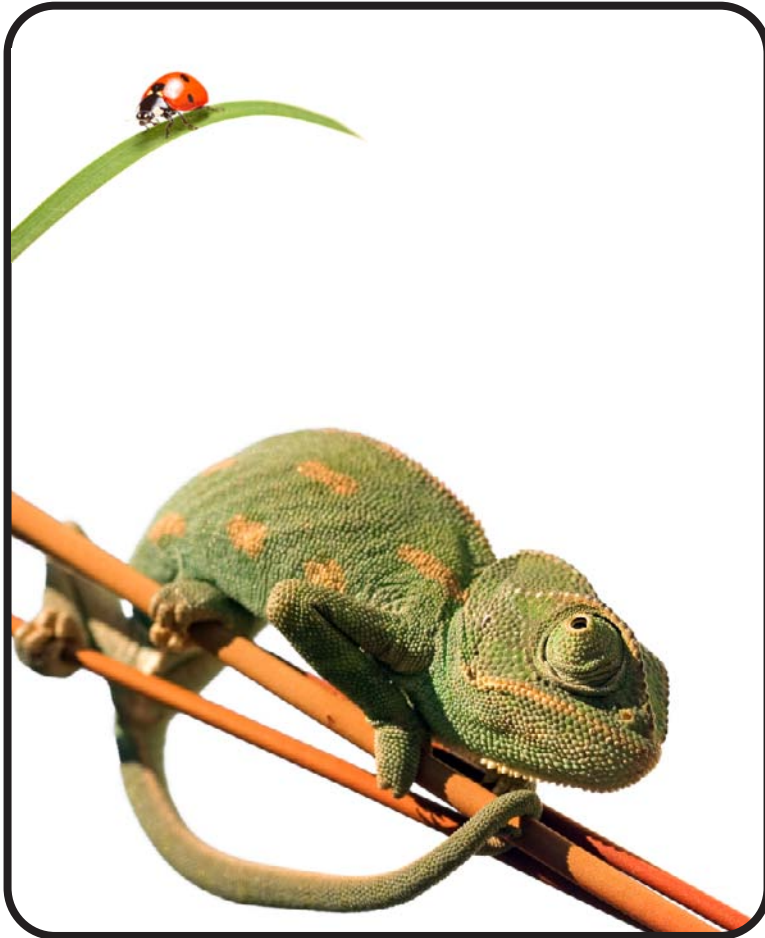


FOOD CHAINS and FOOD WEBS

A Science A-Z Life Series

Word Count: 1,645



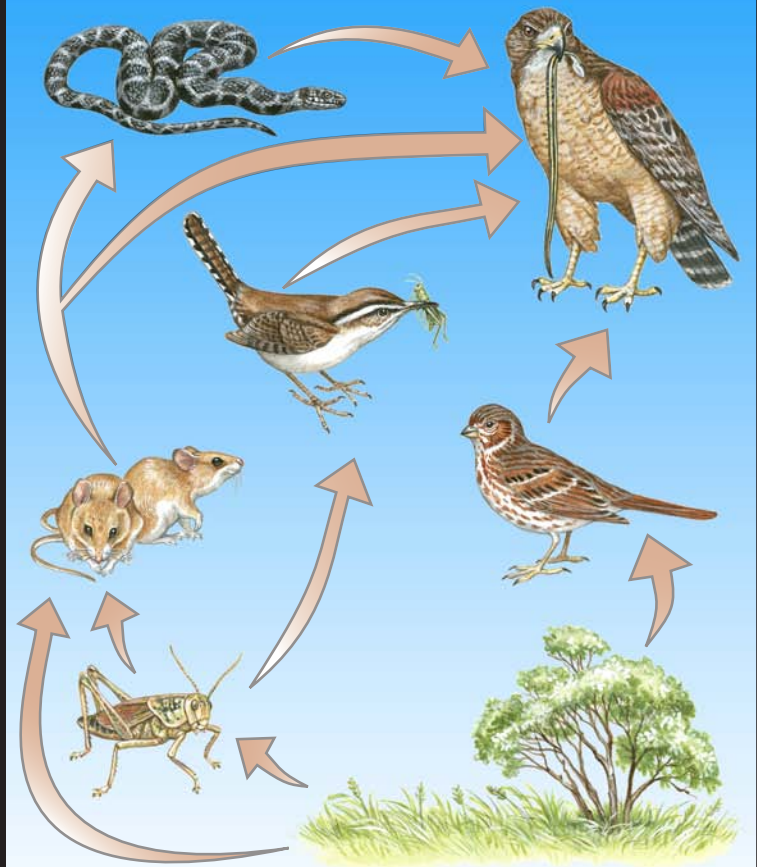
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FOOD CHAINS and FOOD WEBS



Written by Kira Freed

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Food Chains and Food Webs



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KEY ELEMENTS USED IN THIS BOOK

The Big Idea: Every living thing is part of a food chain as well as a more complex food web. There are various ways to categorize organisms within an ecosystem, including producers, consumers, and decomposers; predators and prey; and herbivores, carnivores, and omnivores. Whatever happens to one species can affect many others. Entire ecosystems can even be threatened due to changes. Humans are also part of food webs all around the world. Therefore, it is in our best interest to make a positive impact by protecting ecosystems and by reducing behaviors that can disrupt natural food chains.

