

High-quality research-based information to safely and humanely resolve human-wildlife conflicts



## **Managing Wildlife Damage**

### **Practical Methods for Resolving Human—Wildlife Conflicts**

Raj Smith Paul Curtis Scott Hygnstrom



**National Wildlife Control Training Program**  
**Developing Training Products for**  
**Wildlife Damage Management**

# **Wildlife Species Information**

## **A Summary of Practical Methods for Resolving Human—Wildlife conflicts**

### Acknowledgments

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**Research-based Wildlife Damage Management Information**

**Manage the Damage. Protect the Wildlife. Prevent Future Problems**

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# Wildlife Species Information

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To manage wildlife damage effectively, you must have good information on the species involved. Understanding the biology and habitat of the problem animal allows a person to use effective methods to control or eliminate the unwanted behavior, conflict, or the animal itself.

These wildlife species accounts provide you with information on the biology, habitat, behavior of the animal as well as research-based damage prevention and control methods. These fact sheets should be used as a guide for resolving conflicts.

Every wildlife species chapter contains a list of damage prevention and control methods. Each was created by wildlife biologists, academics, and private practitioners, and reviewed by experts in the field. The publication provides what you need to know about the wildlife species and how to apply the appropriate techniques for damage prevention.

Wildlife managers and agricultural specialists are often familiar with damage caused by wild animals to livestock, crops, and other types of private and public property throughout the United States. They have concluded that damage caused by wild animals is a major agricultural concern. Twenty-seven species were cited as causing the greatest problems. From a national perspective, deer reportedly caused the most damage, followed by squirrels, raccoons, beavers, blackbirds, feral hogs, and coyotes.

Damage by wild animals to ornamental plants, buildings, roads, and other structures can be serious. Some of the most-costly problems are caused by house mice, Norway and roof rats, beavers, and deer (see chapters on these species in this handbook). Wild animals also cause nuisance problems, particularly in urban areas. Problems range from feces left on golf course greens by ducks and geese, and garbage containers overturned by raccoons, to disturbing sounds made as small mammals moving in attics and walls. Chapters in this handbook provide information about nuisance problems caused by

bats, tree squirrels, raccoons, woodpeckers, ducks and geese, and other problem species.

Under some conditions, wild animals are reservoirs of diseases, presenting a threat to other wildlife populations, to domestic animals, and to human health (See the section on Wildlife Diseases). Also, public safety is at risk from automobile and aircraft collisions with wild animals.

People usually enjoy having wildlife near their homes and most are willing to tolerate moderate levels of damage. Some people can control wildlife damage on their own. Others need information about the life histories of the animals' causing problems, their legal status, and suggestions about controlling damage. Still others need professional, onsite help to solve wildlife damage concerns.

A high level of skill and knowledge are needed to control wildlife damage effectively and safely. You need knowledge of the biology and activities of numerous species, and an understanding and ability to deploy animal damage solutions. Animal-handling and control techniques must be learned, practiced, and mastered. If an animal must be killed or dispatched, it should be done as humanely as possible. Do not hesitate to contact state wildlife agency staff if the damage situation is complex, or if safety issues exist. If you have concerns about your ability to handle a wildlife problem with appropriate care and diligence, do not hesitate to work with qualified professionals.

## **Situations Involving Protected Wildlife May Require Additional Permits**

Whether the conflict with wildlife is simple or complex, your response should follow the highest ethical standards. Federal, state, and local laws and regulations must be obeyed. Migratory birds are protected by federal law, such as Canada geese, gulls, hawks, robins, and woodpeckers. States protect game and furbearer species, such as white-tailed deer, cottontail rabbits, wild turkeys, raccoons, and foxes. In addition, species that are endangered and threatened are protected by both federal and state laws. Many states require

professional certification for animal removal and transport, and the use of regulated toxicants. Some require a permit for trapping and removal of certain wildlife species, especially game animals and protected species.

You may need to secure permits — perhaps at both the federal and state levels — before using certain control techniques. The focus of this section is on those species that routinely cause conflicts with people in the US.

## Federally Protected Wildlife

Endangered species (national and state lists), threatened species (national and state lists), and migratory birds are all federally protected wildlife. In most states, people cannot, under any circumstances, handle an endangered or threatened species.

You must take special care to make sure that activities intended to control other species do not accidentally harm an endangered or threatened species. Here's what to do. First, review the lists of endangered and threatened species to see if any are found where you work. Go to the US Fish and Wildlife Service Endangered Species Online Bulletin (<http://www.fws.gov/endangered/species/index.html>) and click on your state to see the most up-to-date list. Learn how to identify those species. Then take special precautions, especially if applying pesticides or setting traps.

Migratory birds that most commonly cause conflicts with people include the American crow, Canada geese, gulls, double-crested cormorants, and woodpeckers. The Migratory Bird Treaty Act protects these birds, their feathers, nests, and eggs. You may not take, possess, or transport a migratory bird without permits from the US Fish and Wildlife Service (50 CFR Depredation Permit).

## Bird Control

### **Methods that require state and federal permits include:**

- any attempt to capture, relocate, injure, or kill migratory birds (except for those waterfowl species which may be taken during

the hunting season by those with a state hunting license, a federal waterfowl hunting stamp, and Harvest Information Program (HIP) registration).

- any attempt to destroy eggs of migratory birds.
- any attempt to destroy nests of migratory birds that currently have eggs or young within them.

On April 15, 2003, the US Fish and Wildlife Service changed its policy regarding the nests of migratory birds to allow for the destruction of nests that lack eggs or young—as long as those nests are not protected by other laws (e.g., those concerning bald eagles, golden eagles, and other endangered and threatened birds).

Although this policy change now makes it possible (in some cases) to destroy an unoccupied nest, make sure you do not violate the Migratory Bird Treaty Act by accidentally taking eggs or birds. For example, it can be difficult to tell if eggs are in the nest of a tree-nesting or cavity-nesting species, such as a bank swallow.

Legal methods that do not require state or federal depredation permits include harassment, exclusion, habitat modification, and the use of repellents, unless you're dealing with a bird that currently is nesting or has dependent young, for which you would need a permit. If you have any questions, contact your state wildlife agency. Their staff can offer advice about management strategies and information about necessary permits.

## Identify the Pest

You must be able to identify a problem animal if you want to manage it effectively. You need to understand its life cycle, habitat, and behavior. Identification, however, can be difficult. Many mammals are nocturnal or crepuscular and may rarely be visible during the day. Your only clue may be the damage itself.

