protection and shelter necessary for life. Habitats can be interconnected, and different habitats support different communities of plants and animals in an ecosystem.

A biome is where several ecosystems intersect. For example, the grassland biome is home to many organisms. Large bison may live and range widely as they graze among the many grasses. Tiny dung-beetles enjoy a much smaller habitat within the grassland—a pile of bison manure.

### Energy for Life

All organisms reproduce, grow, and respond to stimuli, such as heat or pressure. To do each of these things, organisms need energy. Plants create energy using sunlight to change water and minerals into sugar. Animals eat plants and/or other animals for energy. Other living things use different methods for getting energy.

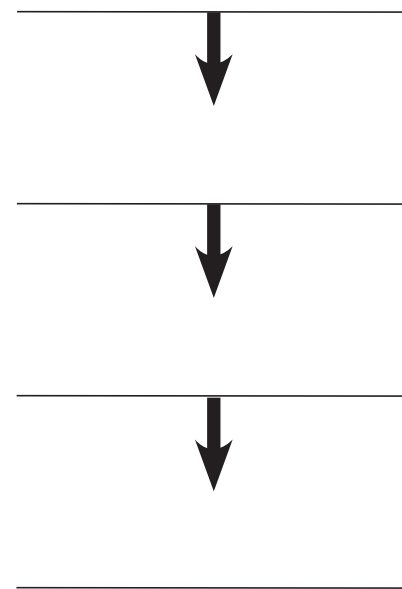
Food relationships within an ecosystem can be shown as a food chain. For example, a plant produces its own food using the process of photosynthesis. An insect may eat that plant and benefit from its energy. Then, a robin may eat the insect. Finally, a snake may then eat the robin. Generally, several food chains exist in one habitat involving different organisms.



## ACTIVE READER

**1 Deduce** Which of these is not an organism: mushroom, spider mite, daisy, rock?

**2 Order** The following organisms live in an ocean habitat: fish, shrimp, algae, whale. Draw a food chain that shows their feeding relationship.





# Chapter 1 Nature's Roles and Relationships

## FOCUS

The underlined sentences state an important idea about different roles an organism can play in a habitat. As you read, underline the names of the various roles organisms play.

## Populations in a Habitat

Any group of the same type of organism living together in a habitat is a **population**. A colony of ants is a population, as are the mushrooms living on a decaying log. All the dolphins living in the Atlantic Ocean comprise a population as do the herons living in the Cuyahoga Valley National Park. Each population in a habitat plays a role that is crucial to the success of the entire ecosystem and the larger biome. These crucial roles have to do with the relationships that develop between different populations.

## Feeding Relationships

Relationships among organisms often have to do with survival and the use of available resources for making or getting food.

For example, plants are **producers**. A producer is an organism that creates or produces its own energy supply. Animals are **consumers** because they must consume, or eat, what they need to make energy.

Some animals, called **herbivores**, eat only plants. Goldfish, grasshoppers, geese, and cows are just a few animals that are herbivorous. Most herbivores eat only specific parts of plants. For example, bees only eat pollen, while beavers eat tree bark and leaves.

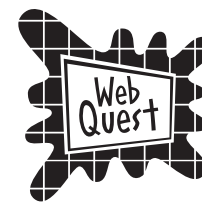
**Carnivores**, on the other hand, only eat meat. Some examples of carnivores are jellyfish, eagles, snakes, and dragonflies. Some types of carnivores do not hunt their own food, but feed on the meat of a dead animal killed by another predator. These carnivores are called **scavengers**.

A few animals, such as humans, bears, and piranhas, eat both plants and meat. These animals are called **omnivores**.

## ACTIVE READER

**1 Recall** Through what process does a producer make its own energy?

**2 Brainstorm** Make a list of animals that are scavengers.



Some plants, such as the Venus flytrap, actually need to get some of their nutrients from meat, rather than making it all on their own. Use the Internet to research other carnivorous plants. Find out more about why they need extra nutrients, how they get their food, and any other interesting information about them.



Other types of organisms get their energy in other ways. Fungus and some microbes actually get food energy from dead or decaying **organic material**. These organisms are called **decomposers**. A decomposer will release an enzyme, a chemical that breaks down organic material.

A fungus may attach onto a dying plant. It will then digest the dead material. As it does this, it releases basic minerals and nutrients back into the ground. This gets rid of nature's litter and makes the earth better for growing plants. In this way, decomposers complete the cycle of the food chain providing the producers with minerals they need for photosynthesis and nutrients for health.

