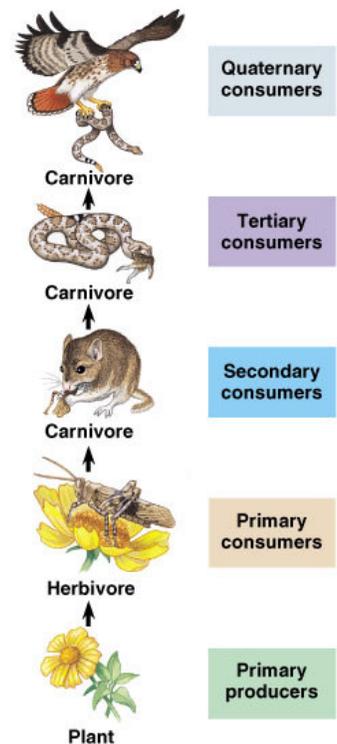


Food Chains and Webs

Living things need energy from food for everything they do. Birds need energy to fly, trees need energy to change size as they grow, blossom and make fruit, kids need energy to run and play.

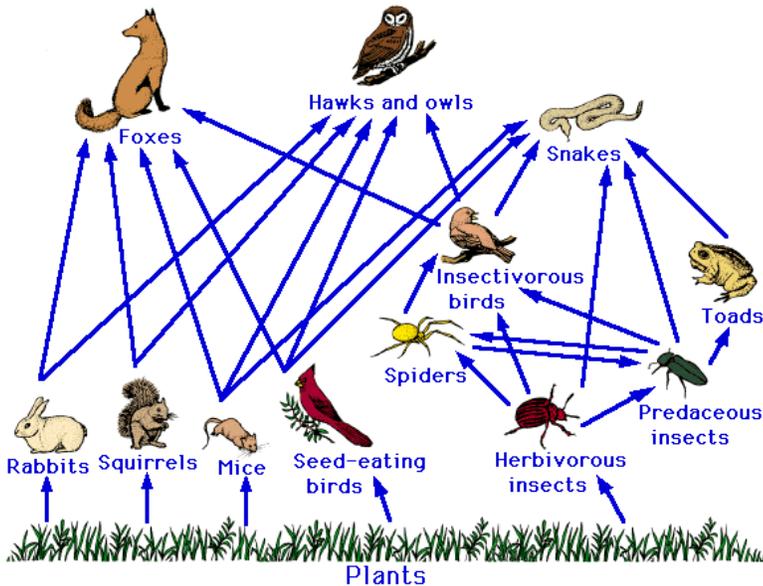
Biologists use the concept of food chains and food webs to describe the transfer of energy in a biological community or eco-system. Plants range from microscopic algae to huge redwoods - but they all derive energy from photosynthesis. They absorb and convert energy from the sun into the nutrients needed to grow, flower and seed. These are the *producers*. Animals can not make their own food, so they eat plants or other animals; they are the *consumers*. Bacteria, earthworms and fungi feed on organic matter, returning it to the soil for plants to reuse; they are the *decomposers*.

Food chains depict a single path of producer/consumer activity. For example, a flower (from a producer) is eaten by a grasshopper (primary or first-level consumer), which is eaten by a mouse (secondary or second-level consumer), which is eaten by a snake (tertiary or third-level consumer), which is eaten by a hawk (quaternary or fourth-level consumer). Each consumer level is called a *trophic level*. (The arrow points in the direction of energy flow.)



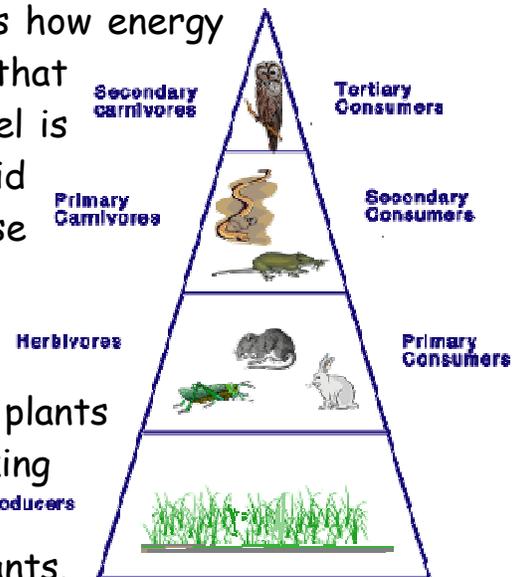
Eco-systems are far more complicated than the single path model of energy transfer. More than one type of herbivore eats grass; on a prairie, grasshoppers and buffalo both eat grass. Turtles, birds and foxes all eat grasshoppers. Bears and foxes eat plant products (berries and fruit) as well as other animals. Opossums eat just about everything - from plants to dead

animals. Snakes eat mice and other rodents, which classifies them as secondary consumers; they also eat frogs and other snakes, which classifies them as tertiary consumers.



Food webs are complicated diagrams illustrating the feeding relationships between the plants and animals in a certain area; they are a set of interconnected food chains. (The arrows point in the direction of energy flow.) The top predators are at the top of the web; like man, they have few or no natural enemies.

Another way to look at the transfer of energy over trophic levels is the **energy pyramid**. An organism uses most of the energy from its food for its normal day-to-day life. The pyramid's clearly shows how energy decreases at each level. Scientists have calculated that an average of 90% of the energy entering each level is 'lost'. The consumers at the top of the food pyramid have much less energy available to them than those closer to the bottom.



Even though all these diagrams seem to show an upward direction of energy, all animals and plants eventually die. The decomposers take care of breaking down dead material into simple nutrients. These are returned to the soil and can be used again by plants. The energy transformation chain starts all over again.