The most practical way to identify a pest is by examining the damage site. Often the damage from one animal is distinguishable from that of another. For example, deer tear off plant parts while rabbits clip

parts off cleanly. Groundhog damage usually occurs close to its burrows. Among predators, killing and eating styles differ by species and may help you identify the culprit. Signs like tooth marks, feces, hair, and tracks are also helpful.

Identifying the damage-causing species takes knowledge, perseverance, and keen observation. The more you know about potential pests and the damage they cause, the more easily you can pinpoint their identity and control their actions.

## Controlling Problem Mammals

There are many ways to manage mammal that are causing human-wildlife conflicts. Many methods are specific to certain pests in particular situations. Usually, a combination of these methods achieves the best control. Review the sections on Wildlife Control Methods and Animal Handling. If using a pesticide, be sure to read the label and review the section on the use of toxicants.

## Controlling Bird Pests

As with mammals, there are many ways to manage pest birds. The goal is to choose the safest, least harmful option that gives effective control. To do this, you must have a solid understanding of the life cycles and habits of the nuisance birds. You must also know which control methods are effective and available to control specific pest birds.

Some techniques used to manage birds are similar to those used for mammals. However, birds have some unusual features. For example, few birds can smell. Olfactory repellents, therefore, do not work on birds. A good understanding of workable techniques will help you choose a successful control strategy. Bird control often involves heights, ladders, lifts and a variety of sophisticated exclusion or repellent methods.

## Develop a Management Plan

Study the birds in the problem area. Observe both pest birds and non-target birds. Study them early in the morning, at midday, and



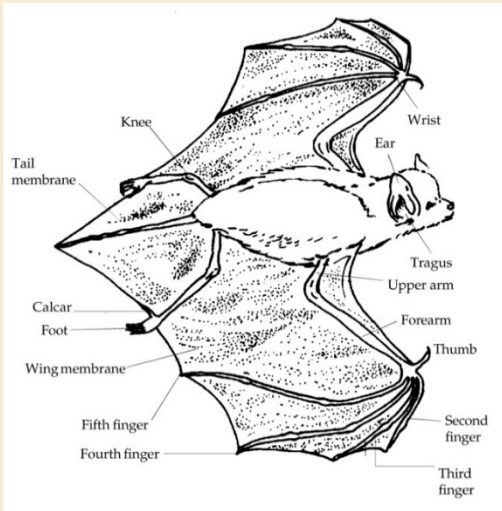
again in the evening. This will tell you how many birds and what species are present. It is important to note what the birds are doing. Are they nesting, feeding, roosting, or loafing? Are they adults or juveniles? Are they resident birds, or are they migrating? Where do they eat and drink? What is attracting them to the area?

Next, make some decisions. What's legal? What's the best long-term response? Answers to the following questions will help you develop a responsible and effective control plan.

Are the birds a nuisance? Are they causing physical damage? Do they pose a health risk? Is exclusion or habitat modification possible? Are these actions practical? Are there effective repellents for the target pest and site? If the birds disperse, where will they go? What are the legal and public relations considerations?

# Bats

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## Species of interest:

- **Little brown bat** (*Myotis lucifugus*)
- **Big brown bat** (*Eptesicus fuscus*)

Forty-four species of bats live in the US, and two listed above commonly roost in buildings.

## Size:

**Little brown:** 3 to 4 inches long. 1/16 to 1/2 ounce. 9-inch wingspan. One of the most abundant species of bat.

**Big brown:** 4 to 5 inches long. 3/8 to 5/8 ounce. 12-inch wingspan.

## Legal status in most states:

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Both the little and big brown bats are unprotected, but their conservation is encouraged. Bats are rabies vector species, so you may need to consult with your county health department and follow their guidelines for handling bats that possibly contacted a person or pet.

## Damage Prevention and Control Methods

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### Habitat modification

- Exclusion coupled with one-way doors or check-valves.
- Change light bulbs to ones less attractive to insects.

### Frightening Devices

- No effective devices have been found.

### Repellents

- Naphthalene flakes are registered in some states.
- Light and low temperatures at roosting sites.

### Fertility Control

- Nothing is available.

### Toxicants

- None are registered.

### Trapping

- Bat traps.

### Other Methods

- Glue boards for direct capture in emergency situations.

### Disposition

- Relocation.
- Euthanasia of individual bats for rabies testing.

The Indiana bat (*Myotis sodalis*) an endangered species found in the eastern US, can be confused for the little brown bat. Remember that an endangered species cannot be harassed, collected, harmed, or

killed without a federal permit. An Indiana bat is not likely to be found in a house. It's not easy to tell them apart, but here's how:

Little brown bat:	Indiana bat:
Brownish nose	Pink nose
Long hairs on toes. Hairs stick out beyond end of toes	Short, unremarkable toe hairs
Calcar* usually lacks keel, or only has weak keel	Calcar has prominent keel

\* The calcar is the bone that juts back from the anklebone to support the tail membrane. It's "keeled" if there's a flat ridge of skin sticking off its side that looks like the keel of a boat.

### Signs of their presence:

1. **At dawn or dusk**, you may see bats entering or leaving the building. This is easiest to see at dawn because bats swarm and fly around the entrance hole a few times before entering the roost.
2. **Sounds:** Bats can see, but they use ultrasonic pulses to guide their flight and locate insects (called "echolocation"). Roosting bats may squeak or scurry when disturbed.
3. **Scat:** Piles of black, dry, guano usually are found under the main exit hole in the attic. It can be found scattered throughout an area, particularly in roosts where bats enter and fly about. Guano may accumulate in wall voids or the intersection of the beams and rafters. You may also see scat on the side of the house, usually below a hole or crack. Large piles of guano usually found beneath areas that are used often, or by large numbers of bats. Individual droppings for the little brown bat are about the

size of a grain of rice. The scat of the big brown is about twice that size, and typically are chunky, due to the types of insects they eat, such as beetles. Bat droppings look like mouse droppings, but mouse scat isn't found in large piles. Also, bat droppings will crumble into powdery dust, and you may see pieces of insect wings, or their reflections, in bat scat.

4. **Rub marks** are slight brown discolorations along the edges of exit holes that are a mix of body oils and dirt.
5. **Roosts:** During the summer, bats use different roosts during the day and night. The daytime roost usually is in an attic, barn, garage, soffit, cave, underneath shutters or roof shingles, in wall voids, or behind siding or chimneys. At night, they will rest in a breezeway, under an awning, or in a garage or similar area. In winter, both species hibernate in colonies in caves, mines, and deep rock crevices. Big brown bats are more likely to hibernate in buildings, often in the attic or in wall voids.

