very large area of land with a huge food supply. They began to multiply quickly. Soon the rabbits were eating all of the grass that was intended for sheep and cattle. Even though "gentlemen hunters" could shoot as many as 1200 a day for sport, the rabbit population kept increasing. In about ten years, 2 million rabbits could be shot or trapped yearly with little effect on the rabbit population size. The rabbits destroyed vegetation and wiped out entire species of native plants. The extinction of certain plants led to the extinction of one-eighth (1/8th) of Australia's mammal species. Meanwhile, the rabbits continued to multiply. Eventually, Australians built miles of fences in an attempt to keep the rabbits from spreading into other parts of Australia. The rabbits are still a significant problem for Australian landowners today.

Ecosystem Interdependence

As you can see with the Australian rabbit example, even a small change in the natural relationships can have a big impact on an ecosystem. Not all changes in an ecosystem are the result of introducing a new species. Small changes can occur naturally from year to year or from season to season.

Consider the food web in figure 16-3. What do you think might happen if a tree fungus killed many of the trees during the summer of one year. How would that change affect the ecosystem? As you can see in this food web, the deer depend on the trees for one of their food sources. If the food they receive from the trees is scarce, they will be forced to seek more of their food from farmers' crops. The farmers probably won't be too happy about that, and they would probably take measures to keep deer away. It is easy to see how a change in the tree population would most likely cause a decrease in the deer population. With less food available, fewer deer can survive. The deer is one of the food sources for the mountain lion. With fewer deer, the mountain lion population must eat more rabbits and mice, so it is very probable that the rabbit and mouse populations would also decrease.

