



3. Obtain a big ball of string, about 35 m in length. Give the ball of string to one of the students.
4. The first student will say what organism he/she represents. Also, the student will indicate what the organism eats and what it is eaten by. The ball of string is then directed to one of students who represents the predator or the prey.
 - a) As the game progresses, what appears to be forming in the center of the circle?
5. Suppose one organism is removed from the circle. Your teacher will direct you which organism will be removed.
 - a) What happens to the web that was created?
 - b) How does the removal of an organism impact on the other organisms in the circle?
6. Suppose that your circle has only a few organisms.
 - a) What would happen to the web in this case if one of the organisms were removed?
 - b) In which situation, a large or small "circle" of organisms, does the removal of an organism have a greater impact?

Bio Words

food chain: a series of organisms through which food energy is passed in an ecosystem

food web: a complex relationship formed by interconnecting food chains in an ecosystem representing the transfer of energy through different levels

autotroph: an organism that is capable of obtaining its energy (food) directly from the physical environment

heterotroph: an organism that must obtain its energy from autotrophs or other heterotrophs

producer: an organism that is capable of making its own food

consumer: a heterotrophic organism

herbivore: a heterotroph that feeds exclusively on plant materials

BioTalk

Food Chains and Webs

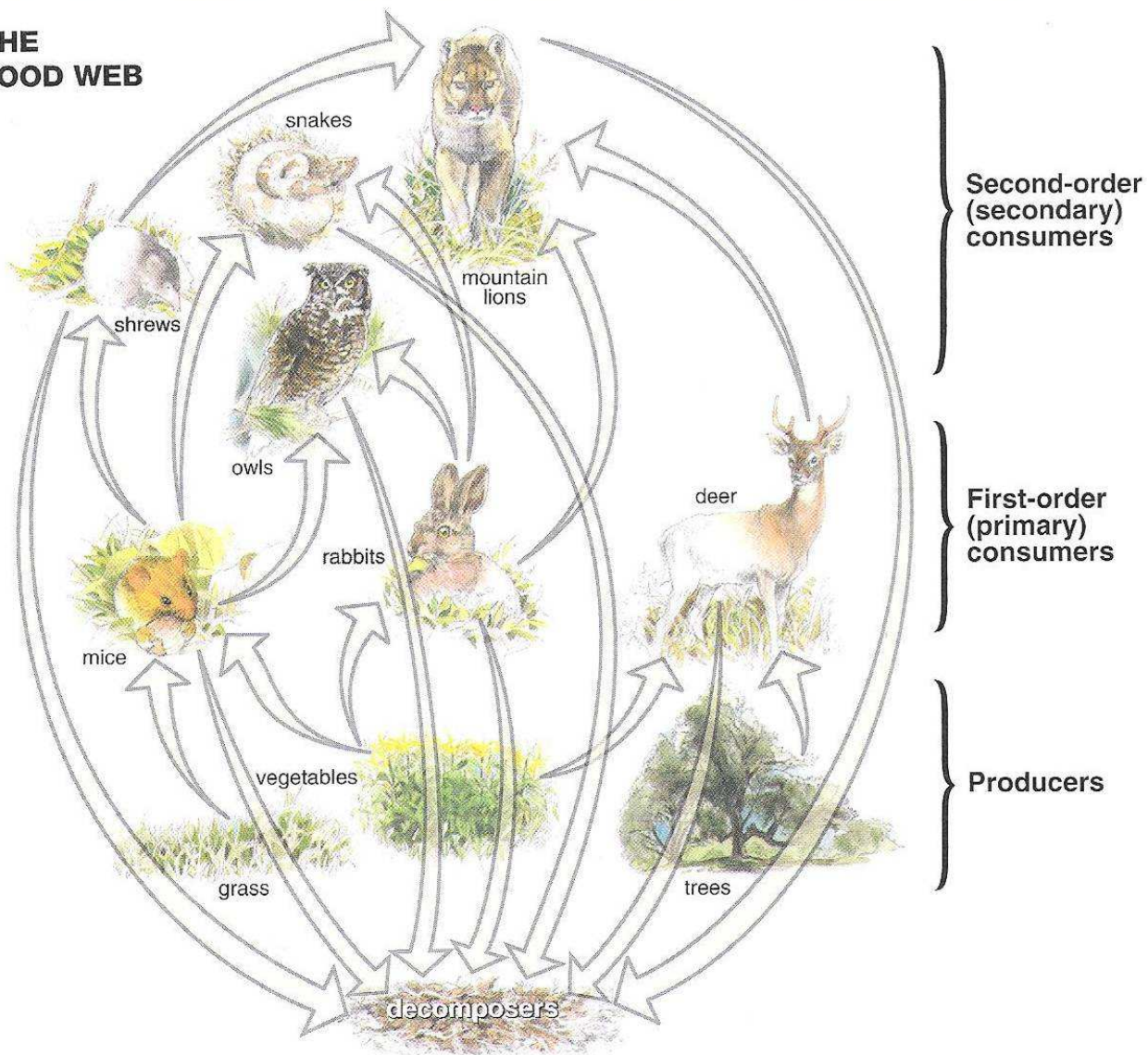
A bat ate a mosquito that had bitten a coyote that had eaten a grasshopper that had chewed a leaf. All these living things make up a **food chain**. A food chain is a step-by-step sequence that links together organisms that feed on each other. The story, however, is incomplete. It does not mention that many animals other than coyotes eat grasshoppers and mosquitoes bite other animals. It also does not consider that coyotes and bats eat and are eaten by a great many other living things. When you consider that the kind of plant a grasshopper might eat may also be eaten by various other consumers, you start to build a picture that links together a whole community of living things. Those links resemble a **food web** rather than a food chain. A food web is a series of interconnected food chains or feeding relationships. The diagram shows how members of a community interact in a food web.