## Diet:

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Entirely insects. A colony of 100 little brown bats can eat hundreds of thousands of insects each summer. They eat many insects that damage crops and ornamental plants, such as moths and flies.

## Typical activity patterns:

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**Social style:** Females of both species are colonial, while the males are usually solitary or found in small bachelor groups. Females roost together to raise their young. Pregnant females look for a hot niche within a roost that will serve as an incubator. These maternity colonies often are found in attics, soffits, wall voids, behind chimneys, in barns, tree cavities, rock crevices, and caves.

**Daily activity:** bats are nocturnal, with peak feeding at dusk and dawn (crepuscular). After feeding in the early morning, they will return to the daytime roost and hang out in a slightly dormant state. After their evening feeding, they'll usually rest. Females return to the roost often to nurse their young.

**Hibernator?** Both species of bats hibernate in colonies in caves, mines, and deep rock crevices. Big brown bats also hibernate in buildings. The body temperatures of these bats will drop to within several degrees of the ambient temperature. Big brown bats can tolerate below-freezing temperatures for short periods, which is why they often roost in buildings. Their heart rates also drop dramatically. The little brown bat's rate will fall below 20 beats per minute and the big brown's rate to 42 to 62 beats per minute. Compare that to their heart rates during the rest of the year: 250 to 450 beats per minute for bats when they're resting, and 800+ beats per minute when they're flying.

**Migrates?** Both species will migrate locally. Their hibernacula usually are within several hundred miles of their summer roost, but some big brown bats hibernate in their summer roost. Some of the other species of bats, as with birds, migrate farther south.

## Where found:

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**Distribution:** Throughout the US.

**Habitat:** Forests and forest edges, areas with lakes and ponds, parks, orchards, fields, suburbs, cities.

**Territory and home range:** Maternity colonies begin to disband shortly after the young are capable of flying, typically in late July. Depending on the weather, females will remain together through early October. From late July through early September, bats actively explore new roosts and often show up in locations where they weren't seen earlier in the year.

## Breeding habits:

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**Pair bonding style:** Polygamous. Females raise young by themselves, although they share the roost with other females and their young.

**Breeding dates:** Bats mate during the fall, but the females store the sperm in their bodies for months. Fertilization doesn't take place

until the late winter or early spring, when the bats emerge from hibernation or return from the south. Gestation is 50 to 60 days.

**Birth period:** births typically are staggered over a 2- to 3-week period in late May through early July.

**Litter size:** Little brown: one pup; big brown: two pups.

**Weaning dates:** Young begin flying at 3 to 4 weeks old. They begin to leave the roost with their mothers in late July.

**Amount of time young remain with parents beyond weaning date:**

Some scientists believe that the young follow their mothers back to the hibernacula. Some of the young return to the roost where they were born.

**Common conflicts:**

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**Time of year:** Peaks from the third week of July through the first week of August, although there may be calls any time of year.

**What are they doing?**

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1. Females may roost in colonies in buildings to raise their young. Their scat and urine can damage insulation and household goods and attract other pests.
2. Sometimes, a lone bat enters the house and flies around. This usually happens in July and August when the young are learning to fly.
3. During an extreme heat wave, several bats may enter the living quarters, seeking a cooler roost. This is when they show up in places they normally don't use.
4. In the winter, a bat may leave its attic roost and fly around in living spaces. This usually happens when the temperature of the attic roost changes dramatically, disturbing their hibernation—during a thaw, or during the very coldest part of the winter, if the attic is much colder than the rest of the house.

5. Disease risks: Rabies and histoplasmosis. In many states, bats are a rabies vector species.

## De-bunking myths about bats:

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1. *There's an epidemic of rabies in bats.* **Wrong.** The incidence of rabies in wild bats is very low, and outbreaks in colonies appear to be rare. Typically, rabies in bats occurs in no more than 4% of the overall statewide population.
2. If one bat in a colony is rabid, they're all sick. **Wrong again.**
3. *All grounded bats are sick.* **Not always.** Young pups sometimes become grounded when they're learning to fly.
4. *I will get rabies from a bat.* This is a tricky one. Although your chances of being exposed to a rabid bat are very low, it is true that most Americans who died from rabies in the past decade had the bat strain. Most people notice if they've tangled with a skunk, raccoon, or fox and are smart enough to go right to the doctor if they think they've been exposed to rabies. So even if they were exposed to rabies, they receive treatment and they don't die. But many people encounter bats at night, while they're drowsy and may not be thinking clearly or even while they're sleeping. They may not realize they were scratched or bitten or may not remember the encounter by the time they wake. So, they see no reason to go to the doctor. Unfortunately, that means that if they did get infected with the virus, by the time they realize it, it's too late. **The bottom line: rabies is a fatal disease, so even though it's unlikely, don't take chances.** However, if someone is so terrified that it's causing problems, try to help that person understand their risks more clearly.
5. *Bats will attack people.* Bats almost never attack people (they will bite in self-defense).
6. *Bats are attracted to a person's hair.* No, they are not hair stylists. They don't aim for a person's hair. Bats are excellent fliers. They may swoop close to a person's face, but if you don't thrash about, they won't fly into you.
7. *Bats suck blood.* The bats that live in the US eat insects. They don't suck blood. The common vampire bat, found in the tropics



and sub-tropics, does feed on blood, mostly from livestock, but they will bite people.

8. *Bats chew holes in buildings.* Bats do not chew holes. They gain access through existing holes.

## Management

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If a person, pet, or livestock may have been exposed to rabies, you are legally required to follow the directions of the county health department. Humanely capture any bat that had direct contact with a person, or was in a room with a sleeping person, an unattended child, or a mentally disabled or impaired (i.e., intoxicated) person. Call the county health department. Do not release or discard the bat without talking to a county health person first!

Bats have so few young that the destruction of one maternal colony may impact local bat populations. Try to use nonlethal management techniques. They are highly effective for bats.

### Safety tips for contact with bats or their droppings

1. Wear leather gloves, disposable Tyvek™ coveralls, goggles, and a proper respirator.
2. Ventilate the area if possible.
3. Don't stir up dust. The dust could contain the spores of the fungus that causes histoplasmosis, which can be inhaled. Don't sweep or vacuum unless using a commercial vacuum with a micro-filter intended for this purpose.
4. Thoroughly wet the materials with a household or commercial disinfectant. Wipe up with a damp sponge. Play it safe and do not use a bleach solution. Bat guano contains ammonia and mixing bleach with ammonia can create fumes that are toxic. Although the concentration of ammonia in bat droppings isn't as strong as it is in bird droppings, there could be a lot of guano.
5. Spray dead bats and their droppings with disinfectant, then double-bag for disposal.