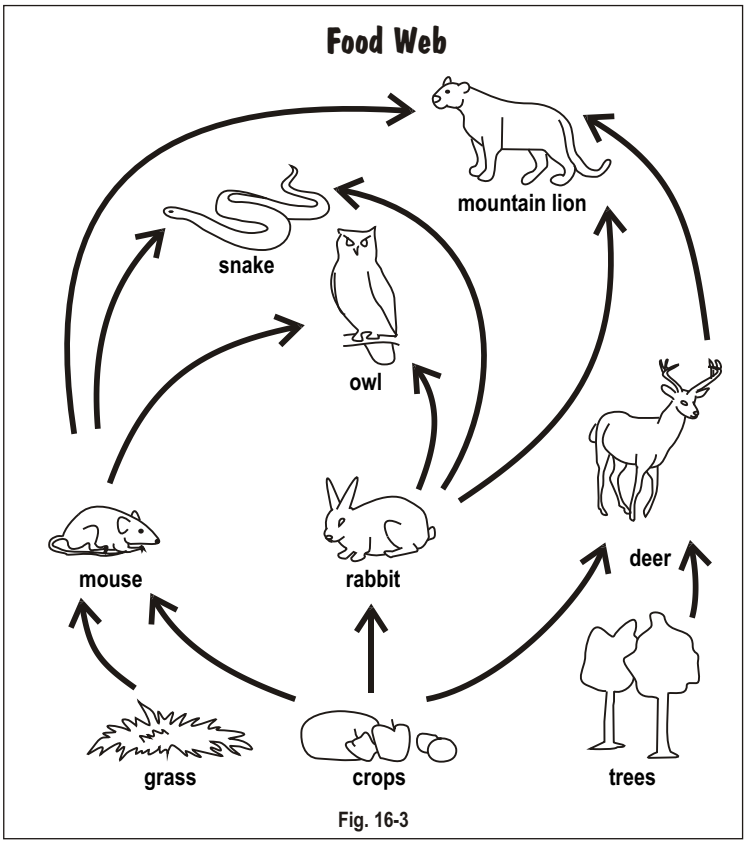


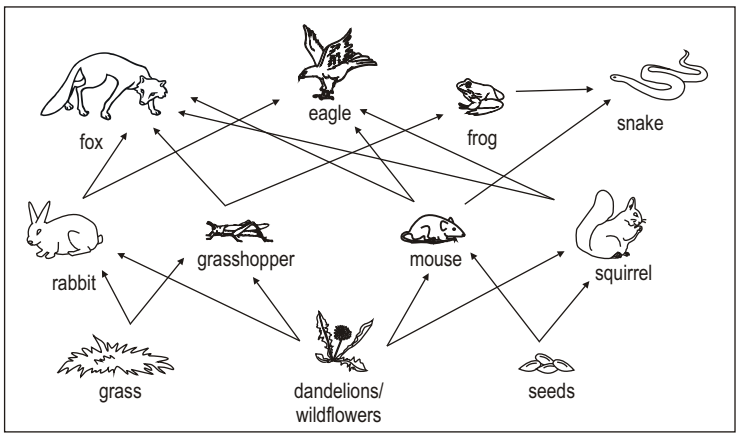
Fig. 16-3

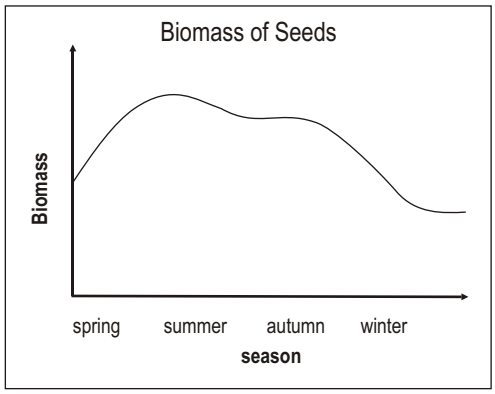
What might be other effects from the tree fungus? The rabbits and mice that eat crops and grass now have competition from the deer in one of their food sources. The populations of mice and rabbits may also decrease due to increased competition for food. If the mouse and rabbit populations decrease, what happens to the owl, snake, and mountain lion populations that depend on them for their food sources? These populations would also decrease.

Now consider what would happen to this ecosystem if it receives greater than normal rain one year and all vegetation, including the tree population, flourished. More grass, crops, and trees means more food is available for the mice, rabbits, and deer. More food available means that the ecosystem can support greater numbers, so the populations of these first level consumers would likely increase. This increase in first level consumer populations would likely affect and cause an increase in the second level consumer populations as well.

Practice

Answer the following questions on population growth and interdependence in ecosystems.





Ⓐ Ⓑ Ⓒ Ⓓ 1. Which of the following does NOT limit natural population growth?
- A. birth and death rate
- B. amount of available resources
- C. seasonal changes in climate
- D. immigration and emigration

Ⓐ Ⓑ Ⓒ Ⓓ 2. The largest population that an ecosystem can support is its —
- A. limiting factor.
- B. carrying capacity.
- C. emigration rate.
- D. growth curve.

Ⓐ Ⓑ Ⓒ Ⓓ 3. If a new species is introduced into an ecosystem and it has no predators, which of the following is MOST likely to occur?
- A. The new species will overpopulate.
- B. The new species will become extinct.
- C. The new species will become a predator.
- D. The new species will eat new foods.

Ⓐ Ⓑ Ⓒ Ⓓ 4. Less than average rainfall in a coniferous forest would likely result in —
- A. a smaller deer population.
- B. a greater biomass of vegetation.
- C. a greater atmospheric oxygen content.
- D. a decreased decomposer population.

Ⓐ Ⓑ Ⓒ Ⓓ 5. If nitrogen-fixing bacteria populations in the soil and on the roots of plants decreased, which part of the ecosystem would be affected FIRST?
- A. decomposers
- B. producers
- C. first level consumers
- D. second level consumers

Ⓐ Ⓑ Ⓒ Ⓓ 6. The graph above shows the seasonal fluctuation of seed biomass. Which of the following BEST describes how this fluctuation would affect the food web also shown above.
- A. The frog population would decrease during summer and autumn.
- B. Fewer seeds during the winter would impact rabbit and grasshopper populations the most.
- C. Fewer grasses would be available during the winter due to a decrease in seed biomass.
- D. If mice and squirrels do not store seeds, their populations would decline during the winter.

Ⓐ Ⓑ Ⓒ Ⓓ 7. If for some reason the grasshopper population was drastically reduced, which organism in the food web shown above would be MOST adversely affected?
- A. grasses
- B. foxes
- C. frogs
- D. mice