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# HARVESTING OF WILDLIFE

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# 12

In this chapter, the term “harvest” is used very loosely and is applied to any type of removal of individuals from the wild state. Thus, we do not differentiate between live capture of parrots for the pet trade, for example, and actual shooting of kangaroos for meat and skins. Throughout evolution, humans have harvested wildlife species. Across the world, we can see a broad spectrum of legal and illegal wildlife uses today. In undeveloped countries or countries with undeveloped areas, we see subsistence hunting. At the opposite end of the spectrum, we see wealthy hunters who pay large sums of money to shoot at what may be little more than a captive animal on a game farm. Somewhere in between these two worlds, we see the commercial hunters—some legal, some illegal. In this chapter, a variety of aspects related to human harvest of wildlife are explored, beginning with subsistence hunting and then proceeding to commercial and recreational hunting. The wildlife trade that is illegal is also examined and reveals that human culture can have a devastating effect on wildlife populations.

Today, there are three central reasons for harvesting wildlife: the first is simply for subsistence, the second is recreation, and the third is commercial/financial. We differentiate between these three because their goals differ, and this in turn may influence the population dynamics of the species that are harvested. In principle, it may seem obvious enough that there is a fundamental difference between hunting to live (subsistence hunters) and living to hunt (recreational hunters). In reality, however, the distinction may be difficult to discern. For the purpose of this discussion, subsistence hunters are defined as hunters who must obtain wildlife meat in order to survive. Hunters in this

category would include, for example, tribal and nontribal humans who dwell in Amazonia or tribal humans in Africa or Southeast Asia.

## **SUBSISTENCE HUNTING: HUNTING TO LIVE**

Imagine you are faced with the following problem. You live on the Great Plains of North America in the 1800s. You live in a village and you must live by hunting. Every day you must find food, and that means you must kill an animal. Moreover, it is bitterly cold six to eight months of every year, and animal skins are your only protection from the weather. You use these skins for clothing and to build your dwelling, since there is little structural vegetation for construction.

Native Americans in this region relied heavily on harvesting the American bison (Roe 1951). This was done via cooperative hunting. Cooperation gives humans a tremendous advantage in hunting. A group of humans could, for example, position themselves so as to drive a group of bison over a cliff. Some of the bison would die in the fall and others would suffer broken legs. The injured bison could be easily killed by slitting their throats with knives made from the bones of their ancestors.

When meat was available, Native Americans found ways to preserve it through a drying process. Thus, although the problem of finding food began anew every day, there were intermittent reprieves.

Weapons available to Native Americans were primitive before Europeans arrived. Nevertheless, the idea has been advanced that humans caused the extinction of a number of species of Pleistocene megafauna.

Now let's fast-forward to a village in the Amazon Basin in the 1990s. It is dawn and you are hungry. You emerge from your hut, made of vegetative material from the surrounding area, and it is pouring rain. In the Amazon Basin of South America, it rains frequently in some seasons. Your hut is in a small village. You have a "new" shotgun which you obtained by trading some artifacts to a passing miner. The shotgun is new only to you. It is in fact very old and partly rusted. You also have ten shotgun shells. Shotgun shells in the Amazon are very expensive and therefore very precious. Each one represents a meal—as long as you don't miss when you shoot. Your hunt for bush meat begins as soon as you load your canoe and leave the village.

Wildlife populations are scarce near the village, as those unwary animals were consumed long ago. Today, you know you must travel a great distance (perhaps several kilometers) to find an area where populations are large enough that your chance for success makes the effort worthwhile.

And what do you hope to find? The farther you travel, the farther you must transport the kill. Nevertheless, you hope for a large animal—one large enough to feed you for more than a day and still small enough that you can kill it with a single shot. (Remember, those shells are worth a fortune in the Amazon.)