6. Be aware of potential pesticide residues in the attic from previous control attempts.

**If one bat has accidentally flown into the house:**

1. Remove any pets and people from the room and seal the room. Shut the doors. Close any heat registers. Close all but one window. Turn on a dim light so that you can see, but not too bright that you will disturb the bat. If disturbed, the bat probably will try to hide in the most remote, darkest place it can find. Searching for a tiny bat in a large, cluttered room is not fun. If the bat is flying around, stay quietly nearby and wait. The bat likely will find and fly out the window within 5 minutes. If the bat lands, you can capture it by covering it with a plastic container and slipping a piece of cardboard underneath. If there definitely is no concern about possible rabies exposure (see above) the bat can be taken outside. Place the bat up at arm's reach on the side of a tree, slowly slide out the piece of cardboard and then remove the container.
2. Don't worry about the bat flying at you, and don't chase or swat at it because that will only panic the bat. When indoors, bats normally fly around the room a few times until they find the exit. They make steep, banking turns, flying up as they approach a wall, and swooping down as they near the center of the room.
3. Check the windows, especially if there's an air conditioner in the window. Seal any gaps between the upper and lower window, or around a storm window.

**Timing of bat-proofing is critical**

- April through early May (may be in the roost, but no young yet): complete bat-proofing and use of check-valves is fine.
- Mid-May through early August (when young are in the roost): ONLY limited bat-proofing so females can nurse young.
- Late August through November (after the young have left the roost, and before the weather causes dangerous roof condition): complete bat-proofing and use of check-valves is fine.

## **Limited bat-proofing (mid-May through early Aug).**

This approach allows you to protect both people and bats. The most important step is to seal potential points of entry into the living quarters, then work on unused cracks and holes on the outside of the building. Bats can enter a building through a crack that's only  $\frac{1}{4}$  inch wide by 1 1/2 inches long, about the size of a stubby pencil. Do NOT seal the primary hole, and do not separate the mothers from their pups. You must let females enter and exit the building freely.

## **Complete bat-proofing (April through early May and late-August through November)**

**First step:** Find their entrances. Inspect the house for signs of warped, shrunken, or loose materials, especially at joints. Pay special attention to roof drip edges, dormer tie-ins, roof corners, ridge caps, vents, and deteriorated walls, roofs, and eaves. In the attic, cover the windows and then turn off the lights. Look for light seeping through gaps, cracks, and holes. Use a flashlight to take a better look at these potential entry points.

**Second step:** Determine which entrance is the primary exit hole. Look around for piles of guano, which may accumulate beneath the primary exit hole or stick to the wall near the hole. Rub marks typically are seen on the wall if guano is stuck to the wall. Stage a "bat watch" at dawn or dusk by standing outside the building and watching where the bats enter or leave. Why bother? Because if you seal this hole while there are still bats inside, they'll probably panic and crawl into the living spaces as they frantically seek a way out of the building. There is an easy way to avoid this problem: install a "check-valve" (one-way door) over the main exit hole.

## **One-way door (check-valve)**

1. Check-valves allow bats to leave on their own, but they can't get back inside. Here's how it works. Bats exit at bottom, but when they attempt to return, their sense of smell guides them back to

the hole. They land on the plastic mesh near the hole, but they cannot figure out how to get back into the hole.

2. Use a commercial check-valve or make your own by placing a 1/4-inch polypropylene net or screen over the entrance holes, forming a long sleeve or tent. The screening should cover the hole and extend about 2 feet below the hole. It also should stick out about 1 to 3 inches from the wall, so the bats can crawl beneath the screen to leave. Secure the screen at the top and sides with duct tape or staples. Leave the bottom open. Leave the screen in place for 3 to 5 days and check that all the bats have left. Then you can remove the one-way door and permanently seal the hole.

### **If no young are present:**

1. Install a one-way door to allow any bats that are inside to leave the building.
2. Seal all cracks that are larger than 1/4-inches wide and holes that are larger than 1/2 inch in diameter. Bats can wriggle through very small holes! Bats can't chew through exclusion materials the way rodents do, so you have many choices for materials: caulk; expanding foam; "Stuf-Fit,<sup>™</sup>" a knitted copper mesh that's like steel wool, only it doesn't rust; window screen; bird net; or "flash-band," a self-adhesive aluminum-faced sealant. Seal cracks with expanding foam using the Todol<sup>™</sup> foam gun, and then finish with a bead of silicone over that. The mesh size of screen or net shouldn't be larger than 1/2- × 1/2-inch or the bats will be able to crawl through it.
3. Screen chimney flues and caps with mesh that's 1/2 inch or larger, due to the risk of plugging. Check local fire codes for information about covering chimneys.
4. Seal any gaps in the flashing around the chimney, and where the chimney cap meets the chimney.
5. Screen vent pipes with 1/4-inch mesh.
6. If the bats are roosting behind shutters, remove them or space them 2 inches away from the wall by installing small blocks.

7. To decrease the attractiveness of an attic as a roost site, increase the ventilation and decrease the temperature. Install fans, windows, ridge or soffit vents, or insulation in the walls. Install a few fluorescent bulbs and turn them on during the spring or summer occasionally, to discourage the bats from colonizing the site. Be careful to avoid the risk of an electrical fire.

### **If young are present:**

Wait until they're old enough to fly—usually by mid-August. A useful phrase is **“June through July, let them fly!”** Then, install a one-way door over the entry hole. They'll leave but won't be able to re-enter.

### **Trapping strategies:**

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#### **Live traps:**

1. Since check-valves and exclusion are so effective, we are not very supportive of the idea of capturing several bats at a time with multiple-capture traps. First, capturing several bats in a single trap causes stress on individuals and great care must be taken that you are not moving a disease, such as white-nose syndrome from one place to another. Euthanizing large numbers of bats in a live trap is unnecessary, especially when bats are fully capable of flying off on their own, such as through appropriately placed check valves and exclusion.
2. If you must capture the bats, several types and sizes of multiple-capture traps are available for bats. The Batrap™ consists of a tube that leads the bats through a one-way baffle into a chamber, in which they're confined. Multiple-capture traps are a bit trickier to use than one-way doors. It is necessary to correctly estimate the number of bats in the roost. You need to match the size of the trap to the number of bats that may be captured, because if too many bats are confined in the trap, they might suffocate. Another danger is that if bats remain in the trap too long, they might overheat from exposure to the sun, and die.
3. Consider offering bats an alternative roost nearby by installing a bat box in the yard. Why? Many people like having bats nearby,

because of all the insects they eat. Another good reason to install a bat box is that it may prevent that colony from moving into a nearby building. It's best to locate the bat box where people are less likely to encounter the bats. Designs for bat boxes and instructions for placement are available online.