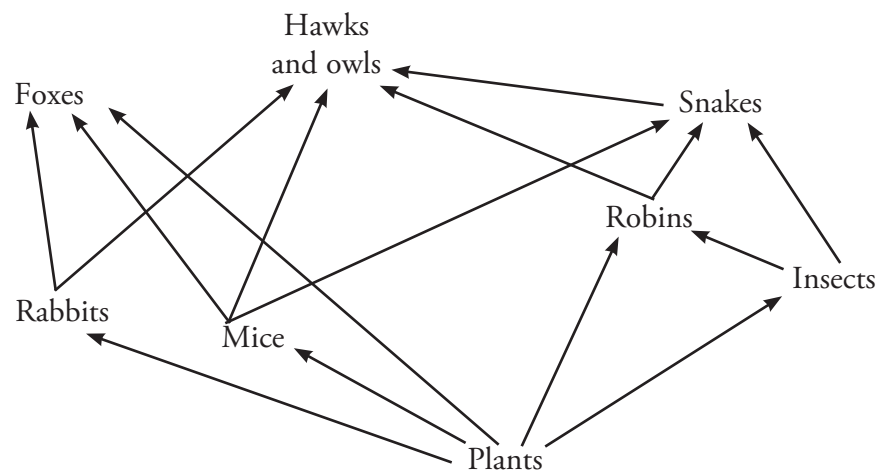
Bacteria are decomposers that exist in many forms. Bacteria are found everywhere on Earth, including icebergs, steamy geysers, and your acidic stomach.

## Competing for Food Resources

Animals compete with others of a different species when they both rely on a common food source. For example, blue jays and squirrels both eat acorns. A blue jay might dive bomb a squirrel to get it to drop an acorn it is carrying. If the bird is unsuccessful, it might watch to see where the squirrel buries the nut and dig it up when the squirrel leaves.

A food web shows how food chains within a habitat are interconnected. In the example below, it is easy to see that the carnivores—snakes, hawks, and owls—have to compete with each other for the herbivores—rabbits and mice, and omnivores. When food is scarce, foxes and hawks may compete with other scavengers, such as vultures and opossums, for **carriion**, the remains of dead animals.

### Food Web



### ACTIVE READER

**1 Extend** What decomposer might you find on old cheese or bread?

**2 Deduce** According to the chart, which two animals are omnivores?

### Good to Know

Maggots (baby flies) are actually decomposers, consuming whatever rotting, moist material they hatch on. They then become scavengers, feeding on rotting flesh. Doctors sometimes put maggots on infected wounds. The maggots consume only the dead flesh and the bacteria. The wound can then heal more quickly.





**Classify** Complete the chart about five animals found in New York. You might include animals such as insects, arachnids, amphibians, reptiles, and fish as well as birds and mammals. Use a reference book or the Internet to research, if needed. Then answer the questions that follow.

Animal Found in New York	What It Eats	Feeding Relationship
1.		omnivore
2.		carnivore
3.		scavenger
4.		herbivore
5.		decomposer

1. List the animals you have chosen in order from smallest to largest.

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2. What are some tools you might use in a scientific study of the behavior and feeding relationships of the animals you have listed above?

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## Trophic Levels

By studying feeding relationships, you can understand the pattern that allows energy to flow through an ecosystem. The typical pattern in a land ecosystem is: First, the plants produce energy from the sun and nutrients; then, the herbivores eat the plants; next the first-level carnivores eat the herbivores; then the second-level carnivores eat the first-level carnivores. Each of these steps is called a **trophic level**.

### FOCUS QUESTIONS

1. What organisms make up a “population”?

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2. How is a scavenger different from a decomposer?

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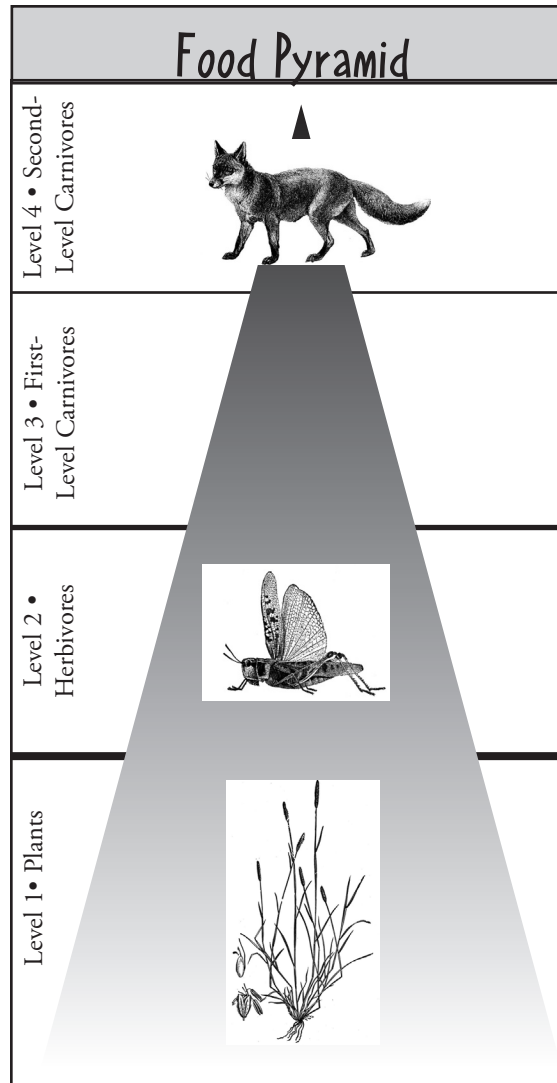
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### ACTIVE READER

**1 Deduce** At which trophic level would you probably find omnivores?

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### Good to Know

The roles that organisms play in a habitat can be described using many different terms. For example, an owl could be labeled a carnivore, a predator, or a consumer. The owl's role in its habitat is crucial to the other organisms in that particular habitat. In fact, its presence may even affect the surrounding habitats as well. All organisms—no matter how big or small—can play a crucial in the habitat.

