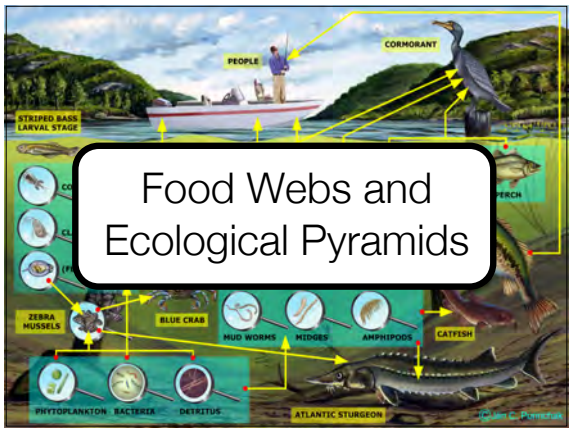
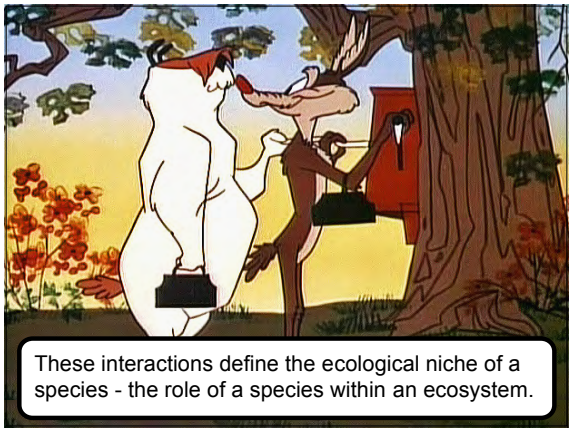


Food Webs and Ecological Pyramids

Every species interacts with other species and with its environment in a unique way.



These interactions define the ecological niche of a species - the role of a species within an ecosystem.

Ecological Niche

For example, the ecological niche of a black bear is as follows:

- black bears feed on nuts and berries as well as insects and other small animals
- bears carry seeds over long distances in their digestive systems before they are expelled and germinate

Ecological Niche

For example, the ecological niche of a black bear is as follows:

- bears hibernate during the winter
- they have few predators, but are fed on by blood-sucking insects and other parasites

Ecological Niche

A key feature of any ecosystem is the feeding roles of each species.

We have already distinguished between producers and consumers, however consumers can be further subdivided depending on what types of organisms they eat.

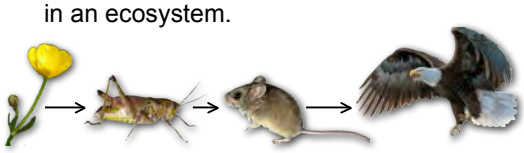
Ecological Niche

Feeding Role	Definition
herbivore	animal that eats plants or other producers
carnivore	animal that eats other animals
omnivore	animal that eats both plants and animals
scavenger	animal that feeds on the remains of another organism

Food Chains

The easiest way to display these relationships is with food chains.

Food chains illustrate who eats whom in an ecosystem.

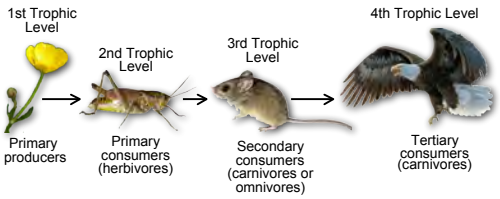


Food Chains

Food chains show how energy passes through an ecosystem.

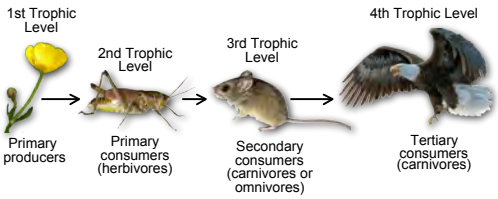
Energy is continually lost from all levels of the food chain.

Trophic Levels



Ecologists refer to the trophic level, or feeding level, to describe the position of an organism along a food chain.

Trophic Levels



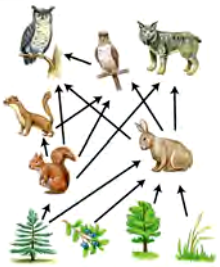
Producers occupy the lowest, or first, trophic level. Herbivores occupy the second trophic level, and carnivores occupy the third and fourth trophic levels.