In parts of the world, the daily problem of finding food for oneself and one's family has changed little from earlier times. Each day the problem must be solved anew. One way to partially offset this daily grind is to preserve the meat acquired in salt. Village huts are adequate, but there is no television, let alone a refrigerator. If clothes get too gamey, they must be cleaned so as not to betray one's presence to an animal (= a potential meal) with a sharp sense of smell. Clothes are cleaned by taking them to the river to wash them.

Solving the daily energy problems of oneself and one's family may mean finding something to trade for more shotgun shells or reliance on a more primitive means of killing, such as a bow and arrow, a blowpipe, or simply a sharp stick. Failure to make a kill may be offset by sharing food with a successful hunter from one's extended family in the village. (Hunters are expected to share their success.) Physical labor may also be traded for some food.

Every day is a struggle; life is very hard and is becoming more so every day. Consider the effects of deforestation on these populations. The forest is lost and so are the animals that live there. In place of the rain forest, which is often simply burned, grass is sown and cattle are raised on the grass. But the soil is not especially fertile and a lot of rain forest must be converted to rangeland to make it profitable. In the end, these cattle are slaughtered and their meat used in fast-food restaurants in North America. It is ironic that we pay so little for something that is so difficult to come by in some parts of the world.

Let's turn our attention to what kinds of species are harvested. We focus on Latin America because it is one of the last places on earth where subsistence hunting is an important way of life and because we have tremendous knowledge of the area through studies done by scientists at institutions such as the Center for Latin American Studies at the University of Florida.

In Amazonian Peru, "bush meat" and fish constitute much of the animal protein consumed by colonists. Among the Miskito Indians of Nicaragua, wildlife makes up 98% of the meat consumed (Redford and Robinson 1991). In contrast, bush meat comprises less than 20% of the animal protein in the diets of colonists living along the transamerican highway in Brazil (Smith 1976).

If wildlife species are important to local peoples in Latin America, an interesting question involves which species are taken. In one study involving

local people in Suriname, it was found that the people killed (for meat and skins) 27 species of mammals, 24 species of birds, 3 species of turtles, and 2 species of lizards (Redford and Robinson 1991). One might imagine that people take animals in proportion to their abundance, but this is too simplistic a view. Other important considerations involve cultural taboos. Mittermeier (1991) conducted in-depth interviews with local people in Suriname to determine their feelings about primate consumption. He found that some subsistence hunters avoided harvesting red-banded tamarins (*Saguinus midas*) or squirrel monkeys (*Saimiri sciureus*) due to local taboos because (1) the animals have sexual behavior too like that of humans, (2) the people believed that the meat would make them sick, (3) some species cradle their offspring like humans, and (4) the animals smelled bad (Mittermeier 1991).

Subsistence hunters may carefully pursue only certain species of mammals. In Suriname, for example, there are eight species of nonhuman primates that the local people hunt for meat and skins. Indeed, hunting for subsistence by local peoples has been identified as the most important factor in the disappearance of primates from Suriname (Mittermeier 1991).

Hunting habits and diets of local peoples are highly vulnerable to even minor development (Ayers et al. 1991). Thus, deforestation reduces population sizes, and roads bring in less knowledgeable hunters who may harvest previously unharvested species. Roads also may bring in supplies of canned meat from other parts of the world.

## WILDLIFE FOR SALE

In Chapter 3, we learned that the caiman is a protected species. In Corumba, in southwestern Brazil, cowboys make a living herding cows and hunting caimans (Misch 1992). Although Brazil passed a law in 1967 protecting much of its wildlife from commercial hunting, the law is not enforced, which is not an uncommon occurrence. The cowboys shoot the caimans and sell them to local tanneries for around five dollars each. From there, the hides make their way to North America, Europe, and Asia. Estimates are that some 500,000 caimans are killed in the Pantanal region of Brazil each year. Scientists do not know if such harvests are sustainable.