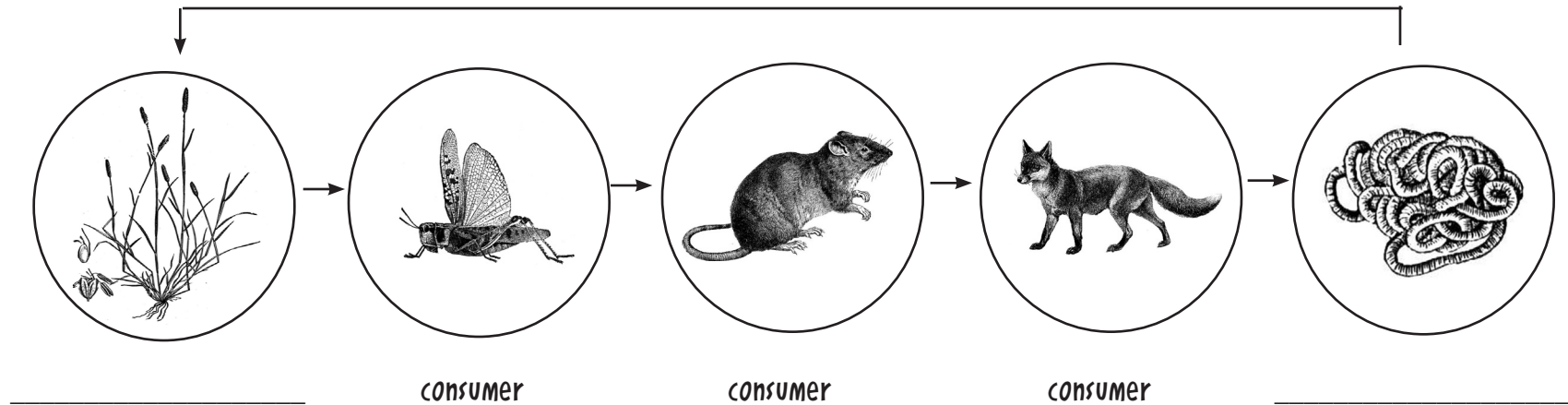




## Food Chain

Herbivores, carnivores, omnivores, and scavengers are not the only links in a complete food chain. They are the consumers, but are just part of the picture. Producers and decomposers complete the chain.

- Write *producer* and *decomposer* in the proper place to complete the diagram below.



- Explain in your own words how a food chain works.

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FOCUS

The next part of the chapter explains how organisms of the same and different species compete and cooperate with each other.

Competition

A population lives in its own unique habitat, along with other species of plants, animals, and microbes that populate the same or interconnected habitats. For example, populations of foxes, hawks, owls, and snakes form a community that shares a habitat. These populations must interact. They compete for food and for other basic needs for living.

Competition may involve animals of the same species or different species. For example, zebras may compete for water during the dry season. Males of the same species also compete for mates. Competition among animals is intensified when resources, such as food and water, become limited. This can happen when the population swells and the habitat becomes crowded, or when resources become depleted because of climate change, for example.

Plants, too, compete for sunlight, water, soil nutrients, and space.



*The tallest plants in a forest receive the most sunlight.*



*Owls and foxes that share a habitat compete for small herbivores such as mice, a favorite food of both predators.*

ACTIVE READER

**1 Connect** Give an example of a competition between organisms of the same species.

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**2 Connect** Give an example of competition between organisms of different species.

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## Cooperation

Not all relationships among organisms involve competition, however. There are many examples of cooperation among organisms in the natural world. This cooperation is also known as commensalism. For example, one species may provide shelter for another, or one may spread the other's seeds.

Trees become home for a variety of organisms. Plants and fungi live on some trees, never touching soil at all. For example, most orchids grow on trees or shrubs. This allows them to grow higher in the forest canopy where there is more sunlight.

Crabs and shrimp often form relationships with sea anemones, living in their tentacles for protection from their predators.

Red bats roost in bushes and weeds. As they fly out of them, they brush against the bush's seed pods, picking some up on their fur. They may then leave some behind as they fly or in the next place they **roost**, thereby spreading the seeds.



