MAINTENANCE GUIDEBOOK VII
TERMITE, INSECT, AND RODENT CONTROL

CHAPTER NINETEEN - OTHER VERTEBRATE PESTS

SECTION A INTRODUCTION

Although rats, mice, and birds are the vertebrate pests most commonly encountered in the urban environment, other vertebrates sometimes become pests too. Some of these animals become pests when they wander into residential areas from nearby wild areas or parks—for example, skunks, raccoons, and possums. A skunk in the woods is beneficial; a skunk nesting in the crawlspace of a home is an entirely different matter. Other vertebrate pests, such as bats and squirrels, have taken to living with people—next to or sometimes inside buildings.

Whatever the pest, it should be managed. However, game animals or others which are considered pests may be protected. Many people feel a strong attachment to vertebrates that they do not feel towards other organisms. Children in particular may love and cherish them. Some people are involved emotionally in protecting the "welfare" of animals, particularly vertebrates. Control of vertebrates other than rats and mice is more of a public-relations problem than a pest problem. Killing may be the control method of choice.

1. BATS

a. Characteristics and Recognition

Bats (Fig. 19-1) are unique in the animal kingdom as the only true flying mammals. A thin membrane of skin stretches from their long front legs to the back legs and then to the tail. Bones in their "fingers" are elongated and support the wings.

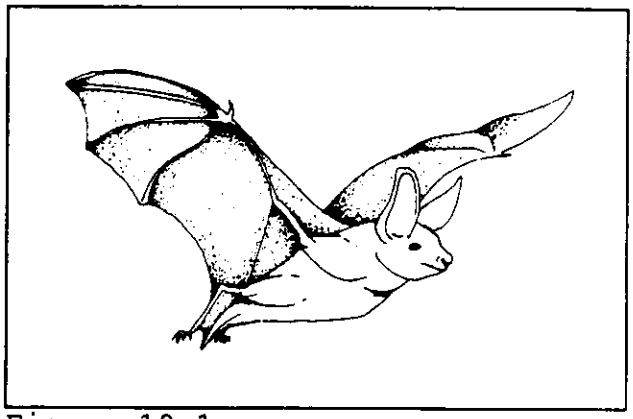

Figure 19-1

Bats are usually beneficial, since they feed on insects. They can consume up to half of their body weight in insects in one feeding. Occasionally, however, bats may become a nuisance when they move into buildings and pose a public-health problem.

They become a problem when they live in colonies or groups. Some of the bat species are: little

brown bats, big brown bats, Mexican free-tailed bats, and big-eared bats. These species sometimes hibernate or roost inside buildings in attics, wall and ceiling voids, belfries, chimneys, and unused furnaces. Bat droppings and urine can cause a foul odor and stains in walls and ceilings. Their squeaking and scrambling noises can be intolerable to residents.

b. Habits of Bats

During warm weather, bats feed on flying insects in late afternoon, evening, and early morning. They are not active in bright daylight. If you see a bat at this time, it has either been disturbed from its resting place or is sick. When not in flight, they rest in dark places (caves, buildings, hollow trees). Bats are able to enter these places of refuge through holes as small as 3/8-inch.

Bats capture flying insects by "echo-location." They emit high-frequency sound, inaudible to human beings, similar to sonar. They also make audible squeaking sounds for communication. In much of the country, bats migrate or hibernate when the weather turns cold, sometimes in hanging clusters inside buildings. Depending on the species and geographic location, they breed from late spring to midsummer. Young bats grow rapidly and can fly in three to seven weeks.

2. TREE SQUIRRELS

a. Characteristics and Recognition

Tree squirrels (Fig. 19-2) are mainly found in forest areas throughout most of the United States. Some species have adapted well to suburban and city life. Occasionally they enter buildings and cause damage or disturbance. The most common species that become pests are the gray squirrel, red squirrel, flying squirrel, and fox squirrel.