Key words: adaptation, carnivore, change, competition, consumer, decomposer, diet, ecosystem, energy, energy pyramid, food chain, food web, global warming, herbivore, invasive species, link, omnivore, photosynthesis, population, predator, prey, primary consumer, producer, secondary consumer, species, survival, survive, tertiary consumer, top predator

Key comprehension skills: Interpret graphs, charts, and diagrams
Other suitable comprehension skills: Cause and effect; compare and contrast; classify information; main idea and details; identify facts; elements of a genre

Key reading strategy: Summarize
Other suitable reading strategies: Ask and answer questions; connect to prior knowledge; visualize; using a table of contents and headings; using a glossary and bold terms

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Mushrooms decompose a tree stump.

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Ana eats breakfast to get the energy she will need for the school day.

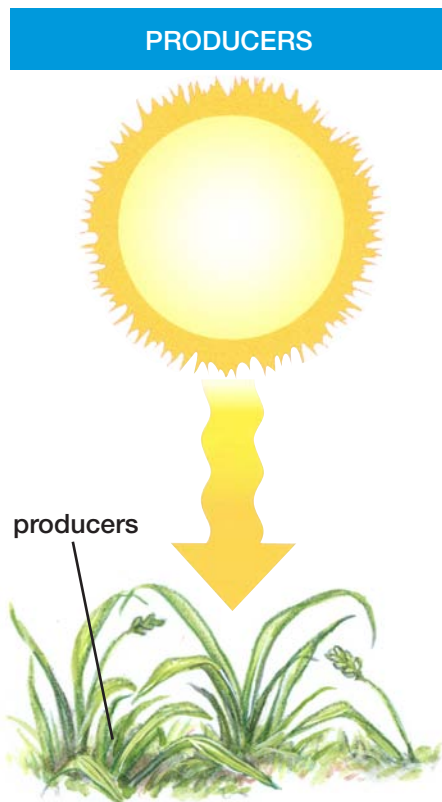
Introduction

Ana eats a breakfast of oatmeal, yogurt, and orange juice before going to school. The food she takes in will give her energy for learning, gym, and other morning activities. Where did the energy in her food come from?

This book explores how living things get the energy they need to survive. You will learn how one living thing depends on another and that all living things depend on the Sun's energy. You will also learn what happens when a food source is taken away.

Producers and Consumers

Living things are either **producers** or **consumers**. Producers produce, or make, their own food. Green plants are the main producers. They produce food by using the Sun's energy to combine water, soil nutrients, and a gas in the air. This process is **photosynthesis**. Without the Sun's energy and the producers that use it for photosynthesis, most living things on Earth would not survive.