*Many orchids grow on other plants, especially trees. They depend on them for physical support, but not for nutrients.*



*Red bats distribute the seed pods of plants as they fly around their habitat.*

## ACTIVE READER

**1 List** Give an example of a population that houses another.

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Give an example of a population that spreads another's seeds.

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Give an example of a population that protects another.

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## Parasitism

Some plants or fungi living on other plants, however, can be harmful to its host. An example is mistletoe, which robs the tree it grows on of nutrients. Mistletoe is a **parasite**, an organism that lives on or in another organism from whom it gets its nourishment. Parasites don't often kill their hosts, however. The mistletoe would also die if it destroyed its host tree.

Examples of parasites that live inside another organism include the bacteria, fungi, flatworms, and viruses that live in the bodies of humans.

### FOCUS QUESTIONS

1. In what way is parasitism different from other forms of cooperation among organisms?

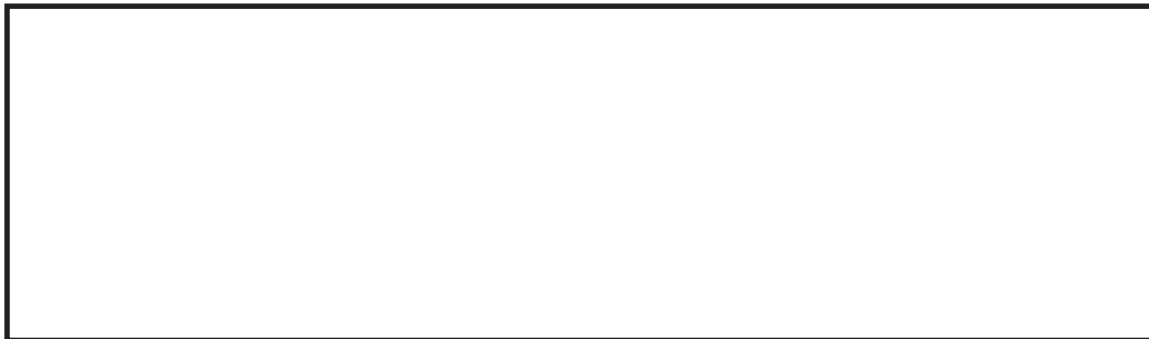
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2. Draw a diagram that shows these organisms in the order they would appear on a food chain, from producer to decomposer: bobcat, dove, snail, moss, worm.



### Good to Know

Everything in an ecosystem may be affected when a change occurs to one population – eventually. Even landforms and rocks can transform if something happens to a plant, animal, fungus, or bacteria population in the biome. If a tree population dies, for example, rains and erosion will much more easily wear away a hillside without the tree roots keeping the soil and rocks in place.



## Stop and Think

This page will help summarize what you have read so far. Use the tip to help you answer the questions.

1. The leading cause of skin problems in dogs and cats is the common flea.

Which term best describes the relationship between fleas and mammals?

- |                 |                 |
|-----------------|-----------------|
| (1) competition | (3) cooperation |
| (2) parasitism  | (4) scavenging  |

**Tip:**  
Read the stem and all the distractors in a multiple-choice item before deciding on your answer.

2. The Giant Panda is considered an omnivore even though 99 percent of its diet is the plant bamboo.

Which other food that is part of the Panda's diet helps it qualify as an omnivore?

- |             |            |
|-------------|------------|
| (1) bananas | (3) eggs   |
| (2) yams    | (4) leaves |

Base your answers to questions 3 and 4 below on your knowledge of science.

3. What are four organisms that are part of the same food chain?

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4. What role does each organism play in the food chain?

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Dear Ms. Understanding,

I have heard that of all the animals, the insect population has the most species and numbers. But since the world is mostly water, why aren't fish the largest population of animals?



*Fishing for Answers in Fulton*

Dear Fishing,

Good question! Fish are quite plentiful, but insects are even more so. This is partly because most fish habitats are in regions close to the water's surface. Most fish can't live in deep water. Also, not every animal that lives in water is a fish. Many aquatic mammals, such as otters and whales, and crustaceans, such as shrimp and barnacles, also live in the water.



Think of all the insects found in New York – and all the places you can find them: water striders, beetles, bees, dragonflies, mosquitoes, flies, crickets, ticks, wasps, and over nine hundred types of butterflies and moths.

*Ms. Understanding*



# Chapter 1 The Effects of Change

## FOCUS

This chapter explains how changes affect a habitat and the populations of organisms living in it. As you read, look for all the types of changes that can happen and how the organisms are affected.

## Biotic and Abiotic Factors

The term **abiotic** refers to non-living things in an environment such as temperature, water, light, soil, wind, and natural disasters. The term **biotic** refers to living things, such as the organisms that share a habitat.

When change happens to abiotic factors in a habitat, biotic factors are usually affected, too. This is because organisms are adapted to their natural surroundings. Camels, for example, store water in fatty tissue, have especially wide hooves for walking on sand, and possess other physical features which make them well-suited to a desert habitat. Animals that lack features like these will come under great stress and begin to die off if climate change slowly converts their normally-wetter habitat to desert.