Caimans are a small part of the illegal wildlife trade, however. Misch estimated the total value of wildlife sold to be from \$5 to \$8 billion annually. Most of the poaching is done by local people trying to make a better living. Although habitat loss is the primary threat to most of the world's species, trade in wildlife products can also wipe out a species. The passenger pigeon and the Carolina parakeet were two common North American species 100 years ago.

Both were driven to extinction by the wildlife trade. The Orinoco crocodile, the Javan and Sumatran tigers, and the black rhino are being driven to the same fate as a result of the wildlife trade.

Waste in the animal trade is staggering. Some 15 out of every 100 parrots imported into the United States die in transit. Among macaws, 30% die before they reach their owners. The dead birds are, of course, replaced by live birds from the wild. Although these losses seem high, they do not compare to those incurred by primates. When a young chimpanzee is taken from the wild, most of the adults must be killed first. Thus, for every chimp taken from the wild, some ten are killed. The Convention on International Trade in Endangered Species (CITES) (Chapter 2) is supposed to block import and export of endangered species and regulate trade in threatened or potentially threatened species.

Thus, the treaty requires vigilant monitoring, which is proving to be an impossible task for many countries. One of the most notable successes of CITES has been the African elephant. Populations of elephants across Africa had plummeted to less than 600,000 in 1994. The international attention given elephants has raised consumer awareness and made the purchase of carved ivory, boots made of elephant skin, and wastepaper baskets made from an elephant's foot repugnant to most shoppers. CITES, however, has many loopholes that permit countries such as Zimbabwe, South Africa, Botswana, and Malawi to list "reservations" on Appendix I species such as elephants. Appendix II species can be traded provided wild populations are not compromised. But how are these populations monitored? Who verifies that the species is prospering? Some people even suggest that inclusion in the Appendix II list is an advertisement for poachers to collect now because tomorrow may be too late.

CITES agreements are difficult to trace, and no sanctions are placed on nations that violate the treaty. Vietnam, Myanmar, Cambodia, and Laos had not yet signed the treaty in 1996, and these are biologically rich nations. Once a product such as a tiger penis reaches Laos, anyone can purchase it and then attempt to ship it home.

As Misch points out, rangers in most parks are poorly paid and poorly equipped, and most parks are short-handed. It is far easier and safer to take a bribe than to protect an animal when the poachers are heavily armed and determined. Is it reasonable to expect a guard who is paid \$5.00 a month to protect a rhinoceros worth \$1000 in horn alone. Most often, guards are chosen from the local population and are resented because they have the highest paying jobs in the area. Moreover, the guards are charged with keeping their neighbors from making a living off the park's natural resources. Frequently, the guards are ostracized in their own villages.

# COMMERCIAL HARVEST OF WILDLIFE IN NORTH AMERICA\*

On Earth Day, April 22, 1996, the *Tampa Tribune* ran a story on a Waldo, Florida, wildlife gift shop. The store sells snake skins to major boot manufacturers, but shoppers can buy many interesting and unusual products. For instance, python cummerbunds or sports jackets and even alligator back scratchers can be purchased. Road-killed stuffed bobcats, opossums, armadillos, and snakes are also available. Among the more exotic gifts are cobra-head belt buckles; rattlesnake belts, ties, and hatbands; and alligator boots. Certainly, animal rights activists actively campaign against such shops. However, although many of us are repulsed by these macabre gift shops, they serve as a constant reminder that humans continue to exploit wildlife and some people make a living doing it.

A large number of species are currently exploited commercially. The taxa involved range from sponges to mammals. In the United States, shellfish, sponges, jellyfish, and several species of fur-bearing mammals are commercially harvested. Historically, a number of species of waterfowl, upland gamebirds, and big game mammals once were commercially harvested in the United States. Some of these species are discussed below, but only after examining some of the tragedies of market hunting in the United States. Hopefully, a pattern will quickly become apparent: there is no safety in numbers.