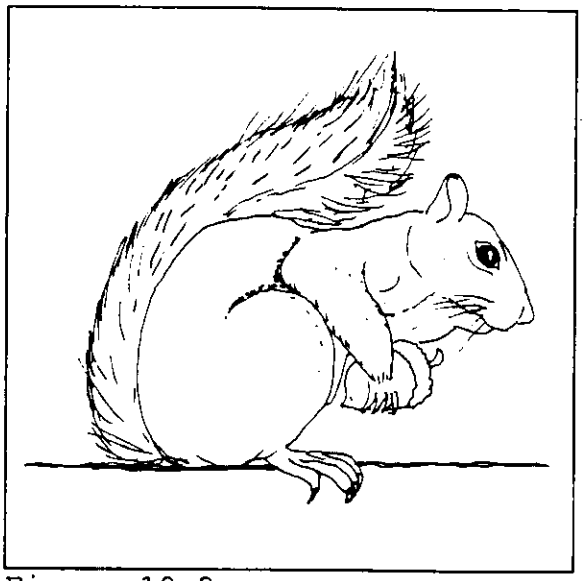

Figure 19-2

Tree squirrels usually build their nests in trees, but may also find shelter and store food in attics and garages. They can become pests by scrambling and scratching inside attics and in wall voids, and by short-circuiting transformers. They also like to gnaw on wires. The legal status of squirrels varies with geographic area and species. Many are classified as game animals. Some are protected. Be sure to check with local game conservation officers before beginning any kind of lethal control or trapping program.

3. GROUND SQUIRRELS AND CHIPMUNKS

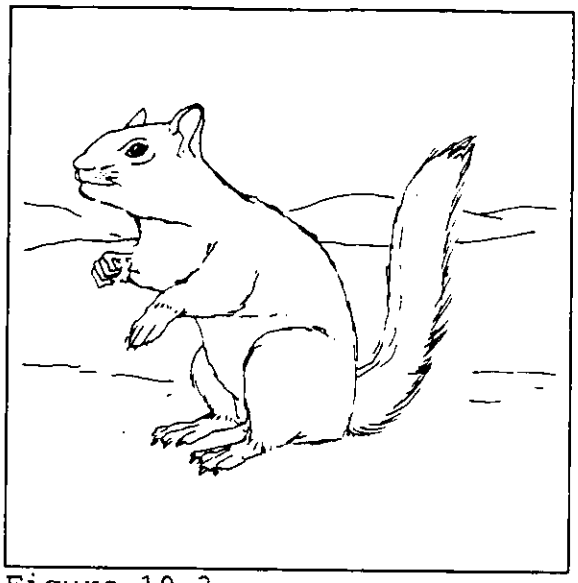

Figure 19-3

A number of species of squirrels and chipmunks occasionally become pests in and around buildings. The major concern is their burrowing around foundations, in lawns, and in gardens. Ground squirrels (Figure 19-3) can have extensive burrows with large mounds, especially along roads and ditch banks. On occasion, burrows beneath buildings can cause structural damage. Ground squirrels can also transmit diseases such as tularemia and plague.

Both ground squirrels and chipmunks are active during the day and are easily seen when foraging. But they spend much of their time in their burrows. During winter months, most ground squirrels and chipmunks go underground and stay inactive. In some areas, ground squirrels will go into a summer hibernation when the temperature is high.

Ground squirrels are primarily vegetarians, feeding on grass. When vegetation dries up, they switch to seeds, grains, and nuts. Chipmunks eat both plant and animal material, including seeds, nuts, insects, worms, songbirds, and frogs.