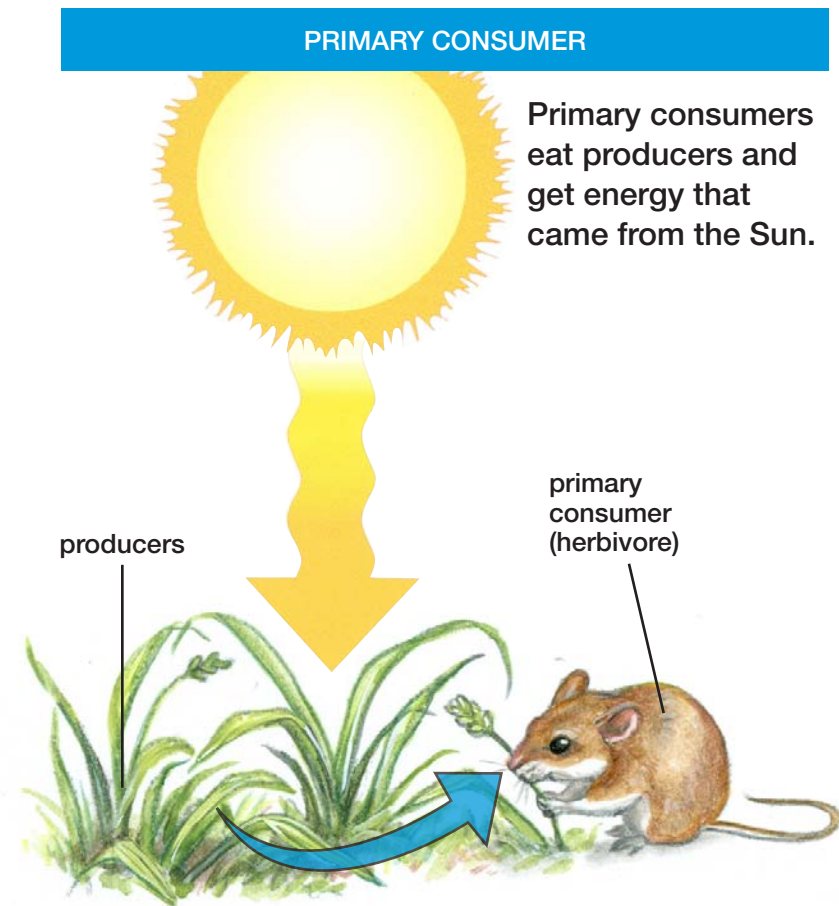


Consumers cannot make their own food. Instead, they depend on producers for food. Consumers eat, or consume, producers or other consumers. Producers and consumers depend on each other in many ways.

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Food Chains

Food chains show how one living thing depends on another living thing for food, as each link in a paper chain depends on the one before and after it. Food chains also show how energy flows from producers to consumers. Since producers make food, they are the first link in a food chain.



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Grasshoppers and elephants are both herbivores.



A food chain has only one link for producers but many links for consumers. *Primary consumers* are living things that eat plants. They are the next link in a food chain. Grasshoppers and elephants are both primary consumers, or **herbivores**.

Herbivores often have special body parts that help them get and use the energy stored in certain plant parts.



Parrots have hard beaks to crack nuts.

To review, the first link in a food chain is the producers, or plants. The second link is primary consumers, or herbivores. The third link is *secondary consumers*—animals that eat the herbivores. These animals are **carnivores**, or meat eaters.



A spider eats a grasshopper.

When people think of carnivores, they often think of animals such as tigers and wolves. But other

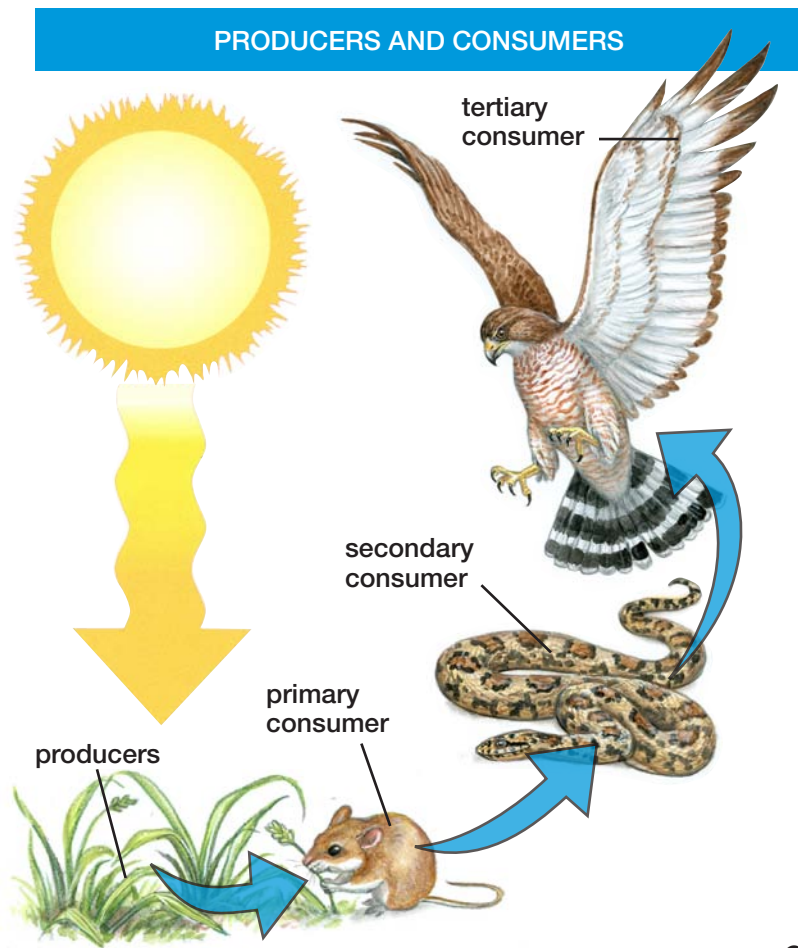
animals, such as insect-eating spiders and some bats, are also carnivores. So are penguins, bald eagles, and other fish eaters.