### Preferred killing methods:

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- CO<sub>2</sub> chamber (a smaller chamber is better)

### Methods that don't work well, or aren't legal in some states:

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1. Ultrasonic devices aren't effective.
2. Moth balls are not registered for bats and can be dangerous, especially to children.
3. No fumigants are registered for bat control.

# Bears

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**Species of interest:** Black bear (*Ursus americanus*)



Black bear. Photo by Scott E. Hygnstrom

**Size:** When on all fours, male black bears stand about 3 feet high at the shoulder and may be up to 6 feet long. They weigh 250 to 350 pounds on average, with some reported at over 600 pounds. Females are considerably smaller, commonly weighing 150 to 200 pounds.

## Legal Status

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Black bears are protected by federal and state laws and regulations throughout their range.

# Damage Prevention and Control Methods

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## Habitat Modification

- Sanitation, including bear-proof containers, removal or securing of bird feeders
- Eliminate bear feeding (intentional or unintentional)
- Locate camp sites in areas with low bear activity
- Store food in bear-proof structures or on elevated platforms
- Elevate beehives

## Exclusion

- Place livestock within protective buildings
- Electric fences or heavy woven-wire fencing with electric wires

## Frightening

- Night lights and human effigies
- Loud music, pyrotechnics, guard dogs, and rubber bullets may provide temporary relief

## Repellents

- Capsaicin spray

## Toxicants

- None registered

## Shooting

- Firearms of .30-caliber or larger
- Tracking with dogs

## Trapping

- Culvert and barrel traps
- Cable-restraints

## Other Control Methods

- Chemical immobilization (permits required)



## Signs of their presence

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**Tracks:** Somewhat like a person's footprint, with long claw marks. Hind print is about 7 inches long x 4 inches wide.

**Scat:** Can be variable, depending on what they're eating, but often roughly cylindrical. Somewhat like, but larger than a dog's scat. May include seeds, plant material, and insect parts.

**Sounds:** Adult females and cubs communicate with low moans and squeals. You may hear an adult hiss, growl, or pop their teeth at each other and occasionally people, if the bear feels threatened or is under stress. At the same time, their ears may be laid back and hair on their backs may be raised. If you hear these sounds and see these postures, be careful! Bears also bellow, whimper, mumble, and grunt, but people usually don't hear those noises.

**Dens:** In the winter, bears den in shallow caves; beneath brush piles, rotten logs, or blow-down trees; or in depressions, hollow trees, or under decks. Leaves or grass sometimes are used as bedding. In the summer, they'll rest in shallow depressions in the forest litter or sleep in trees.

**"Bear trees."** Bears rub against trees and will stretch high to claw and bite the tree (4 1/2 to 6 feet off the ground). Those high scratch marks may be a mark of dominance ("See how big I am?"). The rubbing could be a form of scent marking, or maybe they're just itchy.

While foraging, bears will dig; turn over rocks and logs; and tear open logs, yellow jacket nests, and beehives. In addition, you may see:

- Trails leading to a food source.
- Flattened areas in corn or grain fields or berry patches.
- Fruit stripped off cherry and apple trees, with possible damage to the branches.

- Scattered garbage around a dumpster or garbage can.
- Damaged buildings or cars if they smell food within.

## Diet

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**Opportunists.** During the spring and summer, black bears mostly eat plants and insects, especially ants and bees. They feed heavily on fruits such as apples, cherries, and raspberries, and on nuts and agricultural crops, often corn. Bears also eat amphibians, reptiles, fish, and small mammals (mostly rodents), although they may prey on deer fawns. In the fall, nuts are a critical food, especially acorns and beechnuts, which provide the fat they need to get them through the winter. Bears will eat carrion and garbage. They sometimes kill livestock. They love honey and will eat the bees, too.

## Typical activity patterns

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**Social style:** Generally solitary, although they will interact at a food source.

**Daily activity:** Most active at dawn and dusk, but may be active any time, depending on the season and availability of food.

**Hibernator?** Bears are not true hibernators, but they do sleep deeply during the winter. The females give birth while they're in this sleepy state. They groom and nurse their young—still half-awake—for about four months. During a warm spell, the females will get up and go outside for a short time.

**Migrates?** No. They will, however, travel great distances in search of food. Males will move hundreds of miles away from their birth site, while females typically will not.

## Where found

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**Distribution:** Black bears are found throughout North America and are the most numerous of the bear species.

**Habitat:** Most often found in the deep woods, in areas with large tracts of mature hardwoods or mixed forests that include some wetlands, such as swamps, rivers, streams, or lakes. They will live in second-growth forests if better habitat is limited. Black bears like areas with thick ground cover and few people but they will venture into farm fields, orchards, and suburban areas.

**Territory and home range:** The home range of males is up to 100 square miles. Females stay closer to where they were born, with home ranges often less than 15 square miles.

## Breeding habits

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- **Pair bonding style:** Polygamous.
- **Breeding dates:** May to June, sometimes extending into July, August, or even September.
- **Litter size:** 2 to 3 cubs. Females usually have cubs every other year.
- **Birthing period:** Late January to early February. They give birth in their winter dens.
- **Weaning dates:** At about 7 months old (late August to early September).
- **Amount of time young remain with parents beyond weaning date:** They den with their mother their first winter. The family stays together until the spring, when the female is ready to mate again, usually in June.

## Common conflicts

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**Time of year:** Any time of year, but problems usually peak in June through September.

### What are they doing?

Most complaints are associated with their feeding. Bears eat bird seed and destroy feeders, especially in the early spring and late fall. They may enter porches seeking stored bird seed, and raid dumpsters, garbage cans, coolers, tents, camps, and picnic tables looking for an easy meal. This is common at campgrounds and resorts throughout the summer and early fall. At restaurants, bears raid dumpsters, garbage cans, and the containers that hold cooking grease. Bears eat corn and grain and may cause additional damage to the field while they're feeding. Sometimes this damage may make it hard to harvest the crop. Bears eat fruits, such as cherries and apples. Occasionally, they will attack domestic livestock or poultry.