4. MOLES

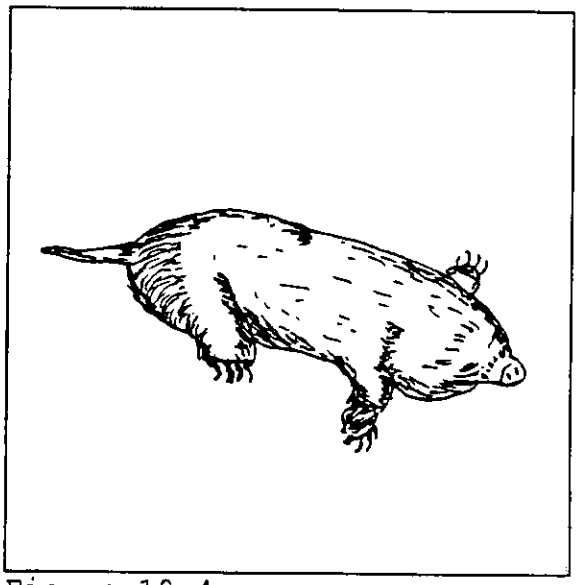

Figure 19-4

Moles (Fig. 19-4) are not rodents like mice and gophers, but are relatives of insectivores (insect eaters) like shrews and hedgehogs. Moles burrow in lawns, meadows, stream banks, and open woodlots while searching for food. They feed on earthworms and insect larvae (grubs), and are rarely seen above ground. Moles are four to nine inches long, including the tail, with long dark gray or brown fur. Their eyes are tiny, like a pinhead, and the tail and feet are usually pink. They have no visible ears. There are seven species in the United States.

Moles may damage plants and disfigure lawns with

mounds and ridges. As they tunnel just below the surface, moles raise the sod up with their front digging feet while searching for food or new tunneling sites. They can push up surface tunnels at the rate of a foot per minute if the soil is loose. They prefer loose, moist soil shaded by vegetation.

5. SNAKES

Most snakes are nonpoisonous, harmless, and beneficial. As a general guideline, poisonous snakes usually have a large triangular head, a pit between their eyes and nostrils, and vertical and elliptical pupils. They may also have rattles on their tail, noticeable fangs, and a single row of scales between their vent and tip of the tail. When unsure, assume that the snake may be poisonous and protect accordingly.

Snakes are predators. Depending on the species, their diet may include insects, rodents, frogs, birds, worms, or toads. Some snakes hibernate in dens during the winter, sometimes under houses. At certain times of the year, they may enter buildings for warmth, shade, or moisture.

6. SKUNKS, RACCOONS, AND POSSUMS

These three vertebrates are considered together because they are similar pests with similar management and control recommendations. Management of these animals almost always involves exclusion and live trapping.

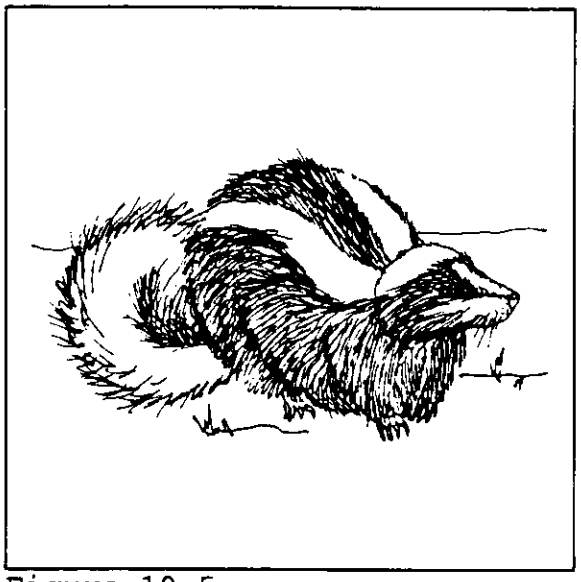
Figure 19-5

a. Characteristics and Recognition

Skunks: Two kinds of skunks may become pests, the striped skunk (Fig. 19-5) and the spotted skunk. The striped skunk is about the size of a large house cat, with two broad white stripes running from the back of its head to the large bushy tail. Spotted skunks are about half that size, with four irregular stripes beginning behind their eyes and below the ears.

Skunks are nocturnal. They do not hibernate, but may sleep through cold-weather periods. They usually live in underground burrows, hollow logs, or rock piles, or under houses, sheds, cabins, or storage buildings. The main problem with skunks is their stink. They become "pests" when they change their dietary selections from rodents, insects, and wild fruit, to garden crops, garbage,

and lawn insects, and locate their habitat closer to people. A major problem, in some areas of the country, is the transmission of rabies.

Raccoons: Raccoons are common throughout North America. They are easy to recognize with their black face mask and black, brown, and white-ringed bushy tail. They have long thick fur with a thin muzzle and pointed ears. Their feet are well adapted to climbing. They are large animals, weighing between ten and twenty-five pounds.