What comes after primary consumers (which eat plants) and secondary consumers (which eat herbivores)? Many food chains also have *tertiary consumers*—carnivores that eat other carnivores. For example, let's say a mouse eats grass. Then a snake eats the mouse. A hawk that eats the snake is a tertiary consumer.

Word Wise

| | |
|-----------|-----------------|
| Primary | 1 st |
| Secondary | 2 nd |
| Tertiary | 3 rd |

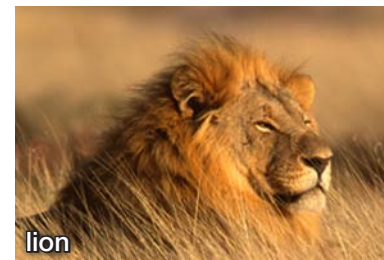
Some animals are **omnivores**—consumers of both plants and animals. Omnivores can eat almost anything. Bears, raccoons, and humans are all omnivores. They may be in many levels of a food chain. When you eat an apple, you're a primary consumer. When you eat a hamburger, you're a secondary consumer. Do you eat any carnivores? If so, you're also a tertiary consumer.



Predators and Prey

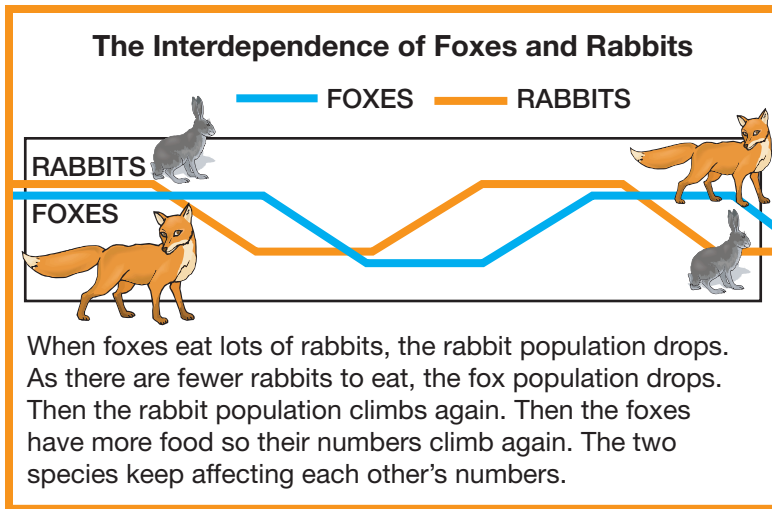
Let's learn a little more about the consumers in a food chain. Animals that hunt and eat other animals are **predators**. The animals they eat are their **prey**.

At the top of a food chain are animals that are not food for any other animals. These animals are *top predators*. In the natural world, top predators have no enemies. Lions, orcas, and polar bears are all top predators. People are the only animals that are a threat to their survival. As a result, humans are the highest top predator.



All these animals are top predators.

Producers, predators, and prey are all part of an **ecosystem**. So are air, water, and other parts of an area. An ecosystem is a collection of living and nonliving things and the ways they affect each other. In an ecosystem, groups of predators and prey affect each other's numbers. For example, let's look at this graph of rabbits and foxes.

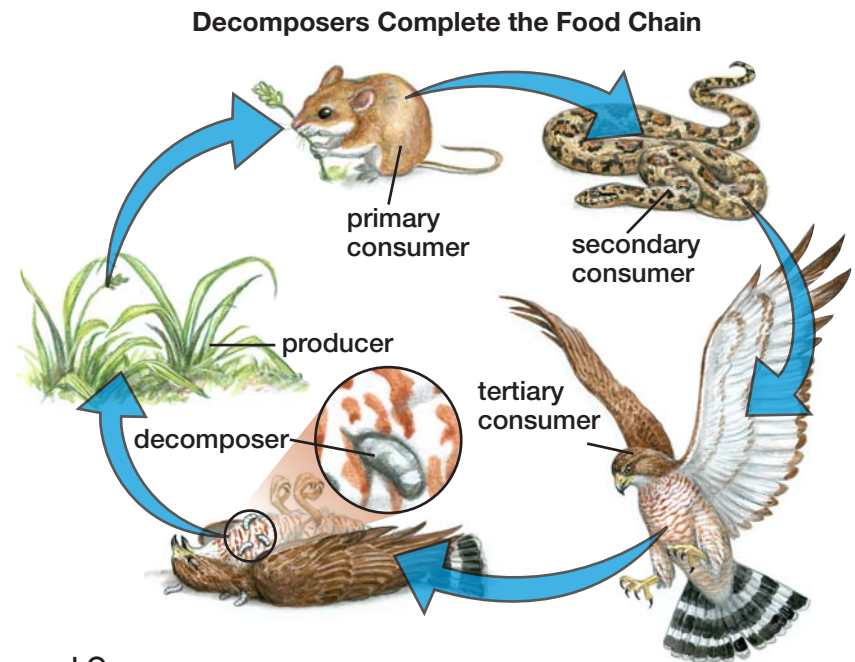


Think About It

Predators, like lions and sharks, usually eat old, young, and sick animals. Those weaker animals often do not get a chance to reproduce. As a result, they don't pass on their weaknesses to their babies. The stronger animals—the ones that escape—reproduce more. What does this say about the importance of predators?

