



science applied

How Can We Manage Overabundant Animal Populations?

The growing human population has caused population declines in many animal species, as we saw in Chapter 4. At the same time, other species have flourished as the result of human alterations of the landscape. Increases in the populations of these species have had many consequences. How have these increases happened, and what, if anything, should we do about them?

What causes animal population explosions?

The white-tailed deer is a high-profile example of dramatic animal population growth in the United States. Before European colonists arrived, its densities were approximately 4 to 6 deer per square kilometer (10 to 15 deer per square mile). In many areas today, however, deer densities are up to 20 times higher. In New York State, for example, unregulated hunting and the clearing of preferred deer habitats for farming had nearly eliminated the deer population by 1900, but the population has since grown exponentially to 1 million deer.

This population growth can be explained by processes we have discussed in Chapters 4 and 5. For example, white-tailed deer prefer to live in early-successional fields containing wildflowers and shrubs. Abandoned farms that have undergone secondary succession during the twentieth century, such as the old fields of New England that we described in Chapter 4, are prime deer habitat. Such increases in habitat and food supply have increased the carrying capacity of the environment for deer. With a higher carrying capacity, density-dependent controls on the population are weaker, and reproduction increases.

In addition to providing them with habitat and food, humans have eliminated the deer's major predators: wolves and cougars. During much of the twentieth century, regulated hunting took the place of natural predators and continued to hold deer populations in check. Over the last few decades, however, the number of deer hunters has steadily declined, allowing the deer population to increase further. In short, a higher carrying capacity and a lower mortality caused by predators and hunters have allowed deer populations to grow exponentially and exceed their historic carrying capacity (FIGURE SA3.1).

The white-tailed deer is not the only species whose populations are exploding. Animal overpopulation is a global issue. Many large herbivorous mammals have benefited from anthropogenic alterations of the environment, including predator extinctions, reduced hunting, increased habitat, and increased food supplies provided by agriculture and by people who feed them. The sika deer (*Cervus nippon*) of Nara, Japan, for example, lives in an area that has been protected as a natural monument since World War II. Many factors have contributed to a population explosion of this species. Human visitors to the area feed the deer, hunting is restricted, and Japan's native wolves—natural predators of the deer—are extinct. In Australia, eastern grey kangaroos (*Macropus giganteus*), which normally consume wild grasses, are also consuming agricultural crops (FIGURE SA3.2). Their natural predator, the Tasmanian wolf (*Thylacinus cynocephalus*), is now extinct. In South Africa, the population of African elephants (*Loxodonta africana*) doubled within 10 years of their being granted legal protection from hunting.

Large herbivorous mammals are not the only animals that experience overpopulation. Florida's 500,000 monk parakeets (*Myiopsitta monachus*) are the offspring of individuals that have escaped from the pet trade since the 1960s. Other former pets, including dogs and cats,

FIGURE SA3.1 Deer overpopulation. As humans have provided increased food and habitat for white-tailed deer and simultaneously removed their major predators, deer populations have increased to the point that they exceed the historic carrying capacity.

quickly establish feral populations when released into the wild. Populations of Canada geese (*Branta canadensis*) have grown along with the number of agricultural fields and golf courses on which they can feed.

What effects do overabundant species have on communities?

Populations that exceed their historic carrying capacity can cause widespread problems. Large populations of herbivore species such as deer, elephants, and kangaroos can overgraze the plants in their community, leaving little food for other herbivorous species. In Australia, grazing by the overabundant kangaroos removes many of the plants needed by other herbivores, including several species of endangered animals that depend on these plants for food and habitat.

These large animal populations also have direct effects on humans. Herbivorous mammals consume agricultural crops, landscape plants, and valuable wild plant species. In the United States, for example, the deer

FIGURE SA3.2 Overabundant kangaroos. Abnormally high populations of kangaroos consume all of their natural food supply and consequently move into human-dominated landscapes, where they come into conflict with humans.

population so greatly exceeds the land's natural carrying capacity that it is now difficult to regenerate several valuable forest tree species, including northern red oak (*Quercus rubra*) and sugar maple (*Acer saccharum*). Deer also consume suburban landscape plants and damage $60 million worth of agricultural crops each year.

Wildlife overabundance also increases wildlife-human encounters, such as deadly collisions of vehicles with deer or kangaroos. More frequent contact with wildlife also increases the risk of humans contracting diseases that the animals carry. White-tailed deer, for example, carry ticks that can be infected by the bacterium that causes Lyme disease. Nearly 10,000 people in the United States contracted Lyme disease in 1992. This number climbed to more than 27,000 in 2007.

How can we control overabundant species?

Controlling the population of any species involves issues that are ecological, political, moral, and ethical. From an ecological perspective, it is clear how to control a wildlife population: reduce the available food and habitat to lower the carrying capacity, compensate for the missing predators by killing individuals in the population, or slow the population's ability to reproduce. On a local scale, it can be helpful to discourage people from feeding wildlife. On a larger scale, however, reducing food and habitat is often the least viable option because it would typically require restricting the access of large herbivores to millions of hectares of land.

In 2009, the Australian government ordered the army to shoot 6,000 kangaroos as a way to control the population. This controversial decision was opposed by animal rights activists and by many Australians who consider the kangaroo a national symbol that should be protected. The activists obtained a court injunction to stop the culling of the species, but after a delay, the kangaroo cull proceeded. Throughout the world, even when all parties agree that the overabundance of a species poses major problems for humans and for the environment, culling a herd through shooting is an increasingly unpopular strategy.

A strategy that has more public support is birth control. This approach is common in cities, where many feral cats are trapped, neutered, and returned to the wild. Researchers are also investigating ways to give animals contraceptive drugs in order to reduce their populations over time. The drugs being developed differ in their modes of action, ranging from chemicals that prevent animals from making critical reproductive hormones to chemicals that prevent sperm from fertilizing an egg. Contraceptive strategies are currently being tested on a variety of species, including deer, kangaroos, elephants, and monk parakeets (FIGURE SA3.3).

Reducing animal overpopulation with contraceptives has widespread public appeal because it eliminates the need to kill animals. Getting the contraceptive drugs into the animals, however, presents substantial challenges. Drugs can be administered to some animals via dart guns. For others, such as monk parakeets, researchers are working on ways to administer medications in food. Some contraceptive drugs last for a single breeding season and require a new dose each season, which can

FIGURE SA3.3 Administering contraceptives to wild animals. In South Africa, a wildlife biologist shoots a dart containing contraceptives at a female elephant. The goal is to reduce the overabundant elephant population and reduce the destructive effects of these elephants on the habitat.

be difficult and expensive. The cost of giving an animal a single dose of a contraceptive drug ranges from $100 to $500 per animal.

The issue of overabundant wildlife highlights a number of other environmental issues. The underlying causes of animal overpopulation are typically associated with human population increases. These human-caused wildlife population explosions can, in turn, have substantial negative effects on humans and their environment. Although there are several potential solutions to the problem of animal overpopulation, successful solutions must take into account the public's affection for wildlife, its opposition to killing animals, and its frequent lack of knowledge about the negative effects of overabundant species. As we saw in the case of China, enforced infertility can be an effective, though controversial, strategy for controlling human populations. Many people view enforced infertility as an acceptable strategy for controlling wildlife, although it is not yet effective.

References

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