Their hearing, sight, and touch are well developed, while taste and smell are not. They are commonly found near streams, lakes, and swamps, and often do quite well in suburban areas and even in city parks. Raccoons den inside hollow trees or logs, rock crevices, deserted buildings, culverts, chimneys, attics, and crawlspaces. They may use more than one den. Mostly active at night, raccoons may be seen at dawn or dusk and sometimes even in the middle of the day. Winter months are spent in the den, but they do not hibernate. They may become active during warm spells.

Raccoons feed on animals and plants. In the spring and summer, they feed on crayfish, mussels, frogs, and fish. In the fall, they switch to fruits, seeds, nuts, and grains. They also eat mice, squirrels, and birds, and are quite happy knocking over a garbage can. Raccoons, too, can transmit rabies.

Opossum: Related to kangaroos, opossums are the only marsupial (a mammal whose young are carried for months after birth in an external pouch on the abdomen) in North America. The opossum is a whitish or grayish animal the size of a house cat. Its face is long and pointed with rounded, hairless ears. It grows up to 40 inches long. It will weigh up to fourteen pounds; the average is six to seven pounds for males and four pounds for females. Their tracks look like they were made by little human or monkey hands.

Opossums prefer to live near streams or swamps. They den in the burrows of other large animals, in tree cavities, brush piles, and under sheds and buildings. Occasionally, they move into attics and garages. They eat nearly everything, from insects to carrion, fruits to grains, garbage to pet food. Opossums are active at night. Their mating season is January to July, and they may raise two to three litters per year. Most young die in their first year, but those that survive may live up to seven years.

Opossums move slowly. Their top speed is about seven miles per hour. When threatened, opossums climb trees or go down into burrows. If cornered, they may growl, hiss, bite, screech, and exude a smelly green fluid from their rear ends. If these defenses aren't successful, they may

play dead. They have the reputation of being stupid, but scientists consider them to be smarter than domestic dogs.

As a pest, the main complaint against opossums is that they get into garbage, bird feeders, or pet food left outside, and carry large populations of cat fleas.

SECTION B HAZARDS OF INFESTATION

1. BATS AND DISEASE

Bats are associated with a few diseases that affect people. Rabies and histoplasmosis are the most serious. Rabies is a dangerous disease, fatal if not treated in time. However, the bat's role in transmission has been greatly exaggerated. Although bats are confirmed carriers of the disease, only a few human fatalities have been attributed to bat bites. Nevertheless, use care when handling bats. Bat bites should be considered to be potential rabies exposure. Because most bats will try to bite when handled, they should be picked up with heavy gloves, forceps, or a stick. If a bat has bitten someone, it should be captured without crushing its head. Refrigerate it (don't freeze it). Then take it to the local Health Department for rabies testing.

The incidence of Histoplasmosis (discussed in detail in Chapter Eighteen—Birds) transmission from bat droppings to humans is not thought to be high. However, when working in a bat-roost site with lots of accumulated droppings, wear a respirator and protective clothing and follow the safety procedures outlined in Chapter Eighteen.

SECTION C INSPECTION AND MONITORING

1. INSPECTION FOR BATS

Look for two things: entry and exit points of bats, and the location of the roost.

a. Entry and exit points

A building in poor repair will have seemingly unlimited entry points. Look for loose flashing, vents, shingles, or siding that bats can squeeze through. Look for damage and openings under eaves and soffits, at cornices, louvers, and doors, by chimneys and windows, and anywhere pipes or wiring enter. Notice droppings under openings, smudges around holes, and odors.

Bats can be observed at twilight as they leave the building to feed. The best time to observe the bats and pinpoint major exit and entry points is usually from just before to an hour after sunset. Station one or more observers at different sides of the building, looking up towards the roof. Listen for squeaking at the exits just prior to the flight. If the night is chilly or rainy, the bats may not come out.

b. Location of Roost

Locate the roost in the following way:

- Look inside attics and unused rooms during daylight;
- Check inside the chimney and vents;
- Bang on the walls and listen for squeaks and scratches as roosting bats are disturbed;
- Check behind shutters;
- Look for bat droppings. They will be found below roosting bats. Their droppings differ from mouse droppings, which they look like, because bat droppings contain wings, legs, and other body parts of insects. Bat droppings often accumulate to a depth of several inches or more.
- In large roosts, smell for bats. They have a very pungent and penetrating odor, musky and sweet, that comes from rotting droppings and bat urine.