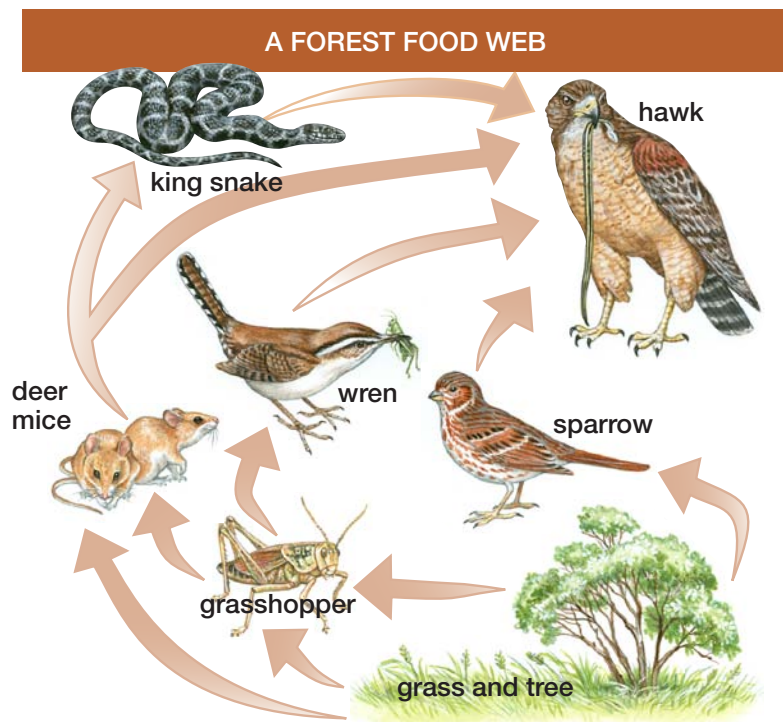
Decomposers are the last link in a food chain. They make sure that none of the energy in an ecosystem is wasted. They break down, or decompose, any leftover living material. Then other living things can use the energy. Decomposers break down dead plant matter, such as autumn leaves, and return the nutrients to the soil. Decomposers also break down the waste and dead bodies of animals.

When decomposers recycle nutrients, the energy is again available to nourish producers (plants). Without decomposers, Earth would be covered with trash and waste.



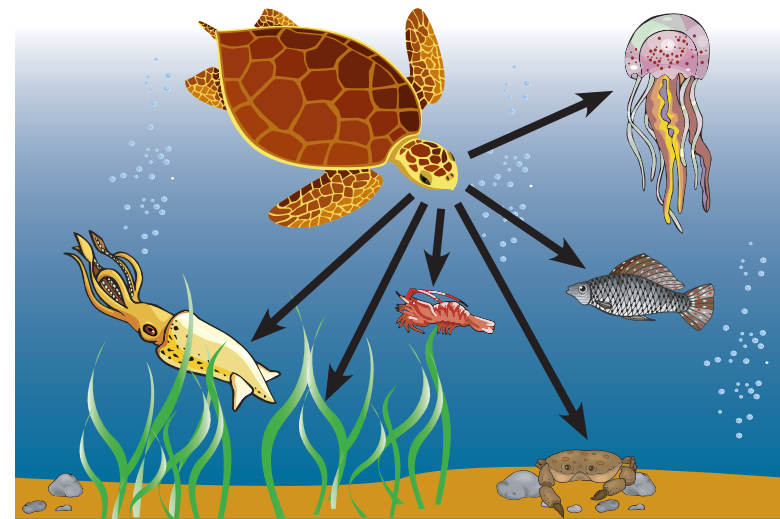
Food Webs

A food chain is a simple way to learn how energy passes through levels in an ecosystem. But in nature, the patterns of eating are almost never as simple as those shown in a food chain. Most animals eat many different things to meet their food and energy needs. And most prey animals are hunted and eaten by many different predators. We can show all these eating patterns in a diagram. This complex web of relationships between living things is called a **food web**.