Food Webs

Food chains do not exist in nature. They are only used to show simple feeding relationships.

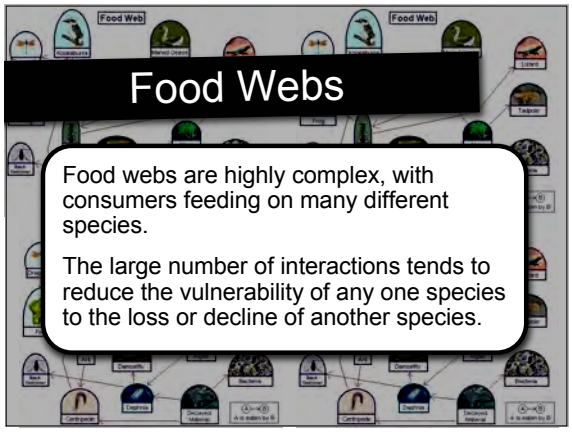
Food chains are part of more complex sets of relationships that exist among species.

Food Webs



A more accurate, but still incomplete, way to illustrate interactions is with a food web. A food web shows a series of interconnecting food chains.

Food Webs



Food webs are highly complex, with consumers feeding on many different species.

The large number of interactions tends to reduce the vulnerability of any one species to the loss or decline of another species.

Food Webs

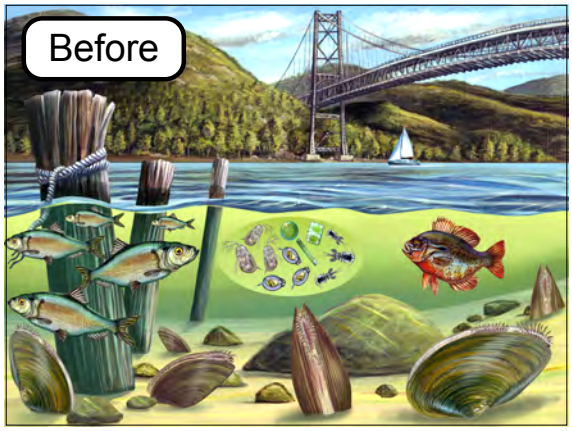
Food webs are useful tools to figure out what may happen when a species is removed from or added to an ecosystem.

For example, if a species is removed from a food web, the species it feeds on may increase dramatically in numbers.

Food Webs

Conversely, the population of a newly introduced species may disrupt the entire food chain.

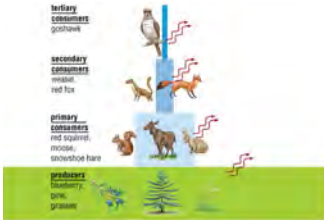
For this reason, complex food webs are thought to be more stable than simple food webs.



Ecological Pyramids

Another way ecologists illustrate how ecosystems function is through ecological pyramids.

Ecological Pyramids



Ecological pyramids display relationships between trophic levels in an ecosystem.

Ecological Pyramids

The three types of ecological pyramids are energy, numbers and biomass.

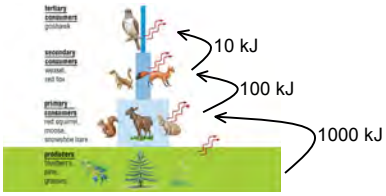
energy pyramid pyramid of numbers pyramid of biomass

Energy Pyramids

An energy pyramid illustrates energy loss and transfer between trophic levels.

The size of each layer in the energy pyramid represents the amount of energy available at that trophic level.

Energy Pyramids



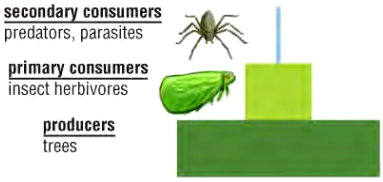
Only about 10% of the energy taken in by the individuals at one trophic level is passed on to individuals at the next trophic level.

Energy Pyramids

Species in the highest trophic levels have less energy available to them than species near the bottom.

This often results in their populations being much smaller than species lower in the food chain (i.e. an ecosystem will have fewer predators than herbivores).

Pyramid of Biomass



Biomass is the total mass of all living organisms in a given area. A pyramid of biomass shows the total mass of organisms in each trophic level.

Pyramid of Numbers

A pyramid of numbers shows the number of individuals of all populations in each trophic level.

Food Web Gizmo

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