SECTION D CONTROLS

1. CONTROL AND MANAGEMENT OF BATS

Chemical control is no longer an option for eliminating bats. No pesticides are currently registered for bat control by the EPA. The best way of getting rid of bats roosting in a building is through "bat-proofing."

a. Exclusion

Bat-proofing: Making a building "bat-proof" means sealing or screening all of the openings used by the bats to enter a building. It can be a difficult job because, in many cases, all upper openings 3/8 inch and larger must be sealed, but this is the only permanent method of ridding a building of bats. Bats should not be entombed when the building is sealed. Otherwise, trapped bats can be a problem.

June and July are the peak months for bat complaints in much of the country. Unfortunately, this is the worst time for control, since bats are rearing young in their colonies, and young bats cannot fly. Bat-proofing during this period would trap the young bats, and they would die, rot, and

become an odor problem. Bats may also crawl and flutter into living areas.

The best time of year to bat-proof a building is either in late fall, after bats have left for hibernation, or in late winter and early spring before the bats return. If bat-proofing must be done in summer, it should be done after mid-August.

Bat-proofing should be carried out as follows: seal all but one or two principal openings. Allow three to four days for the bats to adjust to using the remaining openings, then seal those openings some evening just after the bats have left for their nightly feeding. "Bat valves" can also be used. These are placed over the remaining openings and allow the bats to leave but not to return.

Standard bat-proofing materials include 1/4-inch hardware cloth, screening, sheet metal, caulking, expanding polyurethane foam, steel wool, duct tape—the same materials used for rodent-proofing. When old deteriorated buildings have many openings, and can't be sealed economically, large plastic bird nets can be draped over the roofs to keep out bats.

Bat repellents: If bat-proofing is not possible, or bats need to be forced out of a building before it is bat-proofed, they can be repelled by naphthalene crystals or flakes spread on attic floors or placed in voids. The crystals are most effective in confined spaces. While naphthalene may repel bats, it vaporizes and disappears in a few weeks, after which bats often return. Some people dislike the smell of naphthalene and are even sensitive to it. Such people should avoid all contact with this chemical.

Bright lights have been used with some success in repelling bats. Flood lights can be aimed at the bats' entry points to keep them from entering. However, the bright lights may attract insects too, which is the bats' food.) Attics can be illuminated with four or more bulbs; ensure that all corners of the attic are illuminated.

Drafts of cool air from fans and air conditioners may keep bats from roosting in a poorly sealed attic. Ultrasonic devices do not repel bats.

A single bat: When a single bat finds its way into a dwelling, it will usually find its way out again. When it does not find its way out, capture the bat with an insect net, a coffee can, or even with a gloved hand. The bat can then be released or destroyed.

2. CONTROL AND MANAGEMENT OF SQUIRRELS

Depending on state laws, ground squirrels and chipmunks may or may not be protected. Check with local officials before initiating any control plan.

a. Exclusion

Squirrel-proofing: The first step in eliminating a squirrel problem in a building is to find out where the squirrels are entering. Remember that squirrels will be coming and going each day. Common points of entry include damaged attic louvers, ventilators, soffits, joints of siding, knot holes, openings where utility wires or pipes enter, chimneys, and flashing. Squirrels may gnaw directly through siding and shingles too. Use heavy-gauge 1/2-inch hardware cloth or sheet metal to seal openings. Make other suitable repairs as for rat-proofing.

Squirrels can be stopped from travelling on telephone wires by installing two-foot sections of two to three-inch diameter plastic pipe. Split the pipe lengthwise, spread the opening apart, and place it over the wire. The pipe will rotate on the wire, sending the squirrel tumbling off. Be careful near high-voltage wires. Do not attempt to place plastic pipe on electrical wires. Call the company that supplies the electricity.

Squirrels often use overhanging branches as highways to rooftops. Tree branches should be trimmed back ten feet from the building. If the branches can't be trimmed, a two-foot wide band of metal fastened around a tree, six to eight feet off the ground, keeps squirrels from climbing up the tree and jumping to the building.

b. Mechanical .

