



Every organism needs to obtain energy in order to live. For example, plants get energy from the sun, some animals eat plants, and some animals eat other animals.

A food chain is the sequence of who eats whom in a biological community (an ecosystem) to obtain nutrition. A food chain starts with the primary energy source, usually the sun or boiling-hot deep sea vents. The next link in the chain is an organism that make its own food from the primary energy source -- an example is photosynthetic plants that make their own food from sunlight (using a process called **photosynthesis**) and chemosynthetic bacteria that make their food energy from chemicals in hydrothermal vents. These are called **autotrophs** or **primary producers**.

Next come organisms that eat the autotrophs; these organisms are called **herbivores** or **primary consumers** -- an example is a rabbit that eats grass.

The next link in the chain is animals that eat herbivores - these are called **secondary consumers** -- an example is a snake that eat rabbits.

In turn, these animals are eaten by larger predators -- an example is an owl that eats snakes.

The tertiary consumers are are eaten by **quaternary consumers** -- an example is a hawk that eats owls. Each food chain end with

a **top predator**, and animal with no natural enemies (like an alligator, hawk, or polar bear).

The arrows in a food chain show the flow of **energy**, from the sun or hydrothermal vent to a top predator. As the energy flows from organism to organism, energy is lost at each step. A network of many **food chains** is called a **food web**.

### **Trophic Levels:**

The trophic level of an organism is the position it holds in a food chain.

1. **Primary producers** (organisms that make their own food from sunlight and/or chemical energy from deep sea vents) are the base of every food chain - these organisms are called **autotrophs**.
2. **Primary consumers** are animals that eat primary producers; they are also called **herbivores** (plant-eaters).
3. **Secondary consumers** eat primary consumers. They are **carnivores** (meat-eaters) and **omnivores** (animals that eat both animals and plants).
4. **Tertiary consumers** eat secondary consumers.
5. **Quaternary consumers** eat tertiary consumers.
6. Food chains "end" with top predators, animals that have little or no natural enemies.

When any organism dies, it is eventually eaten by **detritivores** (like vultures, worms and crabs) and broken down by

**decomposers** (mostly bacteria and fungi), and the exchange of energy continues.

Some organisms' position in the food chain can vary as their diet differs. For example, when a bear eats berries, the bear is functioning as a primary consumer. When a bear eats a plant-eating rodent, the bear is functioning as a secondary consumer. When the bear eats salmon, the bear is functioning as a tertiary consumer (this is because salmon is a secondary consumer, since salmon eat herring that eat zooplankton that eat phytoplankton, that make their own energy from sunlight). Think about how people's place in the food chain varies - often within a single meal.

### **Names and word definitions**

**Producers.** Organisms, such as plants, that produce their own food are called autotrophs. The autotrophs, as mentioned before, convert inorganic compounds into organic compounds. They are called producers because all of the species of the ecosystem depend on them.

Name some producers:

**Consumers.** All the organisms that can not make their own food (and need producers) are called heterotrophs. In an ecosystem heterotrophs are called consumers because they depend on others. They obtain food by eating other organisms. There are different levels of consumers. Those that feed directly from producers, i.e. organisms that eat plant or plant products are called primary consumers. In the figure above the grasshopper is a primary consumer.

Organisms that feed on primary consumers are called secondary consumers. Those who feed on secondary consumers are tertiary consumers. In the figure above the snake acts as a secondary consumer and the hawk as a tertiary consumer.

Some organisms, like the squirrel are at different levels. When the squirrel eats acorns or fruits (which are plant product), it is a primary consumer; however, when it eats insects or nestling birds, it is a tertiary consumer.

Consumers are also classified depending on what they eat.

Name some consumers:

**Herbivores** are those that eat only plants or plant products.

Name some herbivores:

**Carnivores**, on the other hand, are those that eat only other animals.

Name some carnivores:

**Omnivores** are the last type and eat both plants (acting as primary consumers) and meat (acting as secondary or tertiary consumers). Examples of omnivores are:

Bears --They eat insects, fish, moose, elk, deer, sheep as well as honey, grass, and sedges.

Name some omnivores:

## Coral Reef Food Chains

Coral Reefs are full of life. Fish and plants depend on each other for their survival. Many fish are prey of larger fish. Smaller fish feed on plankton and coral. All living things depend on other things for their own survival.

Decide on an animal and research how it survives. Use these questions to help guide you through your research.

1. What does the fish eat?

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2. Who are the predators of the fish?

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Draw a chart that shows the food chain of this animal. Remember to include plants, water, prey, etc.

Food Chain of \_\_\_\_\_

Make this as detailed as you can using specific terminology.

## Sample Food Chains

Trophic Level	Grassland Biome	Pond Biome	Ocean Biome
Primary Producer	grass ↓	algae ↓	phytoplankton ↓
Primary Consumer	grasshopper ↓	mosquito larva ↓	zooplankton ↓
Secondary Consumer	rat ↓	dragonfly larva ↓	fish ↓
Tertiary Consumer	snake ↓	fish ↓	seal ↓
Quaternary Consumer	hawk ↓	racoon ↓	white shark ↓

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