### De-bunking myths about bears

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*Bears are true hibernators.* No. True hibernators, such as ground squirrels, do not wake up until spring. Bears will lose about a quarter of their body weight during the winter. During their deep sleep, their body temperature drops about 7° and their heart rate drops by about 50%.

*Bear dens are huge.* Bear dens are much smaller than most people think—only about 2 feet high by 6 feet long. Bears don't often reuse their dens.

*Playing dead will deter a black bear.* This defense is meant to be used with grizzly bears. Playing dead will not deter an attack by a black bear. Walk backwards slowly and maintain eye contact with the bear. Black bears sometimes will bluff charge. If a bear charges, clap your hands, wave your arms, and yell.

## Management

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Most black bears avoid people unless they learn to associate people with food. This usually happens around dumpsters, garbage cans, campgrounds, and places where people illegally feed bears. Bears that develop this habit pose the greatest threat to people. Wildlife professionals often say, “a fed bear is a dead bear,” referring to the reality that when bears become habituated on humans for food, they often become a threat to humans and therefore end up getting trapped and shot to protect human health and safety. Such conditions need to be changed. To do that, think with your nose.

### **Manage the garbage:**

- Use bear-proof garbage containers or place regular cans in bear-proof storage facilities. Garages (with closed doors) are safer than porches, for example.
- Use plastic bags inside garbage cans to help hide odors. Putting camphor, mothballs, air fresheners, disinfectant, or an ammonia-soaked rag in the can to mask food odors.
- Remove garbage regularly. Bears especially like grease, fat, bacon, and other meats.
- Don't burn garbage because that makes it more attractive to bears.
- Clean garbage, compost, and recycling containers frequently with ammonia, bleach, or disinfectant.
- Keep the site clean.
- Do not leave dirty diapers or diaper pails outside.

### **Eliminate other enticing food sources:**

- If people are feeding bears, persuade them to stop. It's dangerous and illegal!
- Don't feed birds during the spring and summer. Suet, bird seed, and the sweet liquid placed in hummingbird feeders attract bears.

- Pick and remove all fruit from trees that are located near buildings.
- Don't feed pets outside— even an empty dish can attract a bear.
- Keep livestock in buildings and pens, especially during the birthing seasons. If possible, locate those pens away from woods and areas that provide good cover for bears.
- When camping, store food and organic wastes in bear-proof containers, on elevated platforms (“bear poles”), or in an airtight container that's suspended on a rope between two tall trees that are downwind of your camp site. Bear poles should be 15 to 20 feet above ground. The pole should be at least 6 inches wide. Wrap a 4-foot band of galvanized sheet metal around the pole at a height of 6 to 7 feet above ground.
- Plant crops (corn, oats, fruit) away from woods and areas that provide good bear cover.

### **Don't create a scent trail to a vulnerable area.**

- Turn off kitchen exhaust fans that vent to the outside when they're not in use. Clean vent screens regularly.
- Don't eat or cook in your tent. Wash your hands before you handle your gear. Clean everything that touched food, such as dirty dishes and pots. Keep anything that might smell good to a bear far away from your tent. If you can, store food in a bear-proof container, or suspended between two trees, or in your car's trunk. Some bears will break into cars and tear through the back seat to get into the trunk.
- Remove the grease can from gas and charcoal grills after every use and turn the grill on “high” for several minutes after you're done cooking.
- Cover barbeque grills with aluminum foil before cooking. Dispose of the foil properly when finished.

- Clean barbeque pits and grills thoroughly with an ammonia-based cleaner.

### **Protect vulnerable areas and vulnerable buildings.**

- Remove brush and cover around homes, corrals, and livestock pens, creating a 50-yard barrier.
- Electric fences work well to protect a specific site, such as an apiary, cabin, or landfill. Several factors influence the choice of material and design, including the size of the vulnerable area, the amount of bear activity, and local laws.
- If building in an area that's prone to bear damage, use strong construction materials. Solid frame construction,  $\frac{3}{4}$ -inch plywood, strong, tight shutters, strong, tight doors, and steel plates will keep bears out.
- Locate camp sites and hiking trails in areas that bears don't use much.
- Clear hiking trails so you can see 50 yards down the trail.

### **Frighten bears away from a site.**

First, a caution: if a bear shows any aggressive behaviors, such as growling, hissing, popping its teeth, or if its ears are laid back and the hair on its back is raised, DO NOT attempt to harass it and DO NOT approach the bear! It might attack. If a bear is aggressive, back off.

### **What to do if you encounter a black bear.**

In most states, black bears rarely behave aggressively toward people but there have been fatal attacks. Be alert. If a wild bear approaches a person in a remote area, consider that as a sign of aggression. The same behavior from a bear that's used to people and is often fed illegally would not be considered aggressive. Back off slowly. Watch out for cubs. DO NOT climb a tree or run away. You can usually frighten a bear away by making a lot of noise. Shout, clap your hands, throw objects, bang on pots, use a siren or boat horn, or rev an engine. Just don't go so far that the bear feels threatened enough to attack.

## **What to do if you're attacked by a black bear:**

- Immediately call for help if you can: call the state wildlife agency, local law enforcement, forest rangers.
- Fight back with all you've got. Hit the bear with rocks, sticks, your fists, or feet. Yell. Wave your arms and flap coats. Stay together with other people. If the bear is biting or mauling you, shoot it.
- DO NOT climb a tree or run away.
- DO NOT play dead. That seldom works with black bears.
- As soon as you can, slowly back away from the bear. Avoid the bear and any cubs.
- If the attack stops but the bear follows you, try to frighten the bear away again.
- Pepper spray is effective when you have a close encounter with a black bear; its range is usually less than 30 feet. The active ingredient is capsaicin.

## **What to do if a bear is not aggressive:**

- A combination of frightening techniques may convince the bears to leave the area. As always, your chance of success increases if the techniques are used together and in an unpredictable fashion.
- The Critter Gitter® scare device, which combines noise and flashing lights, may work.
- Visual frightening devices: night lights, strobe lights, and scarecrows will work.
- Frightening noises: propane cannons, loud music, air sirens, cracker shells, boat horns, banging on pots, and shouting usually will scare bears away.
- Guard dogs may be able to keep bear out of fenced areas, but few dogs are a match for a bear in a fight.



## Trapping strategies

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### Live traps

Bears can only be trapped under certain conditions, and under special permit by the state wildlife agency.