## Fur Industry

There are still six or seven chinchilla farms left in North America and only four buyers of the skins. As of 1993, there were 556 mink farms in the United States, down from some 2000 a few years ago; 57 of these farms also raise foxes.

State	Number of mink farms
Utah	150
Wisconsin	114
Minnesota	72
Oregon	29
Washington	28
Idaho	27

\* *International Wildlife Trade: Whose Business Is It?* by Sarah Fitzgerald (World Wildlife Fund, 1989) is recommended as supplemental reading.

Iowa	25
Pennsylvania	21
Illinois	15
New York	12
Ohio	11
South Dakota	7
Other	45

## The Passenger Pigeon

When the first Europeans landed in what is now called North America, the passenger pigeon may have been the most abundant bird species (Schorger 1973). Early reports described flocks that blackened the sky and extended for miles. We will never know how many passenger pigeons there once were, but we do know how many there are today—none. Passenger pigeons were victimized by a combination of habitat destruction and overhunting. The last surviving passenger pigeon was a female named Martha; she died in the Cincinnati Zoo on September 1, 1914 (Greenway 1967).

One habit of the passenger pigeon no doubt left the species especially vulnerable to overharvesting: they were very gregarious. Passenger pigeons nested in great concentrations and roosted in enormous flocks. Schorger (1973) described the sad history of the species once Europeans arrived. The vast numbers were reduced by the mid-1800s, and only remnant populations persisted by the late 1800s. Market hunters could kill large numbers by setting out poles for the birds to roost on and then firing their shotguns down the poles. Hunters could also kill vast numbers by smoking their roosts with burning sulfur. The hunters would place little pots of sulfur around the roosts after nightfall. They would then light the sulfur and wait for the birds to drop to the ground. Some individuals were killed outright by the poisonous fumes, and the others were bludgeoned to death. Other techniques involved the use of “stool pigeons.” A calling bird would be placed on a perch (i.e., a stool) in a large trap. Wild birds would be attracted to the trap and easily ambushed. Market hunters sold passenger pigeons by the thousands for only pennies. Now the remnants of this species can be seen only as study skins in trays in the bird collections at various museums of natural history.

## Waterfowl

Humans interested in making a buck through killing wildlife are often far too ingenious for their quarry, as exemplified by the market hunters who discovered that smoking sulfur would bring roosting passenger pigeons to the

ground. Waterfowlers were also rather ingenious. They invented the so-called “punt gun.” A punt gun was a large-bore shotgun mounted on the back of a small boat (i.e., a punt). The bore of the gun was much larger than what waterfowl hunters are legally restricted to today, and punt guns were, in fact, little more than cannons on the backs of these little boats (Baldassarre and Bolen 1994). The hunters could row up to a flock of unsuspecting waterfowl and fire away. Because the gun was mounted on the boat, the tremendous recoil would be absorbed by the waterway and not the hunter’s shoulder. Waterfowl were slaughtered by the millions in this way. Some examples of the slaughter include more than 400 ducks and 450 geese sent to market in a single day by a market hunter in Louisiana, 122 wood ducks killed before 9:00 A.M. on the Mississippi River, and a group of market hunters who sent 1000 ducks and shorebirds to market per week (Baldassarre and Bolen 1994 and references therein).

Nevertheless, there is no example of a waterfowl species that was forced to extinction by the use of punt guns. Is it possible that market hunters could have continued to use punt guns and kill waterfowl without human-imposed legal limits? Probably not. The slaughter of waterfowl in North America likely was a motivating factor in establishing laws to protect the species. Today, the ducks, geese, and swans remain, but many populations are reduced. Without laws and law enforcement, many of these species no doubt would be gone.

There are examples of waterfowl extinctions that were likely caused by commercial hunting. The common eider (*Somateria mollissima*) population of Maine was reduced to a single nesting pair by 1907 (Greenway 1967), but the species recovered in Maine to some extent after it was protected. The Labrador duck (*Camptorhynchus labradorius*), which apparently was never very common, nevertheless appeared in markets between 1850 and 1870 but was not cherished for its palatability (Greenway 1967).