## Changes to Abiotic Factors

Changes in natural surroundings affect organisms, sometimes for the better, other times for the worse. A much-needed rainfall may end a drought in one area, while a wildfire may destroy a forest in another. Environmental changes have positive and negative effects. For example, an early frost will harm some plants, but it will also kill adult fleas thereby benefitting mammals.

Large scale climate change can affect populations, too. For example, if the polar bears die off because of warming seas, the populations of prey species such as seals may increase to the point that the available resources in the environment can't support them.

Humans are a major source of change to abiotic factors in an ecosystem. For example, we like to spread out and build in new places creating **urban sprawl**. When we start building, we first have to level the area we want to build on, including removing trees and smaller plants. This drives away the herbivores that rely on those plants for food. The carnivores, omnivores, scavengers, and decomposers that rely on the herbivore populations for food will either die off or be forced to move away as well.

## ACTIVE READER

**1 Cause and Effect** Name a natural disaster, and describe an effect it can have on the organisms in a habitat.

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**2 Define** Explain the difference between biotic and abiotic factors in your own words.

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## Habitat Fragmentation

Habitats can become fragmented—broken up into smaller areas some of which are completely isolated from the others. The major cause of habitat fragmentation is development by humans. As the built environment expands, habitats are broken up and isolated from one another.

This kind of development has occurred in New York State and around the world for generations. Before 1800, deer were very common in New York State. The population was kept in control by predators, including people, wolves, and cougars. Later, settlers began to cut down the forest and create farms. This broke up the vast forest, thereby fragmenting the deer's habitat. Wolves and cougars were eliminated by hunting, but hunting of deer by humans increased.

Habitat fragmentation can cause populations of animals to move away and can even lead to the extinction of a species. Deer came close to extinction in New York State, except in the wilderness areas, near the end of the nineteenth century. Today, they have **flourished**, living just about anywhere and eating just about anything to survive.

The deer adapted to their new habitat in part by changing their diet. Today, their diet includes almost any vegetation including many of the plants we enjoy in our yards. Now, whitetail deer live on the edge of the forest and spend much of their time in small clearings and open fields.

Another change that helped whitetail deer rebound was that, in the mid-twentieth century, people started to move off their farms in rural areas to large cities for jobs. Fewer people in rural areas meant less hunting. Much land that was formerly farmed was left alone and it returned to a more natural state. Vegetation grew and the land now offered the deer population more food and protection.

The way humans use the land has a major effect on habitats and the organisms they support.



*In the 1870s, there were very few whitetail deer in New York State.*

### ACTIVE READER

**1 Define** *Explain what is meant by the term built environment?*

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**2 Classify** *A recent study has shown that deer will sometimes eat meat such as bird eggs and carrion. If this is proven to be true of most deer, how should they be classified as to their feeding habits?*

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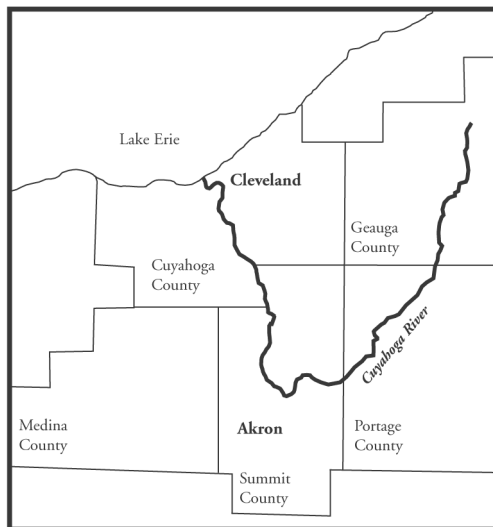


## Habitat Degradation

Habitat degradation occurs when a habitat becomes increasingly less able to support the life of the organisms that live in it. Pollution is often the cause of habitat degradation. The Cuyahoga River in Northeastern Ohio, for example, runs through the cities of Akron and Cleveland. The river became heavily polluted by the dumping of sewage and industrial waste in the twentieth century and actually caught fire several times between 1936 and 1968. The habitat was so degraded by 1968 that it supported little life in the section that runs between Akron and Cleveland.

Efforts to restore the Cuyahoga habitat have been largely successful. Populations of fish have returned and the river can be used for recreational activities such as boating and wading.

The increase or decrease of a population because of habitat fragmentation or degradation also affects other populations. For example, humans sometimes build where tree sparrows usually nest. The sparrows move to a new spot, crowding the bird population in the new habitat. The sparrows eat a lot of seeds and insects, creating a scarcity for other birds and small animals that eat the same things. However, the food supply for larger carnivores that feed on sparrows, such as owls, increases and allows for an increase in the population of the larger carnivores.