Trapping: Live trapping with box or wire traps can be used to remove one or a few squirrels from a building. Traps should be left open and unset for a few days, surrounded by bait, so that the squirrels get used to them. Good baits include peanuts, nut meats, peanut butter, whole corn, sunflower seeds, or rolled oats. Good trap locations include the roof, the base of nearby trees, or attic spaces. Squirrels are nasty biters. Handle them carefully. Experts differ as to whether squirrels should be released or killed. If they are released, do so at least five miles away so that they do not return.

Where lethal control is permitted, rat snap traps can be used to kill squirrels in attics. The bait should be tied to the trigger and the trap nailed or wired to a beam.

c. Chemical

Repellents: Naphthalene has been used (in the same way as for bats) to keep squirrels out of attics and other unoccupied spaces. There is at least one sticky repellent product labeled for squirrels, similar to the sticky repellents used in bird control. Apply it to ledges, gutters, window sills, and the like, to keep squirrels off.

3. CONTROL OF GROUND SQUIRRELS AND CHIPMUNKS

a. Ground Squirrels

Control is usually required in severe infestations. Several important steps must be taken if a control or management program is to succeed:

- Correctly identify the species causing the problem.
- Alter the habitat, if possible, to make the area less attractive to the squirrels.
- Use the most appropriate control method.
- Establish an inspection or monitoring program to detect reinfestation.

Ground squirrels are generally found in open areas. However, they usually need some kind of cover to survive. Removing brush piles and debris will make the area less attractive, and will facilitate detection of burrows and improve access during the control program. Ground squirrels can be controlled with traps, rodenticides, and fumigants.

Trapping: Trapping is a practical means of controlling ground squirrels in limited areas where numbers are small. Live traps are effective, but present the problem of disposal of a live squirrel. Because squirrels can carry disease, many states will not permit the animals to be released at some new location, so they must be killed.

For the smaller species, rat snap traps can be effective. Place traps near burrow entrances or runs, baited with nuts, oats, barley, or melon rind. Place traps under a box if any nontargets might be killed in the trap.

Rodenticides: Rodenticides are the most cost effective way of controlling large populations of ground squirrels, and a number of products are registered for this use. Grain baits are most effective when squirrels are feeding on grains and seeds. Place rodenticides in burrows or in protected bait stations, according to the label directions.

Fumigation: Ground squirrels can also be killed by gassing their burrows. Aluminum phosphide

tablets or smoke cartridges are most commonly used. Fumigation is most effective when soil moisture is high, since moisture helps seal the tiny cracks in the burrow walls. Fumigation is not effective during periods of hibernation because the squirrels plug their burrows. Spring is normally considered to be the best time for burrow fumigation. Fumigation is not a good choice adjacent to buildings because of the risk that the fumigant gas could find its way into dwelling units.

b. Chipmunks

Chipmunks rarely become a serious pest problem. In most cases, lethal control is unnecessary. Altering the habitat may cause chipmunks to move. "Chipmunk-proof" the building to prevent entrance. Remove objects such as logs, stones, and debris close to a structure that may provide an attractive denning environment.

Trapping: Where permitted, live trapping and relocating chipmunks is a humane method of control. Effective baits include peanut butter, nuts, sunflowers, seeds, oats, bacon, and apple slices. Relocation should be done in remote forest areas at least five miles from the trap site.

Rat snap traps can also be used effectively. Traps should be placed at den entrances and baited with an apple slice, perhaps with some peanut butter. Seeds and nuts should not be used because they will attract ground-dwelling birds.

Poison baits labeled for chipmunk control can be used as described for ground squirrels. However, because chipmunk burrows are long, difficult to find, and often near buildings, burrow fumigation is not a recommended control tactic.

4. CONTROL AND MANAGEMENT OF MOLES

Although time consuming, the most effective method of control is the use of traps. Killing moles with fumigants or poison baits is not effective. Since there is no easy way to know which parts of the surface tunnels are active and which are abandoned, mole tunnels should be tamped down in several places over the yard. Mark tamped down sections with a peg or wire flag. If the tunnel has been pushed back up the next day or so, a trap should be set in that place.