## COMMERCIAL HARVESTING OF WILDLIFE IN OTHER NATIONS

### Kangaroos

Five species of kangaroos currently are harvested in Australia. The three most common species are red kangaroos (*Macropus rufus*), eastern grey kangaroos (*M. giganteus*), and western grey kangaroos (*M. fuliginosus*). It is generally believed that there are more kangaroos today than when Captain James Cook



landed in Australia in 1770 (Fitzgerald 1989). When European colonists came to Australia, they cleared forests for agriculture. These activities apparently were not good for smaller species of kangaroos but seemed to be beneficial for larger species. Larger species were seen to be pests as early as the 1850s. Large species were not protected as recently as 50 years ago, but soon it became clear that the commercial harvest of these species had to be regulated. The skins (1 to 1.7 million skins per year between 1981 and 1986) are exported for leather, mostly to Southeast Asia and Europe, and the meat is made into pet food, although at one time it was sold for human consumption. In the early 1980s, more than 1000 tons of kangaroo meat was exported to Europe as "sausage." When undercover agents found that the meat could not pass health inspections, exports dropped to less than 50 tons in 1984. The meat is commonly contaminated with salmonella, in addition to dirt, vegetation, and the parasite *Dirofilaria roemeri* (Shepherd and Caughley 1987).

Commercial harvest of kangaroos is an important management tool because the five species included are often serious pests. State-sponsored shooters are too expensive and recreational shooters do not kill enough to control the populations (Shepherd and Caughley 1987).

Interestingly, the United States once was the largest importer of kangaroo products. However, following a public outcry involving certain endangered species in Australia, the market for kangaroo products dried up (Fitzgerald 1989).

## Introduced Deer in New Zealand

Several species of deer (about ten) have been introduced in New Zealand (Daniel 1962). There are no native deer there. Some of the introduced species have become quite common, which has sparked a commercial trade in meat and hides. For the most part, the deer have been hunted on foot, but recently helicopters have been used. Some argue that the populations have since fallen by 75%. This hurt the commercial trade and represents another example of how technology can influence harvesting success.

## European Hares in Argentina

European hares (*Lepus europeus*) were introduced in Argentina in the 1800s and have been quite successful. Now they are shot by licensed hunters, and the processed meat is exported to Europe. Between 1976 and 1980, an average of 11,800 tons of hare meat was exported from Argentina to Europe (Fujita and Calvo 1982).

## **Crocodilians and Sea Turtles**

There are 23 species of crocodilians worldwide. In 1971, all 23 species were either declining in number or endangered. Today, seven species are still endangered, but the others have benefited from management. Because the skins of these species have high commercial value, private companies have invested in establishing “crocodile farms” around the world. These farms help by hatching eggs and also work to preserve the species in the wild. Other methods of conservation include carefully regulated hunting (as in Florida) and habitat preservation. This is an example of how commercial value can serve as an incentive to citizens to preserve species.

Management programs for sea turtles include the harvest of eggs of olive ridley sea turtles in Central America. Lagueux (1991) studied human harvest of sea turtle eggs in Honduras from 1982 through 1987. She found that nearly 100% of the olive ridley eggs laid in some areas were harvested, a figure that no population can sustain.

## **Sponges**

Sponges were once commercially harvested along the west coast of Florida and in the Keys. In the 1890s, sponges were harvested and exported to Europe and were used domestically for surgeries. The industry in Key West began in the 1830s, and by the 1890s Key West was one of the four most important centers in the world. The other centers were the Bahamas (Nassau), Cuba, and Calaimo, Greece (Munroe 1987).