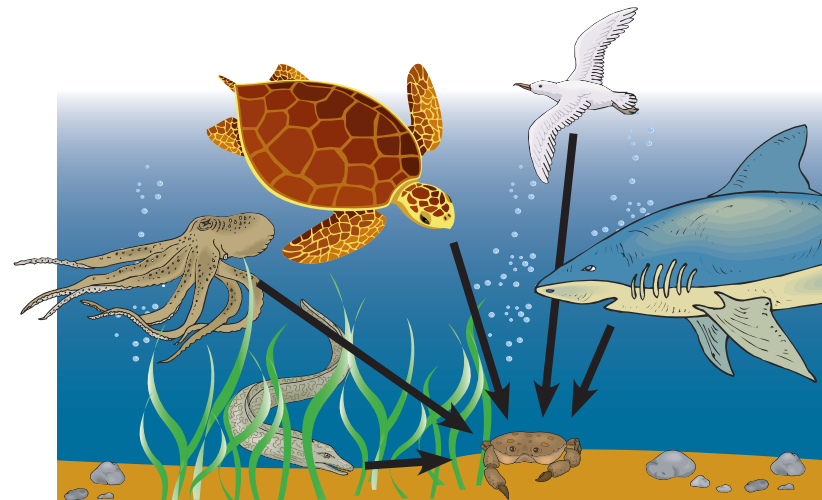


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Let's look closely at a few parts of a food web in an ocean ecosystem. The first diagram shows one predator that eats many types of prey plus a few plants. The second diagram shows several predators that eat the same prey.



A loggerhead sea turtle eats many types of food.



Many types of animals eat crabs.

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Now imagine combining the diagrams on page 14 with diagrams showing the diets of other ocean species of all sizes. The result is a food web, which is much more complex than a food chain. The diagram on this page gives you a basic idea of an ocean food web. But the page is not large enough to include all the details.

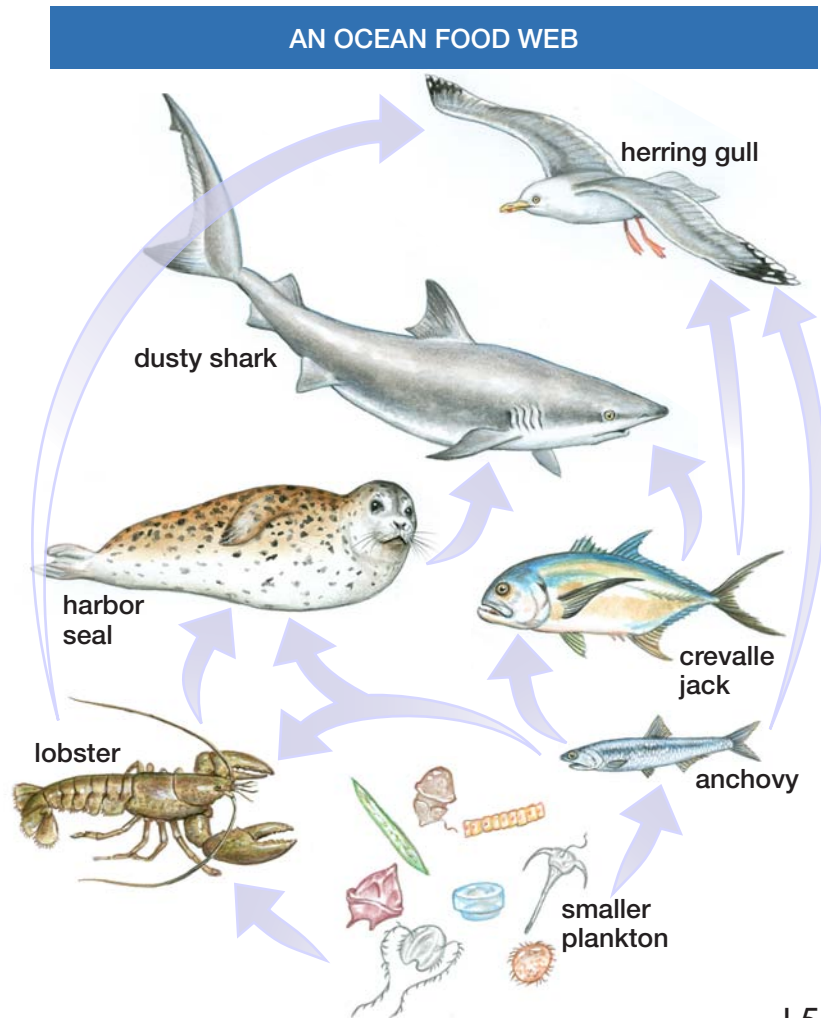
Energy Pyramid

An energy pyramid shows how energy is lost as it passes from one level of a food chain or food web to the next level.

When an herbivore—a primary consumer—eats plants, only a fraction of the energy from the plants is used by the animal to grow. The rest is lost as waste or used for body processes. Because most of the energy is used up, only some of it is passed on when the herbivore is eaten by a carnivore.

