

<https://flexbooks.ck12.org/cbook/ck-12-biology-flexbook-2.0/section/6.13/primary/lesson/predation-bio/>

A **limiting factor** limits the growth or development of an organism, population, or process. In the predator-prey example, one factor limits the growth of the other factor. As the prey population decreases, the predator population begins to decrease as well. The prey population is a limiting factor.

Keystone species

Major changes in the numbers of a keystone species affect the populations of many other species in the community.

Some sea star species are keystone species in coral reef communities. The sea stars prey on mussels and sea urchins, which have no other natural predators. If sea stars were removed from a coral reef community, mussel and sea urchin populations would have explosive growth. This, in turn, would drive out most other species. In the end, the coral reef community would be destroyed.

(Add another parameter: Environment)

Adaptations to Predation

Predator adaptations help them capture prey. Prey adaptations help them avoid predators. A common adaptation in both predator and prey is camouflage.

<https://www.nature.com/scitable/knowledge/library/dynamics-of-predation-13229468/>

(Add another two parameters: parasites and disease)

In reality, the interaction between these two forms of population control work together to drive changes in populations over time. Additional factors, such as parasites and disease can further influence population dynamics.

Every predator has their own preference to their prey.

The availability of food acts as a bottom-up control that affects population size. In years when their preferred food items are abundant, populations will grow. When preferred foods are scarce, individuals must turn to less desirable foods to prevent starvation. They grow more slowly, reproduce less, and populations decline. When vole populations peak and competition for food is strongest, they turn to bark as a marginal food, and this shift in foraging behavior coincides with a population decline.

eg. Foxes prefer to consume voles and other small rodents, but will occasionally eat grouse and hares when voles are less abundant.

Experimental Studies of Snowshoe Hare Populations (Findings)

Resource quality, rather than resource availability, acts as a bottom-up control on hare populations.

(Obvious) The predator exclusion blocks increased the average density of hares two-fold, which supported the idea that hare populations were also controlled from the top-down through predation.

The most striking finding of the study came from the plot that both excluded predators and had supplemental food supplies.

(Obvious) The researchers found that the increased density of hares was due to both higher survival and reproduction on the study plots.