**Culvert trap:** This is the most common trap used to capture bears. It's another variety of cage trap, although obviously much larger than the kind you'd set to catch a woodchuck. A large culvert pipe is placed on a trailer or stand. Inside the pipe is a baited trigger, which closes the door. Post warning signs to keep people away from the trap.

After the bear is trapped, the handler may use nonlethal harassment techniques, such as shooting the bear with rubber buckshot, to stress the bear. Contact your local wildlife agency office for details. This training is called "aversive conditioning" And should persuade a bear to avoid the area.

### **Control strategies that don't work particularly well, or aren't legal in some states:**

- Although legal in a few states, "bear traps," which are foothold traps that are larger than  $5\frac{3}{4}$  inch, are not legal in most of the US.
- Cable restraints are legal in many states but require a special license.

# Beavers

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**Species of Interest: Beaver** (*Castor canadensis*).



Beaver (*Castor canadensis*). Image by (USFWS).

**Size:** Up to 60 pounds 25 to 35 inches long, excluding a 1-foot tail.

## Legal Status

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The legal status of beavers varies among states. In some states, beavers are protected except during fur harvesting seasons. At other times, they are classified as pests and may be taken whenever they cause damage. Beavers generally are not considered pests until economic loss is extensive. Consult your state regulations for additional information related to the management of beavers.

## Damage Prevention and Control Methods

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### Habitat Modification

- Remove dams (may require state permits)
- Remove trees and other food sources
- Install flow devices to control water level of streams or ponds

## Exclusion

- Install metal fences around individual trees
- Install fences to protect culverts (e.g., Beaver Deceiver)

## Frightening

- Nothing is effective

## Repellents

- Latex- or oil-based paint mixed with sand and applied to trees

## Toxicants

- None registered

## Shooting

- Shotgun - 12- and 20-gauge
- Rifle - .22- and .17-caliber rimfire

## Trapping

- Body-gripping traps with at least an 8- x 8-inch opening
- Foothold traps (minimum jaw spread of 6 inches; offset jaws) in drowning sets
- Cage traps – Hancock- and Bailey-style beaver traps
- Cable-restraints

## Signs of their presence

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- **Flooded streams and beaver ponds;** with channels since they tend to use the same routes.
- **Dams and dome-shaped lodges** made of tree branches, corn stalks, and other debris caulked with mud. Beavers also will build burrows in riverbanks especially if living in a fast-moving stream or larger river.

- **Chewed branches and trees**, piles of wood chips, fallen trees, and stumps, usually found close to water. Their broad tooth marks are obvious.
- **Sounds**: a tail slap is their alarm call. Young whine, squeal, and moan at night, but it's very hard to hear them.
- **Tracks**: back foot may be nearly as large as your hand; webbed toes.
- **Scats**: look like saw-dusty, ping-pong balls, usually left in the water at the bottom of a dam or lodge.
- **"Mud pie" scent mounds**: mud heaps perfumed with the beaver's oily scent (castor), that mark the family's territory. These heaps may be up to 1 foot tall and 3 feet wide, and are found at the water's edge, or along river or pond banks. Beavers have distinctive and powerful scents.

## Diet

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**Herbivore.** Beavers eat the leaves, twigs, and bark of trees and shrubs, especially aspen, willow, alder, birch, and maple. They also eat stems and roots of many water plants, such as cattails. They eat corn if the field is close to a pond or stream. In the fall, they create a food cache of mostly submerged branches and poles placed near their lodge. They'll rely on this cache during the winter, after complete ice over.

Beavers gnaw around a tree, eventually cutting a deep groove. They usually fell smaller trees of 2 to 6 inches in diameter but are capable of cutting down much larger trees, even those 2 to 3 feet in diameter. They are quick about it too; beavers can cut down a 5-inch diameter willow in about 3 minutes. They'll trim the branches to a convenient size and carry them in their mouths back to their impoundment. Then, as if eating a piece of corn, they'll turn the branch around to eat the bark, or, in the fall, may add it to the food cache they'll use during the winter months.

## Typical activity patterns

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**Social style:** Beavers are sociable within families; building and maintaining dams and lodges takes a lot of muscle. Young may remain with their parents into the spring of their third year, helping with housekeeping. The average pond is home to four to eight beavers.

**Daily activity:** Mainly nocturnal, with peaks at dawn and dusk.

**Hibernator?** No.

**Migrates?** No. Once a colony has used up its food, they will move to a new area. When the young disperse, they may travel up to 50 miles to find a territory.

## Where found

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**Distribution:** Beavers are found throughout much of the US, where free-flowing water, lakes, and ponds occur. They live in both rural and suburban areas.

**Habitat:** Ponds, lakes, marshes, rivers, and streams with good cover nearby. They prefer streams that have a gentle slope of less than 3 percent. Beavers prefer deep water and will dam areas to create deep ponds.

**Territory and home range:** Territorial by family group. Their home range is defined by a dam or series of dams, and the nearby foraging area, which is rarely more than 100 feet from the ponds.

## Breeding habits

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- **Pair bonding style:** Monogamous. Both parents cooperate in rearing the young. Females are dominant.
- **Breeding dates:** January to March. Gestation takes about 4 months.
- **Litter size:** One to eight kits, usually two to four.

- **Birth period:** May to July, depending on when breeding occurred. Newborn kits are fully furred, able to walk and even swim.
- **Weaning dates:** from 1½ to 3 months.
- **Amount of time young remain with parents beyond weaning date:** 2 to 3 years.

## Common conflicts

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**Time of year:** Beavers can cause problems any time of year. From ice-out through June, new problems often are associated with the dispersal of the 2-year-olds. From October through ice-up, beavers are preparing for winter by cutting many trees and working on their dams.

### What are they doing?

1. Beavers plug culverts, drainage ditches, and drainpipes, which floods or washes out roads or driveways.
2. Beaver dams force water to collect against roads. This may saturate the road, causing potholes, settling, and instability.
3. Their dams may flood upstream areas, which may damage roads or homes or kill crops and trees. It may make certain areas unusable.
4. Beavers cut down or girdle trees and shrubs for food. They can fell a tree up to 2 to 3 feet in diameter.
5. Beaver dams transform the environment. This will be good for some species (ducks) and bad for others (trout). Whether you see this as a concern or a gift depends on your perspective.
6. They may contaminate water supplies or interfere with sewer systems.
7. Disease risks: rabies, tularemia, and giardiasis (an intestinal infection caused by the protozoan, *Giardia lamblia*).