*The Cuyahoga River flows south from Geauga County to Akron, then north from Akron to Cleveland where it flows into Lake Erie.*



*Pollution in the Cuyahoga River caused it to catch on fire several times between 1936 and 1968.*

### ACTIVE READER

**1 Interpret** *The map shows that the source of the Cuyahoga River is in Geauga County. Where is its mouth?*

**2 Infer** *Reread paragraph 3. Explain what might happen if the population of larger carnivores increases beyond the capacity of the habitat to provide food for them all.*



## Habitat Loss

Pollution on a large scale, massive development, and climate change can lead to the complete loss of habitat. Habitat loss changes or eliminates the conditions organisms need to survive. The rate of species extinction, a normal part of the natural world, is speeded up to an unnatural level. When habitat is lost on a large scale, the world's **biodiversity** is threatened.

The term *biodiversity* means “biological diversity” and it refers to the genetic variation within and between all species. Maintaining this variation is key to how all natural and man-made habitats function.



Humans affect wildlife in many ways – directly as well as indirectly. Pollution, is a major cause of habitat degradation. Research online to find ways people affect wildlife and the environment. What can we do to stop or slow any harmful effects?

## FOCUS QUESTIONS

1. What, besides drought or urban sprawl, might affect a food chain? Explain the effect.

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2. What might bring on a positive change in a habitat?

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## FOCUS

The next part of the chapter shows more fully the effects of an invasive species on an environment and its native population. As you read, think about the problem of invasive species in your own area.

## Invasive Species

An **invasive species** is a population that leaves its own habitat and harms its new habitat. A population may be driven out of its environment for a variety of reasons: natural disaster, urban sprawl, degradation, or even habitat loss. Many plants and animals simply die off when these occur. Yet some survive and move or are transported to another habitat.

Another way that invasive species are introduced to a habitat is by humans bringing them in, not knowing that the population is harmful. For example, the purple loosestrife, which is found all over New York State and America, is originally from Europe and Asia. Sailors brought the pretty plant over in the 1800s. People used it in their gardens and for bee-keeping. But overseas a certain beetle ate its stems and roots, controlling the population. Over here, nothing eats this plant. The loosestrife grows very quickly and crowds out other native plants, which feed and house birds, turtles, frogs, and insects. Over time, this pretty garden plant has become a very harmful weed.



*Purple loosestrife*

## ACTIVE READER

**1 Define** *Where does the term invasive species come from?*

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**2 List** *List reasons why a population would leave its own habitat.*

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## Zebra Mussels

Another example of an invasive species in New York State is the zebra mussel. These small clam-like creatures cost the US billions of dollars each year. The mussels attach themselves to boats overseas, then detach in waters here. In their new habitat, zebra mussels smother native mussels and crayfish. They also clog up drainage pipes, boat motors, and other marine equipment. Zebra mussels can now be found in many of New York's waterways, including the Hudson River.



*Zebra mussels, an invasive species, have the potential to become a major problem for Lake Erie's and Lake Ontario's fishing industry.*

### ACTIVE READER

**1 Deduce** How do you think the zebra mussels have traveled from Europe to New York State?

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### FOCUS

### QUESTIONS

1. Are whitetail deer an invasive species in New York? Why or why not?

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## Stop and Think

This page will help summarize what you have read so far.

**1. If an early frost caused a tree to stop producing nuts, which organisms in the habitat would most likely be affected right away?**

- |                |                 |
|----------------|-----------------|
| (1) producers  | (3) decomposers |
| (2) herbivores | (4) scavengers  |

**2. Which is a possible cause of groundhog overpopulation?**

- |   |   |
|---|---|
| (1) a scarcity of their predator, hawks | (3) an increase in the deer population              |
| (2) a scarcity of decomposers           | (4) a drought, killing their favorite food: grasses |

Base your answers to questions 3 and 4 on your knowledge of science.

**3. Identify one predator and explain why it is a predator.**

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**4. Identify one invasive species and explain why it is an invasive species.**

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**Dear Ms. Understanding,**

I used to think that most animals eat only one thing: squirrels eat nuts, birds and fish eat insects, etc. But I'm learning that many animals have a more varied diet. I guess it was silly to think that rabbits only eat carrots!



*Wondering about Beavers in  
Beaver Falls*

**Dear Beaver-head,**

It's amazing how many animals are omnivorous. Just as you need and want variety in your diet, so do most animals. Many birds are carnivorous. Owls, pelicans, gulls, and hawks, live here in New York. Omnivorous animals eat both plants and animals out of necessity, choosing whatever is abundantly available in their habitat.



*Ms. Understanding*

P.S. Beavers are one of the few animals that gets its food from one source—trees.



