

## Teacher's Guide

### Grade 5: Energy Flow Through Food Webs



**TEKS 5.9: Organisms and environments.** The student knows that there are relationships, systems, and cycles within environments. The student is expected to:

B) describe how the flow of energy derived from the Sun, used by producers to create their own food, is transferred through a food chain and food web to consumers and decomposers.



**Background Information:** All organisms require energy for survival. Most plants get energy directly from the Sun, while other organisms get it indirectly from consuming the energy stored in the bodies of other organisms. This unit emphasizes and reinforces how energy from the Sun flows from organism to organism within an ecosystem in both food chains and food webs. The focus is on energy transfer that begins with the Sun and the roles producers (plants) and different types of consumers (herbivore, omnivores, carnivores and decomposers) play in energy transfer. It stresses the interdependence of organisms within food chains and food webs and how changes in populations can affect the transfer of energy within in an ecosystem. Students use food chains and webs as models to trace the flow of energy from the Sun to all organisms within the food chains and food webs.

The process of photosynthesis is reinforced as well as the different types of consumers at different levels in food chains and webs.



**Prerequisite Knowledge:** Students know that all living things have basic needs such as food, water, shelter (animals) and air, water, nutrients, sunlight, and space (plants). They have learned and observed that there is interdependence among living things as they work to meet their basic needs. They have also learned how organisms respond to nonliving environmental factors, such as changes in temperature and varying amounts of precipitation, causing behaviors such as migration, hibernation and dormancy.

They have learned that the energy that flows through a food chain/ food web comes from the Sun. They also know that some of this energy moves

from one organism to another in the form of food. They recognize that changes in a food chain and web, such as the removal of a plant or animal, usually affects all the other organisms in the chain or web in one way or another. They are able to trace the flow of energy from the Sun to all organisms within food chains and food webs.



**Common Misconceptions:** Students may see food webs as only several separate food chains rather than seeing a food web as all the intertwined food chains within an ecosystem. It is important to stress that food chains and webs are graphic models that show the relationships of organisms interacting within an ecosystem for the purpose of meeting their energy needs.

Students may see plants as dependent on humans rather than understanding that humans, like all consumers, are dependent on plants. They may believe carnivores as aggressive animals that enjoy killing other animals. Normally, carnivores only kill when hungry or to feed their young.

Students may think that all the energy stored in plants from the Sun passes to the next organism in the chain, or that all the energy an animal takes in as food passes to the organism that eats it. In reality, a very small part of the energy organisms take in as food is available to the next organism in the chain. Most energy is lost to the atmosphere as heat from processes that occur within the bodies of organisms. This is why in an ecosystem there are many more producers than herbivores and omnivores, and many more herbivores and omnivores than there are carnivores. Less energy is available as you move up the food chain and food web.

Students may believe that decomposers return the energy to the soil or to plants. The matter that makes up the bodies of organisms is recycled by decomposers as nutrients in the soil, gases in the air and water vapor, but energy is not recycled.



**Essential Questions:**

1. How does energy from the Sun provide food for producers?

*Plants absorb energy from the Sun's light rays. They use this energy, water and carbon dioxide gas to make chemical energy that is stored as sugars in the leaves, stems, fruit and sometimes in the roots. This stored chemical energy is used as food by the plant.*

2. How does the Sun's energy support living things that are not producers, such as consumers and decomposers?

*A primary consumer, which includes herbivores and omnivores, gets energy indirectly from the Sun by eating producers. Secondary consumers, which include omnivores and carnivores, get energy indirectly from the Sun by eating other consumers.*

*A decomposer, which includes insects, worms and bacteria, is a consumer that gets energy from the Sun indirectly when it consumes or decomposes what remains of the bodies of dead plants and animals.*

3. How would you describe the flow of energy in the following food chain?  
sunlight → berries → sparrow → bobcat

*The Sun's energy flows to the berry tree, which makes its own food from sunlight, carbon dioxide and water. Some of the energy from the Sun that is stored in the berries flows to the sparrow when it eats the berries. The energy stored in the body of the sparrow flows to the bobcat when it consumes the sparrow.*



**Notes:**