Organisms in the Food Web

Autotrophs are organisms that are capable of obtaining their energy (food) directly from the environment. Most autotrophs obtain their energy through the process of photosynthesis. In this process solar

energy is converted into a form of energy that can be used by the organism. **Heterotrophs** obtain their energy from autotrophs or other heterotrophs. For this reason autotrophs, the organisms that “make” the food, are called **producers**. In the diagram, grass, vegetables, and trees represent the producers. The heterotrophs are called **consumers**. **Herbivores** are first-order consumers. They feed directly on the plants. These organisms are removed by just one step

THE FOOD WEB





Bio Words

carnivore: an animal that feeds exclusively on other animals

omnivore: a heterotroph that feeds on both plant materials and animals

decomposers: organisms that break down the remains or wastes of other organisms to obtain their nutrients

in the food chain from the producers. In this example, they include mice, rabbits, and deer. **Carnivores** are second-order consumers. They feed on the animals that eat other plants. The owl and the mountain lion are just two examples of carnivores. **Omnivores** eat both plants and animals. A human is an example of an omnivore.

There is another group of organisms in the food web that is so important that these organisms are often treated as a separate group. They are the **decomposers**. They break down the complex organic molecules that are found in the wastes and bodies of other organisms. They do this to obtain food energy for their own use. In the process, they release nutrients back into the ecosystem. Bacteria and fungi make up most of the decomposers.

Alternative Pathways Maintain Stability in Food Webs

The alternative pathways in a food web help maintain the stability of the living community. If the rabbits in some area decrease in number,

perhaps because of some disease, the owls might be expected to go hungry. However, this is not the case. The rabbits eat less vegetation. Hence, the greater number of plants produces more fruits, and seeds and furnishes better hiding places for mice. Soon a larger population of mice is present. The owls transfer their attention from rabbits to



The food habits of rabbits vary depending on location, time of year, and species of rabbit. They generally prefer to eat tender, green vegetation. They also eat leaves, bark, seeds, and even fruit of woody plants. Rabbits begin feeding in the evening and continue throughout the night.

mice. This reduces the danger for surviving rabbits, and these primary consumers have a better chance to rebuild their numbers. The greater the number of alternative pathways a food web has, the more stable is the community of living things which make up the web.



Owls are nighttime (nocturnal) birds of prey. Owls feed entirely on living animals. They eat everything from insects to mammals as large as rabbits. The size of the prey is proportional to the size of the owl.

Only a few of the possible offspring of a plant or animal survive to reproduce. Of all the seeds a plant forms, all but a few are eaten by animals. Some die from diseases. Others are killed by poor weather conditions. This can happen either as seeds or somewhat later in life, as young plants that have not yet formed seeds of their own.





Humans are so used to thinking of the welfare of their own species, that they tend to regard as “wasted” all the offspring that do not survive. But there is another side to the picture. For one thing, the world lacks space for so many individuals of any one kind. Also, these individuals are needed as food by a great variety of consumers. Without the fruits, seeds, young plants, and foliage, the primary consumers could not exist. Without the primary consumers, the plants would die. They would become overcrowded or lack nutrients. Without the primary consumers, the secondary consumers would be reduced in numbers because of competition, or would become extinct. Without waste from plants and animals, including dead remains, the decomposers would not be able to get their nutrients. Without decomposers, nutrients that the producers require would not be returned to the soil or water. Through the presence of all these components in the food web, each species is held in check, and the community maintains its stability.

Reflecting on the Activity and the Challenge

In this activity you looked at how every organism is dependent on other organisms and how they are all held together by a food web. You can now begin to understand how the stability of any ecosystem depends on each one of its components. In the **Bio Talk** reading section you were also reintroduced to many terms that are used by ecologists. In discussing your environmental issue, you will be expected to use these terms correctly. You will probably also want to explain the importance of some of these terms in your booklet to educate the public.



How are primary consumers a benefit to plants?

Biology to Go

1. In what ways are living organisms affected by other living organisms?
2. What is the role of decomposers in a biological community?
3. What is the difference between a food chain and food web? Use an example to explain your answer.
4. a) Why are autotrophs called the producers in an ecosystem?
b) Why are heterotrophs called consumers?
5. Are you a herbivore, carnivore, or omnivore? Explain your answer to show that you understand the meaning of each term.
6. Create a food web that includes you and at least five other organisms. Identify the decomposers, producers, and consumers as you diagram your food web.
7. In which ecosystem would the removal of an organism disrupt stability more, an Arctic ecosystem or a deciduous forest? Explain your answer.



Water makes up the largest part of the biosphere. Aquatic regions, both freshwater and marine, are home to many species of plants and animals. As you inquire further into aquatic food webs, you may be surprised at how many different types of aquatic ecosystems exist.

Inquiring Further

Aquatic food webs

Water covers over two-thirds of the surface of the Earth. Research and construct an aquatic food web. Identify the producers and consumers.