# Glossary

**abiotic** – nonliving things in an environment

**biodiversity** – biological diversity, the genetic variation within and between all species

**biotic** – living things that share a habitat

**carnivore** – an animal that eats other animals

**carrion** – the remains of dead animals

**consumer** – an animal that feeds mainly on other animals to derive its energy

**decomposer** – an organism that causes organic matter to rot or decay

**flourish** – to be successful or healthy

**herbivore** – an animal that feeds mainly on plants to derive its energy

**interact** – to act on one another

**invasive species** – a population that leaves its own habitat and harms its new habitat

**marine** – of the sea

**omnivore** – an animal that feeds on a variety of plants and other animals to derive its energy

**organic material** – matter that is or was living

**organism** – a living thing

**overpopulation** – a state in which the number of individuals of a species living in a habitat is so large that the resources available are insufficient to support them

**parasite** – an organism that lives in or on a host organism in a way that harms the host

**parasitism** – a symbiotic relationship between two organisms in which one benefits and the other is harmed

**population** – a group of the same type of organism

**predator** – a carnivorous animal that hunts and kills other animals for food

**producers** – organisms, such as plants, that create their own food

**roost** – a place where birds rest or sleep

**scavenger** – an organism that feeds on the dead or rotting flesh of animals

**trophic level** – nutrition chain

**urban sprawl** – the spread of human populations







**FOCUS  
ON  
SCIENCE**

# Interaction Among Populations

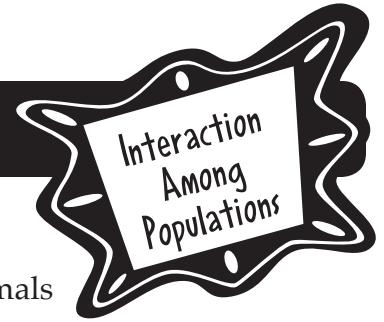
## Assessments







# Check Understanding



In the Answer Document on this page, mark your answer in the row of circles for each question by filling in the circle that has the same number as the answer you have chosen.

1. Which is an example of cooperation between species in a habitat?
  - (1) foxes and hawks both consume small rodents
  - (2) bacteria decomposes waste from carnivores
  - (3) both moles and coyotes move to another area after a fire
  - (4) hummingbirds pick up pollen from one flower and transfer it to another
2. The list below include four animals that share a habitat.

Which of the following animals sharing a habitat will compete?

1 owls	3 mice
2 snakes	4 robins

  - (1) 1 and 4
  - (2) 1 and 2
  - (3) 2 and 3
  - (4) 2 and 4

3. The list below include four animals that share a habitat.

deer	blue jays
squirrels	mice

A shortage of which of the following will cause competition among the four animals to increase?

- (1) frogs
  - (2) grass
  - (3) mature trees
  - (4) nuts and berries
4. Which might be an immediate effect of the building of a major highway through a forest?
    - (1) animals will adapt to their new habitat
    - (2) cooperation among animals will increase
    - (3) animal populations will develop new feeding habits
    - (4) some populations will be cut off from resources they rely on

## Answer Document

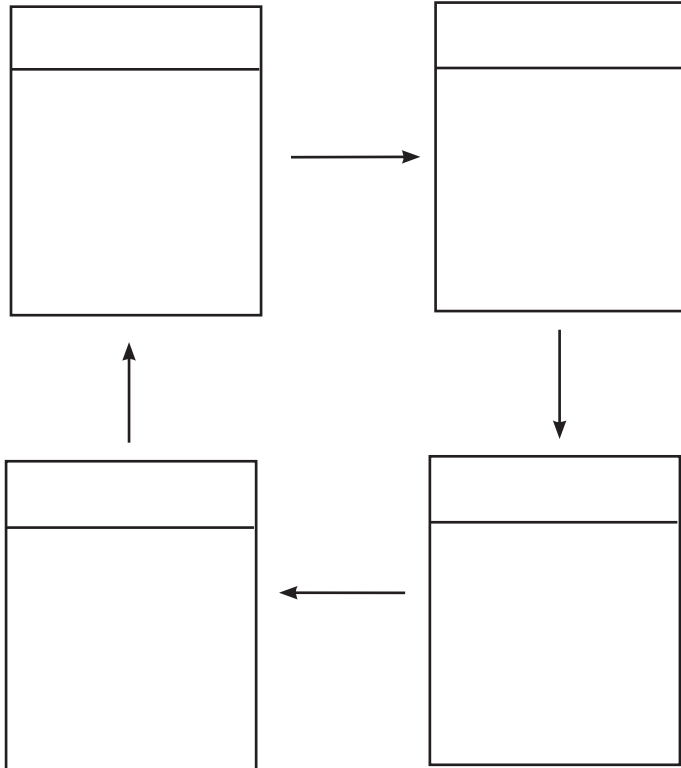
- |    |   |   |   |   |    |   |   |   |   |
|----|---|---|---|---|----|---|---|---|---|
| 1. | ① | ② | ③ | ④ | 3. | ① | ② | ③ | ④ |
| 2. | ① | ② | ③ | ④ | 4. | ① | ② | ③ | ④ |



# Check Understanding

Base your answers to questions 5 and 6 on the incomplete food chain diagram below and on your knowledge of science.

