THINK LIKE A WOLF PRE-READ ARTICLE

Role of Keystone Species in an Ecosystem
From National Geographic

A keystone species is a life form that affects an entire ecosystem.

If the keystone species disappears from the ecosystem, no other species can do its job. The ecosystem would have to radically change, allowing new and possibly invasive species to take over the habitat.

Any being, from an animal down to fungi, may be a keystone species. Almost all examples of keystone species are animals that have a huge influence on food webs. The way these animals influence food webs varies from habitat to habitat.

Carnivores, Herbivores, and Mutualists

Predators

A keystone species is often a predator. Just a few predators can control the population of large numbers of species they prey on.

The entire idea of the keystone species started with studying predators. Zoology professor Robert T. Paine was researching Tatoosh Island in Washington state. He found that the purple sea star had a huge effect on the ecosystem along the shore. These sea stars are a major predator of mussels and barnacles on Tatoosh Island. With the sea stars gone, mussels took over the area. The mussels crowded out other species, including a special algae that sea snails and bivalves ate. Without a keystone species, the wetland habitat's biodiversity, or overall variety of creatures, was cut in half within a year.

In the Greater Yellowstone Ecosystem (GYE), gray wolves are a keystone species. The GYE stretches across the U.S. states of Montana, Wyoming, and Idaho. The GYE includes mountains, forests, meadows, bubbly geysers, and freshwater habitats.

The elk, bison, rabbit, and bird species in the GYE are partly controlled by the presence of wolves. These are prey species, and how they eat and where they choose to make their nests largely depends on what wolves do.

The U.S. government set aside land for Yellowstone National Park in the late 19th century. At that time, hundreds of wolves roamed the GYE. They hunted the abundant herds of elk and bison. The government feared that wolves would too heavily hunt these animals, as well as local livestock, like cows. So, the government removed wolves from the GYE. The last remaining wolf pups in Yellowstone were killed in 1924.

The removal of this key predator started a top-down change in the Greater Yellowstone Ecosystem.

Lacking a top predator, elk populations in Yellowstone exploded. Elk herds competed for food resources, and plants such as grasses and reeds did not have time or space to grow back. This hurt other species populations, such as fish, beaver, and songbirds. These animals rely on plants and their roots, flowers, wood, and seeds for survival.

It wasn't just animals who were affected. Stream banks eroded, or wore away, as plants were no longer there to hold the soil in place. Lake and river temperatures increased as trees and shrubs no longer provided shade.

Starting in the 1990s, the U.S. government began bringing wolves back to the Greater Yellowstone Ecosystem. The results were astonishing. Elk populations have shrunk, willow tree heights have increased, and beaver and songbird populations have recovered.

Herbivores

Herbivores—plant eaters—can also be keystone species.

In African savannas such as the Serengeti plains in Tanzania, elephants are a keystone species. Elephants eat shrubs and small trees that grow on the savanna. Even if the acacia tree grows to a yard high or more, elephants are able to knock it over and uproot it. This feeding behavior keeps the savanna a grassland, rather than a forest.

With elephants to control the tree population, grasses thrive. This feeds grazing animals such as antelopes, wildebeests, and zebras. Smaller animals such as mice and shrews are able to burrow in the warm, dry soil of a savanna. Predators such as lions and hyenas depend on the savanna to find prey.

Keystone Mutualists

Keystone mutualists are two or more species that work as a team. A change in one species would impact the other and change the entire ecosystem. These are often pollinators, such as bees.

In the woody grasslands of Patagonia, a region in South America, a species of hummingbird and native plants work together. Local trees, shrubs, and flowering plants have evolved to only be pollinated by a hummingbird called the green-backed firecrown. Green-backed firecrowns pollinate 20 percent of local plant species. In turn, these plants provide the sugary nectar that makes up most of the hummingbird's diet.

Pockets of the existing Patagonian habitat would collapse without green-backed firecrowns. No other creature can pollinate these plants.