Sponges are still commercially harvested along the west coast of Florida, in the vicinity of Tarpon Springs, but there is no more commercial sponge harvesting in the Keys. In the summer of 1995, sponges near Tarpon Springs began to suffer from an affliction of unknown origin that left their bodies brittle and unusable. This may be yet another impact of a recent red tide outbreak.

## **ILLEGAL TRADE**

When discussing commercial uses of wildlife, it is important to keep in mind that there are both legal and illegal uses. It is sometimes difficult to say that a certain type of trade is illegal, since there may not be any legal basis for saying it is. One example is fishing on the high seas. Is France or Taiwan breaking any laws by overharvesting fish on the open oceans? Illegal uses include trafficking

endangered species or their body parts. The trade becomes illegal when wildlife traffic is imported into a country against its laws. For the purpose of our discussion, we refer to any trade as being illegal if it violates known laws in the United States, which has some very strict laws.

## **What Drives the Illegal Wildlife Trade?**

In many cases, people involved in illegal harvesting (poaching) can double their annual income with just a few kills (in some cases, one tusk of ivory). Bear gallbladders, tiger bones and penises, spotted cat skins, etc. are all highly valuable. The same is true for wild species captured for the pet trade.

One important point to consider is that the more abundant and common a species is, the less likely it is to be involved in illegal activities. Sadly, it is the rare species, those that can least afford it, that are victimized by human greed. As a species become rare, it becomes more valuable—a simple economic principle.

## **Examples of Illegal Commercial Use of Wildlife**

### ***Rhinoceros***

There are five species worldwide, and a variety of products are used, including meat, horn, penis, hide, blood, and urine (Fitzgerald 1989). In India, one zoo sells rhinoceros urine for 44 cents per liter as a cure for asthma or sore throats. The penis of a rhino may sell for \$600 and is used as an aphrodisiac in some cultures. In North Yemen, the horns are used for knife handles. Fitzgerald claims that there are now fewer than 11,000 rhinos of all species in the wild.

### ***Elephants***

The main product is ivory from the tusks. There are two species: African and Asian. Some isolated populations of Asian elephants (i.e., in Sri Lanka) do not have tusks. One major conservation concern is that there has been elevated inbreeding of Asian elephants in some areas because males have been disproportionately harvested for their ivory. Asian elephants are also used as beasts of burden. The biggest concern for Asian elephants is loss of habitat.

African elephants are seldom used as beasts of burden, but they have high-quality ivory. Between 1979 and 1989, the world population dropped from 1.3 million to 625,000, mostly due to illegal hunting. Other factors responsible for the decline in population are habitat loss, drought, and disease.

Eisler and Buckley asked an interesting question in *USA Today*, April 25, 1996: “Should the public dictate hunting policy that once was left to the state?” Their question, however, does not go back far enough. We learned in Chapter 2 that the federal government once dictated hunting policy and then granted the states the right to dictate that policy. The question that should be asked is, “Should the public dictate hunting policy that once was left to the federal government?”

**FIGURE 12.1** This ad appeared in 1990. Mongolia has since signed CITES, and hunts like this are now a thing of the past.

A record number of states are putting hunting referenda before the voters, according to Eisler and Buckley. As always, the two ends of the continuum are obvious. On the far right is the National Rifle Association, and on the far left are the animal rights activists. The ballot questions vary widely with region.

In most of the modern world, hunting is no longer really a major means of feeding oneself, although fishing might play a major role in supplementing people's diets in parts of the United States (according to an article in *Florida Sportsman*).