The carnivore—a secondary consumer—takes in that small amount of energy when it eats the herbivore. Most of that energy is lost as waste or used for body processes. Only a fraction of the energy from the herbivore it ate will become part of the carnivore's body.

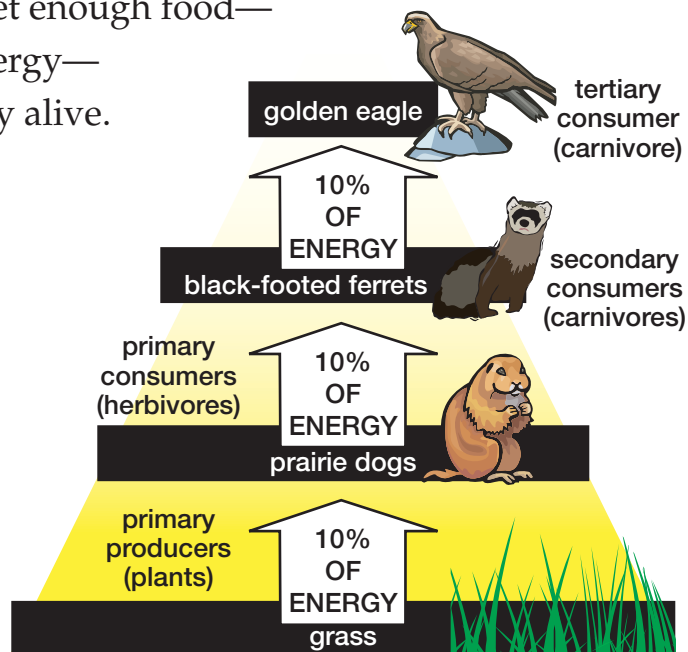
Now imagine that another carnivore—a tertiary consumer—eats the first carnivore. Can you see how little energy is available to this animal?



Scientists estimate that about one-tenth of the energy is passed along from one link in a food chain to the next. Because such a small amount of energy is passed along at each level, an ecosystem needs many more:

- producers (plants) than consumers (animals)
- primary consumers than secondary consumers
- secondary consumers than tertiary consumers

Most food chains have only four or five links before the decomposers. If they had more links, the animal at the end would not get enough food—or energy—to stay alive.



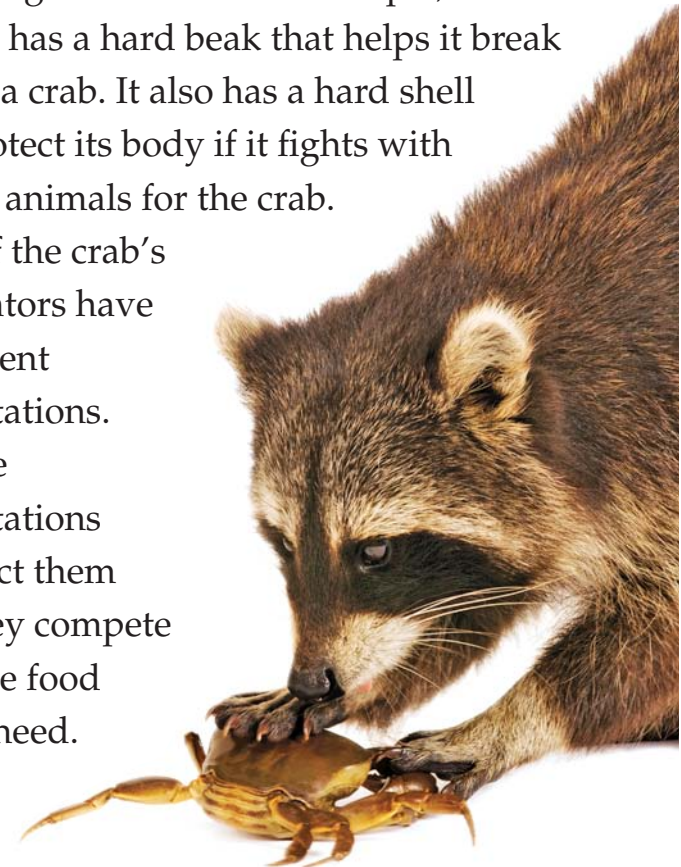
In an energy pyramid, only about ten percent of the energy passes to the next level.

Survival

Take another look at the second diagram on page 14. All those animals are in **competition** with each other for the same crabs. How does nature help them all survive?

Each species has adaptations—special body parts or behaviors—that help its members find what they need to survive. Often they must fight for food. For example, the sea turtle has a hard beak that helps it break open a crab. It also has a hard shell to protect its body if it fights with other animals for the crab.

All of the crab's predators have different adaptations. Those adaptations protect them as they compete for the food they need.