Two types of traps are in general use: harpoon traps and chokers. A harpoon trap consists of two prongs that straddle the tunnel and a set of spring-driven spikes. The spikes are raised above the tunnel and catch in the trigger release. When the mole triggers the trap, the prongs are released and driven through the sod, impaling and killing the mole. A choker trap consists of a cast-metal frame with two spring-retractable loops. Two slits are cut in the tunnel and loops placed inside. When the

mole triggers the trap, it is immediately crushed.

When using traps, place a plastic pail with a warning sign over each trap. An average set will require three to five traps per acre. Check the trap every couple days, and if there are no results for three to four days, move the traps to new locations.

5. CONTROL AND MANAGEMENT OF SNAKES

If snakes become a problem, the best solution is to eliminate snake hiding places. Clean up brush piles, wood piles, rock piles, and other debris. Keep shrubbery away from foundations. Cut high grass. Often snake problems follow rodent problems. Eliminate the rodents, the snakes' food, and the snakes will move elsewhere. Snakes often enter structures through broken block foundations, cracked mortar, damaged vents. These should be repaired.

In a rattlesnake infested area, a snake-proof fence can be installed around a backyard or play area. Bury a galvanized 1/4-inch hardware cloth (with a height of three feet) six inches in the ground and slant outward at a 30-degree angle. Keep all vegetation away from the fence.

a. Snake Removal

If a snake gets into a dwelling or other building, there are several methods to remove it:

- Place damp burlap sacks on the floor and cover them with dry sacks. Check them every few hours to see if the snake has crawled underneath. The snake and bags can be lifted with a shovel, taken outside, and the snake killed or released.
- Rat glue boards will capture all but the largest snakes. The glue boards should be tied down or attached to a plywood base. Place the glue boards along wall and floor junctions. Captured snakes can be killed, or they may be released. Before release, pour vegetable oil over the snake and glue. The vegetable oil will dissolve the glue to release the snake.
- Expanded-trigger rat traps set in pairs along wall and floor junctions can kill smaller snakes.

6. CONTROL OF SKUNKS, RACCOONS, AND OPOSSUMS

a. Exclusion

These animals can be denied entry to buildings by repairing breaks in foundations and screening crawlspace vents with hardware cloth. If the animal is currently living under the building, seal all openings but one, then sprinkle a tracking patch of talc at the opening. Examine the area after dark. If tracks show that the animal has left, close this last opening immediately. Seal attic

openings. Cap chimneys with a wire cage or other animal-proof cover.

When excluding animals in spring or early summer, be aware that young animals may also be present. Be sure that all animals have been removed before sealing the building. Otherwise, an odor problem from the dead animal could result.

b. Live Trapping

Remember to check state regulations before beginning any control program. The best way to remove animals from around buildings is to trap them. If the animal must be killed, lower the trap into a tub of water, or gas it with a fumigant. If the animal is to be released, do it far away from the development. Use information on the biology of the animal to find a suitable habitat. The release site for these large animals should be over ten miles away.

Set traps as close to the animal's den as possible (where damage is occurring), at corners of gardens, breaks in walls, or along obvious animal trails. Set multiple traps in several locations. Since these animals are active at night, check traps at least every morning, preferably twice a day. It is desirable, however, to check traps more often to spot and release nontarget animals.

Skunks should be trapped carefully. Since they don't "shoot" unless they see their target, the trap, except for its entrance, should be covered with burlap or canvas before placing, and a string twenty feet or longer attached to the release door. A commercially-sold, solid skunk trap should be used. Approach the trap slowly and transport it gently when a skunk is trapped. To release the animal, stand more than twenty feet away and release the trap door using the string.

The best baits for each animal are:

- Skunk: chicken parts and entrails, fresh fish, cat food, sardines, eggs;
- Raccoon: chicken parts and entrails, corn, fresh fish, sardines;
- Opossum: apple slices, chicken parts and entrails, fresh fish, sardines.

A WORD OF WARNING: in many areas of the country, releasing a trapped animal is illegal. This is particularly true with skunks and raccoons because they can carry rabies.
ANOTHER WORD OF WARNING: the spotted skunk is protected in some states.
A FINAL WORD OF WARNING: some of these animals may be regulated as fur-bearers under the fish and game laws of the state. Know the state and local regulations before proceeding.

END OF CHAPTER NINETEEN