A keystone species is a plant or animal that plays a unique and crucial role in the way an ecosystem functions. Without keystone species, the ecosystem would be dramatically different or cease to exist altogether.

A keystone species is often, but not always, a predator. A few predators can control the distribution and population of large numbers of prey species.

A keystone species' disappearance would start a domino effect. Other species in the habitat would also disappear and become extinct. The keystone species' disappearance could affect other species that rely on it for survival. For example, the population of deer or rabbits would explode without the presence of a predator. The ecosystem cannot support an unlimited number of animals, and the deer soon compete with each other for food and water resources. Their population usually declines without a predator such as a mountain lion.

The theory that the balance of ecosystems can rely on one keystone species was first established in 1969 by American zoology professor Robert T. Paine. Paine's research showed that removing one species, the *Pisaster ochraceus* sea star, from a tidal plain on Tatoosh Island in the U.S. state of Washington, had a huge effect on the surrounding ecosystem. The sea stars are a major predator for mussels on Tatoosh Island. With the sea stars gone, mussels took over the area and crowded out other species. In this ecosystem, the sea star was the keystone species.

The sea otter is another example of a keystone species in the Pacific Northwest. These mammals feed on sea urchins, controlling their population. If the otters didn't eat the urchins, the urchins would eat up the habitat's kelp. Kelp, or giant seaweed, is a major source of food and shelter for the ecosystem. Some species of crabs, snails, and geese depend on kelp for food. Many types of fish use the huge kelp forests to hide from predators. Without sea otters to control the urchin population, the entire ecosystem would collapse.

Herbivores can also be keystone species. In African savannas such as the Serengeti plains in Tanzania, elephants are a keystone species. Elephants eat small trees, such as acacia, that grow on the savanna. Even if an acacia tree grows to a height of several feet, elephants are able to knock over the tree and uproot it. This feeding behavior keeps the savanna a grassland and not a forest or woodland. With elephants to control the tree population, grasses thrive and sustain 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 for prey. Elephants are the keystone species that maintain the entire savanna ecosystem.