Changes in an ecosystem can make it harder for a living thing to survive. Changes can also affect all the other living things in its food web. Imagine that a disease kills a type of grass (a producer) on an African savanna. Herbivores (primary consumers) that need the grass for energy will suffer. Some will start eating other plants. Others will move to a different area or die. What will happen to the carnivores (secondary consumers) that need those herbivores for energy?

This type of “chain reaction” can cause a group of living things—or a whole species—to become extinct. It shows the importance of protecting every link in every food chain in an ecosystem.



volcanic eruption

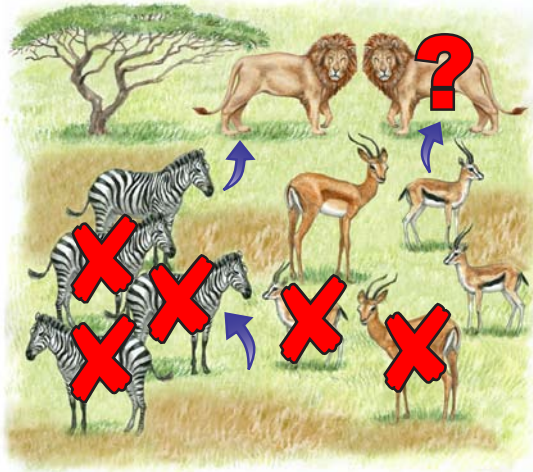
wildland fire



bird covered in oil

All these things can change an ecosystem.

CHANGES IN AN ECOSYSTEM



What happens to secondary consumers?

A change at one level affects the living things at all higher levels of a food web. If the grass dies, then antelopes and zebras suffer. What happens to the lions?

Changes to an ecosystem can have many causes. Diseases, natural disasters, and human-caused threats such as oil spills, pesticides, and other things can harm food chains and food webs. Scientists are now concerned about the effect of global warming on food webs. Even small increases in ocean temperatures are affecting the tiny living things that are the foundation of ocean food webs.



Another serious threat to food webs is caused by people introducing a new producer or consumer into an

ecosystem. Sometimes people introduce a new species on purpose, such as bringing sheep to raise for food. Sometimes non-native species arrive by accident, such as rats that came to North America on boats from Europe. Not all introduced species cause harm. But those that do are called invasive species because they invade an ecosystem. An *invasive species* can cause great harm to an ecosystem.

Do You Know?

In the 1700s, foxes were introduced to Alaska's Aleutian Islands to increase the fur trade. Native seabirds, which weren't used to predators, became easy prey for the foxes. With far fewer seabirds, the islands' lush vegetation disappeared. The vegetation could only survive with the help of the nutrients in bird droppings.

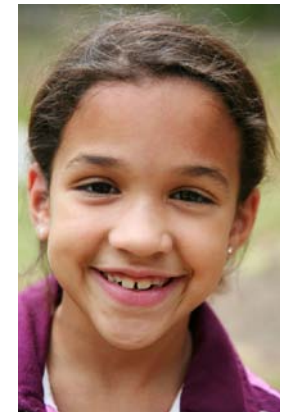


Foxes ate the seabirds.

Conclusion

In this book, you've learned about producers, which make food from the Sun's energy. You've also learned about consumers and decomposers. In an ecosystem, each of these living things has an important role in passing on energy to other living things. A change in one link can affect a whole ecosystem.

Remember Ana from page 4? She was a primary consumer when she ate oatmeal and drank orange juice. When she ate yogurt, a product of an herbivore, she became a secondary consumer. And if you're wondering if she's ever a tertiary consumer, the answer is yes. Her mom is making crab wraps for dinner.



The energy taken in by Ana, as well as by all living things, will someday be passed along to nourish other life forms. Nature makes sure that energy is never wasted.



Glossary

| | |
|--------------------|--|
| carnivores | animals that eat only other animals (p. 8) |
| competition | the struggle between organisms of the same or different species for limited resources, such as food, light, or territory (p. 18) |
| consumers | organisms in a food chain that eat other organisms, especially live ones (p. 5) |
| decomposers | organisms in a food chain that break down organic matter (p. 12) |
| ecosystem | a biological community of organisms together with their habitat (p. 11) |
| food chains | groups of plants and animals that all have a relationship with each other through what they eat (p. 6) |
| food web | the interconnected feeding relationships within an ecosystem (p. 13) |

| | |
|-----------------------|--|
| herbivores | animals that eat only plants (p. 6) |
| omnivores | animals that eat both plants and animals (p. 9) |
| photosynthesis | the process by which plants convert energy from the Sun into food (p. 5) |
| predators | animals that hunt and eat other animals to survive (p. 10) |
| prey | animals that are hunted and eaten by a predator (p. 10) |
| producers | organisms in a food chain that are able to make their own food (p. 5) |

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