**consumer      producer      decomposer**



## Interaction Among Populations

- Complete the food chain using the words in the box as labels. You will use one of the words more than once. Draw or write an example of each type of organism.
- Explain how a food chain works.

[illegible]



**FOCUS  
ON  
SCIENCE**

# Interaction Among Populations

Answer Key



# Answer Key

## Page 8: Starting Points:

### Build Background

**Use Your Knowledge:** Sample answers: marine, freshwater, reef, grasslands, swamps, tundra, temperate forests, rainforests, deserts, mangroves

**Details, Details:** Answers will vary.

**What's the Difference?:** Sample answer: A biome is a community of many varied plants and animals living together in a region with common environmental features such as climate and landforms. The term *habitat* refers to the environment in which a specific organism lives.

## Page 9: Starting Points: Key Vocabulary

**Rate Your Knowledge:** Answers will vary according to the student's prior knowledge. Related Words: Sample answers: 1. biology, biography, biological; 2. consume, consumption; 3. product, produce, production

## Page 10: Key Concepts

**Active Reader:** 1. rock; 2. algae, shrimp, fish, whale

## Page 11: Chapter 1

**Active Reader:** 1. photosynthesis; 2. Sample answers may include vultures, hyenas, beetles, yellowjackets, lions

## Page 12: Chapter 1

**Active Reader:** 1. mold; 2. foxes and robins

## Page 13: Chapter 1

**Think Like a Scientist:** 1. Answers will vary.; 2. Answers will vary but students might list such tools as binoculars, microscopes, movie and still cameras, gps devices to track the range of an animal, no-harm traps, scales for weighing and other measuring devices.

## Page 14: Chapter 1

**Active Reader:** 1. Levels 3 or 4

**Focus Questions:** 1. Any set of organisms of the same species in the same habitat; 2. Sample answer: A carnivore that feeds on dead meat is a scavenger. A decomposer feeds on the remains left behind by a scavenger. Decomposers are usually worms or smaller organisms, such as bacteria.

**Page 15: Think Like a Scientist:** 1. producer, decomposer; 2. Sample answer: Herbivores eat plants. Carnivores and omnivores eat the herbivores. When these animals die decomposers feed on their remains, as well as dead plants.

## Page 16: Chapter 1

**Active Reader:** 1. Sample answers: Two hawks hunting the same dove.; 2. Sample answer: Plants competing for sunlight in a forest.

## Page 17: Chapter 1

**Active Reader:** 1. Sample answers include: a tree housing birds and insects; butterflies spreading flower seeds; a bush may be a perfect camouflage for a lizard

## Page 18: Chapter 1

**Focus Questions:** 1. Parasites hurt their host. Other forms of cooperation do not involve such harm.; 2. moss, snail, dove, bobcat, worm

## Page 19: Stop and Think

1. (2); 2. (3); 3. Answers will vary but should show how each organism is related in a food chain.

## Page 20: Chapter 2

**Active Reader:** 1. Answers will vary.; 2. Sample answer: Abiotic factors are non-living factors, while biotic are living ones.

## Page 21: Chapter 2

**Active Reader:** 1. Sample answer: elements of an environment made by humans, such as buildings, parking lots, underground water and sewer pipes; 2. omnivore

## Page 22: Chapter 2

**Active Reader:** 1. Lake Erie; 2. The carnivores will fight each other, die off, or move away



# Answer Key

## Page 23: Chapter 2

**Focus Questions:** 1. any natural disaster, such as fire, flood, disease, or a man-made effect, such as hunting season; 2. Answers will vary, but may include cleaning up pollution.

## Page 24: Chapter 2

**Active Reader:** 1. Sample answer: *Invasive species* refers to a population that invades or is introduced into and flourishes in a habitat that is new to the species.; 2. natural disaster, urban sprawl, habitat degradation, habitat loss, human intervention, habitat fragmentation

## Page 25: Chapter 2

**Active Reader:** 1. The mussels traveled from Europe across the Atlantic, Ocean, through Lakes Ontario and Erie and into New York streams and rivers.  
**Focus Question:** 1. Sample answer: No, because they were always a part of the habitat and adapted to it as time went on.

## Page 26: Stop and Think

1. (2); 2. (1); 3. Sample answer: A predator feeds on other populations.; 4. Sample answer: Invasive populations may or may not feed on other populations, but they may harm populations in their new habitat by crowding them out.

## Page 31: Assessments

**Check Understanding:** 1. (4); 2. (2); 3. (4); 4. (2);

## Page 32: Assessments

### Check Understanding:

5. producer→consumer→consumer→decomposer; The examples students choose will vary, but they should choose a plant as a producer, an herbivore as a first-level consumer, and a carnivore or omnivore as a second-level consumer. Decomposers include bacteria, worms, and others.; 6. Students' explanations should note that the energy created by producers is passed along to herbivores and carnivores, and finally to decomposers who return nutrients to the soil, which in turn nurtures the producers.