Traditionally, species involved in recreational hunting have been divided into categories. One category includes big game species such as white-tailed and mule deer, elk, mountain sheep, mountain goats, javelinas, and the host of exotics in Texas (discussed in Chapter 10). Big game hunting outside of the United States is also appealing to many recreational hunters (see [Figure 12.1](#)). A second category includes small game species, both mammals (such as squirrels and rabbits) and birds. The birds may be either upland gamebirds or waterfowl. Upland gamebirds include species such as ring-necked pheasants, bobwhites, various species of quail and grouse, mourning doves and other doves and pigeons, and turkeys. Waterfowl includes species such as ducks, geese, and swans. There is a very important reason for this distinction between upland gamebirds and waterfowl. Upland gamebirds are typically residents in a state. Moreover, they also include exotic species such as the chukar, grey partridge, and ring-necked pheasant. Waterfowl, on the other hand, are largely migratory, and they cross several state and national borders in any given year. Management of upland species may be handled by individual states, but waterfowl require an interstate and international program.

One measure aimed at producing funds for waterfowl management is the "Duck Stamp" which all waterfowl hunters in the United States must acquire in addition to a small game license.

## SPECIAL HUNTS

### Alligators in Florida

Alligators were once hunted nearly to extinction, mostly for their skins but also for meat. Even today, the meat may sell for as much as \$4 to \$5 per pound. The skins are used for leather products and sell for \$25 to \$35 per linear foot.

Alligators are not only hunted in a special season (in Florida it has been the month of September since 1988) but are also raised on alligator farms. Louisiana has a large alligator farming industry and yields the greatest number of skins of any state.

In Florida, there is a lottery for permits to trap alligators. Florida residents pay \$250 for a trapping permit, and nonresidents pay \$1000. Each trapper is then assigned an area and has two weeks to remove as many as six alligators. In 1995, there were 573 hunters (selected by computer from 9000 applicants), and the harvest quota for 1995 was 3500. The Florida Game and Fresh Water Fish Commission claims that there are as many as 16,000 alligators in Lake Okeechobee alone; thus, the removal of 3500 from the entire state does not represent a high percentage.

Commercial use of alligators extends to the so-called nuisance alligators. They are taken by licensed trappers. See Figure 3.3 for an idea of the number taken.

## Rattlesnake Roundups

Across the southern states, rattlesnake roundups take place each year. One of the largest hunts is in Sweetwater, Texas. People collect snakes and bring them to a large barn on a specified day. Awards are given for the most snakes caught, the largest snake, and so on. The snakes are milked for their venom and then slaughtered for the meat and skins. The harvest is uncontrolled. Because the Sweetwater Round-up occurs in early March, when it is often still too cold for much rattlesnake activity, the hunters flush the snakes from their burrows mechanically with hooks or chemically by pouring gasoline down the burrows. Individuals of many other species are victims of the gasoline. In the southeastern United States, these other victims include indigo snakes (*Drymarchon corais*), gopher tortoises (*Gopherus polyphemus*), and possibly gopher frogs (*Rana capito*) and Florida mice (*Peromyscus floridanus*).

## SUMMARY

Wildlife is harvested for subsistence in many parts of the world. As technology advances, the ability to overharvest species increases. Commercial harvesting typically is not sustainable. Indeed, there are few examples, like the kangaroos in Australia, of species commercially harvested under tight controls where we see any inkling of sustainability.

Recreational hunting is practiced in many parts of world. A number of species are harvested, and this may be economically beneficial to those guiding the hunts. Recreational hunting is probably most popular in states with lower population densities. In states such as Florida, fewer than 2% of the population participates in recreational hunting.

## EXERCISES

- 12.1 Identify three examples of bird species that are harvested for subsistence.
- 12.2 How would you characterize these species?
- 12.3 What is the most common reason for use of animal body parts in Asia?
- 12.4 Pick some states and/or countries and find out what it costs to hunt big game species there.
- 12.5 Give one example of an introduced species that is harvested commercially somewhere in the world (other than the ones listed in this chapter).
- 12.6 How many African elephants are there now? How many were there 20 years ago? Why has their population crashed?
- 12.7 Are hunting reserves the answer to preserving wildlife? If a local village can get \$20,000 from a hunter willing to shoot a bull elephant, wouldn't that be a powerful incentive to raise more bull elephants?

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