

## Week #3

### Insects and food webs

#### Educational goals

- Learn about the layers of a food pyramid
- Differentiate a food web from a food pyramid
- Discuss the roles of producers and consumers in food webs and food pyramids
- Learn about the differences between herbivores, carnivores, and omnivores
- Learn about trophic levels and how energy travels through food webs and food pyramids
- Observe and learn about biotic and abiotic factors in food webs

TEKS: 2.9c, 3.9b, 4.9a, 4.9b, 5.9a, 5.9b, 5.9c, 5.10a

#### Introduction

Many different factors play a role in an environment's ability to sustain life. Food webs show the connections that organisms have to each other and show how energy travels through ecosystems. By looking at these connections, we can see how all the organisms in an ecosystem are dependent on each other for survival.

There are two main ways that scientists illustrate these interactions, through food webs and food pyramids. A food web shows many chains of relationships and connections in an ecosystem. It shows how organisms at all levels of the food pyramid are connected. Each organism in a habitat contributes in some way to the wellbeing of the ecosystem. A food pyramid is a simplified model of a food web. A food pyramid is very similar to a food web, except that it only shows linear connections between organisms. Food pyramids show the flow of energy in a community. Organisms at the base of a food pyramid hold up and support organisms at each subsequent level of the pyramid. These increasing "pyramid levels" are referred to as trophic levels. The higher up an organism is on a food pyramid, the higher its trophic level is. Organisms who exist at higher trophic levels rely heavily on the stability of the populations of organisms on lower pyramid levels. . This can be related to the game "Jenga" (a game where you slowly remove blocks from a tower until the tower falls). If all the pieces are still in the tower then it is stable, but if you remove one piece it becomes slightly unstable. Removing pieces from the base of the tower is more difficult and more likely to cause a collapse than removing pieces higher up on the tower. No matter what, if you remove too many pieces then the whole structure falls apart.

#### Producers

A food pyramid starts out with the sun providing solar energy to plants. Plants are considered producers since they can produce their own food from solar energy (the sun's energy). They do this through a process called photosynthesis. During photosynthesis, plants go through a chemical process where they combine the sun's energy with water and carbon dioxide (from the air). This makes food (sugar) for the plant and releases oxygen which we use to breathe! Just think about how important producers can be, without them we couldn't breathe! Examples of producers are any plants like trees, flowers, or grasses.

### Primary consumers

A consumer is an organism that can't make food on its own, so it must consume (eat) other organisms to survive. Since some consumers eat others, there are different layers of consumers. The first layer of consumers are primary consumers. These consumers eat producers (plants) and are commonly known as herbivores or plant eaters. Examples of primary consumers include most insects, seed and nectar eating birds, and mammals like deer, cows, and sheep.

### Secondary consumers

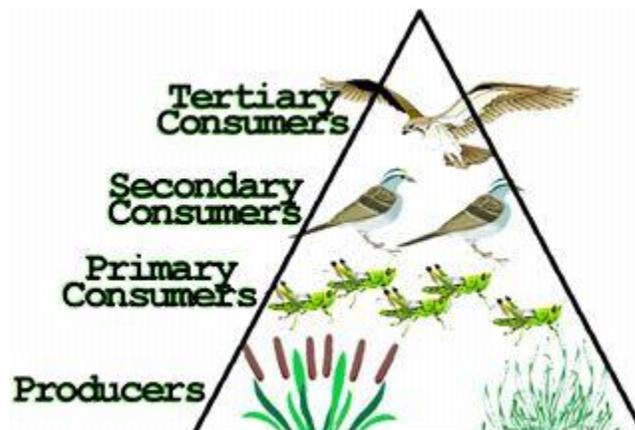
A consumer that eats a primary consumer (herbivore) is called a secondary consumer. Any consumer that eats another consumer can be referred to as a carnivore or meat eater. Secondary consumers may also eat producers. We refer to these organisms as "omnivores" because they eat both meat and plants. Omnivores can be considered secondary or primary consumers depending on if they are eating primary consumers or producers. An example of a secondary consumer is an owl. Since owls only eat meat, they're considered carnivores and secondary consumers. A skunk eats other animals like lizards and insects but can also eat berries, so this makes a skunk an omnivore.

### Tertiary consumer/ top consumer

A tertiary consumer is the third consumer in a food chain and is referred to as the top consumer. An example of tertiary consumer is a bobcat who eats a snake which eats a mouse. Since the mouse (herbivore, eats plants) is a primary consumer and it was eaten by a snake (carnivore) who is a secondary consumer, this makes the bobcat who ate the snake a top or tertiary consumer.

### Decomposers

Throughout the food pyramid decomposers are doing their job of recycling matter, connecting all the levels of the food pyramid back together into a web. Decomposers eat dead things. Decomposers break down matter that other organisms can't and won't eat. Without decomposers like vultures or fungus there would quickly be litter and dead matter everywhere.



### Food web vs food pyramid

Now that you understand the different food pyramid levels, let's explore more about food webs and how they're different. A food web shows the relationship between predators and prey and their environment. A food web shows how interactions in a community can affect other organisms. This is important to know because all organisms (including humans!) depend on these interactions to survive! Food pyramids show us that plants are the foundation of ecosystems since all other organisms rely on them for food (either directly or indirectly). Without the sun, there would be no plants. This is why we draw the sun as the center of the food web because the sun allows all plants to survive.

### Biotic and Abiotic factors

Organisms also rely on abiotic and biotic factors that are in their habitats. Abiotic factors are anything in an environment that has never been alive. They are important to an organism's life because they provide resources that many organisms need. Examples of abiotic factors are dirt and rocks, which give nutrients to plants and provide homes for many creatures like worms. Biotic factors are anything in an environment that has ever been alive or that came from something that once was living (like an apple or a feather). Biotic factors can interact with each other directly (like a coyote chasing a deer) or indirectly (a tree being a home for a bird's nest). All of the interactions between biotic and abiotic factors in an environment describe an ecosystem.

### Pre-activity take away

Having made your net and become a highly skilled bug catcher you have probably come across many different bugs and their habitats. You may have noticed some bugs like specific hiding spots and some prefer specific habitats over others. Just like birds, which we talked about last week, different species of insects have specific adaptations that allow them to live in different environments.

Insects play a big role in the food chain because they're primary consumers and there are a lot of them which makes them easy prey for secondary consumers. Insects primarily eat plants (producers), so insects are usually at the bottom of a food chain, right above producers. Insects are eaten by many different secondary consumers here at Government Canyon and around the world! Some cultures even consider insects to be delicacies, chomping down on them like we chomp on potato chips!

### Post-activity introduction

Now that you have learned about food pyramids and seen examples at Government Canyon, it's time to make your own! Be sure to include organisms at all the levels in the food pyramid!

Bonus: Go outdoors and try to identify wild organisms at each pyramid (trophic) level! Try to find and draw a decomposer!