## Management

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Solutions for beaver damage problems can be far more complex than those for some of the other species in this booklet. For example, repairing a hole that a squirrel chewed in a wall is much easier than replacing a culvert or installing a water level control device. You may need additional training to successfully use an integrated approach to beaver damage management.

Several legal, safety, and environmental issues must be considered if you seek to modify a beaver wetland. You may need additional permits, perhaps even from different agencies. If improperly installed, water level control devices and culvert modifications could create dangerous road conditions or flood downstream areas. You could accidentally create a problem that's worse than the one you were trying to solve, and you might be liable for damages. Any actions that change a beaver wetland could affect many species. Consult with technical experts (such as your state wildlife agency, highway department, site engineers) before you do anything.

### ***Defining success***

Complaints about beavers usually focus on flooding, tree-cutting, or some combination of the two. These problems are caused by their feeding and construction activities (building of dams and lodges). You may need to know more details to solve the problem. For example, if you don't want the beavers to cut down trees, then a fencing barrier to keep the beavers away may work. But if you don't want them to cut trees or wash out a road, you have a very different situation.

The same problem at a different site may require a different solution. Take flooding, for example. You may need to totally exclude or remove beavers near water supplies, sewer systems, roads, railroad tracks, or powerlines, where flooding cannot be tolerated. If beavers are on a large private property, however, they may be tolerated or even welcome, because beaver create wetlands that are

used by many wildlife species. Perhaps that landowner is happy with the water level and just wants to prevent flooding. The landowner may be able to secure a permit to allow the dam to be breached before a heavy rainfall. That might be the perfect solution for some people.

### **Examples of questions that may help you choose the right strategy.**

- What exactly are you trying to stop or prevent?
- Can you tolerate any level of beaver activity at the site?
- Do you want the beavers to stay or go?
- Would you prefer only nonlethal techniques, only lethal techniques, or some combination of the two?

### ***Some general tips:***

- Trapping often is an important part of the solution. During the legal fur trapping season, you can invite licensed trappers onto your property to remove the beavers at no cost.
- Some beavers are more determined to fix a breached dam than others, especially if a water level control device is installed. You may be able to remove the individuals with “compulsive damming disorder,” and the other beavers may accept the device.
- Don’t crawl into a culvert or stand in the water in front of it when you’re trying to unblock it or stand on the downstream end while trying to breach a dam. That could be dangerous.
- You will need a good pair of waders and may want a wet suit.

### **Protect vulnerable trees and shrubs:**

- Be aware that these options are meant to stop beavers from gnawing. They won’t stop beavers from flooding the area, which could kill the plants.
- Wrap hardware cloth loosely around trees and shrubs to a height of at least 3 feet to prevent beavers from gnawing on them. Match the height of the hardware cloth to the typical



snow depth for the area because deep snow will allow the beavers to reach much higher on the tree. The cloth should be several inches from the plant, to give it room to grow.

- A 3-foot-high fence of 6x6-inch welded wire or a 1-foot-high electric fence (high tensile, 3 strands set 4 inches apart) can protect groups of plants. Make sure the fence can't be breached during deep snow.
- Paint trees with a mix of 1 quart of sand in 1 gallon of exterior latex paint to prevent beavers from chewing on the trees.

## Managing water levels

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### ***General tips that apply to sites with a beaver dam or a culvert:***

The feel and sound of flowing water are the cues that attract beavers to a "hole," whether that opening is a breach in their dam or a culvert. These cues trigger their instincts to build or repair a dam.

Faster-moving water also sounds louder and is more likely to attract beavers than slow-moving, quiet water.

Think of a culvert from a beaver's point of view: it looks like a smallish hole in an otherwise terrific dam. Easily fixed, eh?

The size of the "hole" (culvert or breach in dam) usually determines whether or not beavers will try to plug it. The smaller the hole, the more compelling the sound of water rushing through it, and the more likely they are to try to plug it. The shape of the culvert matters, too: beavers are less likely to plug a square or pipe-arch shaped culvert than a round one.

Water level control devices (WLCDs) enable you to determine the depth and area of the impounded water above the dam, rather than the beavers. They enable us to co-exist with beavers, but they are not the right fix for every situation. Sever improvements have been made in the design of WLCDs over the years. For greater success, use modern devices and ensure that they are properly installed and

maintained. Choose your site wisely because these devices only work in specific situations.

Work with technical experts to determine the degree to which you need to drop the water level. This depends on the slope of the associated land and other site factors. Your “draw down” requirement determines the depth at which you install a WLCD.

When installing a WLCD, you need to leave enough water in the pond for the beavers to survive the winter. If you don’t, they may try to foil your device, or build another dam, or leave the area. This is why WLCDs tend to work better in ponds that are at least 4 feet deep. In shallower water, the installation is trickier, and the beavers may be more determined to outsmart the device so they can maintain an appropriate water level for winter survival. If the point of the device was to keep the beaver around but prevent them from causing damage, then if you drive them off you haven’t exactly succeeded. So, in general, try to maintain at least 3 feet of water at the lodge. Remember to factor in the typical depth of ice for that area. Three feet of solid ice will not do the beavers any good.

If you install a WLCD near a culvert, make sure it can handle as much water as the culvert did before it was modified. Otherwise, it could cause flooding. Regular inspection and maintenance of WLCDs is critical, especially during the first 2 weeks after installation. The degree of required maintenance will depend on the device and the site. In some situations, weekly inspection and cleaning may be necessary. If the maintenance is inadequate, the device may fail. Keep WLCDs clean of debris. If you don’t, it may just turn into a dam! A 6x6-inch mesh size will keep the beavers out but allow debris to flow through the fence. Larger enclosures require less frequent cleaning. You may need to install a debris dam in front of your exclusion device. Check WLCDs after the leaves drop in the fall, after storms, and soon after ice out, because there’s more debris moving through the water at those times.

WLCDs can be used to protect beaver wetlands while minimizing the risk of damage. Combine this tool with the harvesting of beaver to maintain sustainable population levels.

### **Where do water level control devices work best?**

- Where the pond or stream is at least 3 to 4 feet deep.
- Where they are properly maintained. Consider providing maintenance for a WLCD.
- Where people can easily reach the devices for inspection and maintenance.
- Where landowners are willing to have a few beavers around and pay for a WLCD.

### ***Special considerations for sites with culverts.***

If you're installing a new culvert, you may be able to prevent damage by choosing one that's the right shape and size for the site. The width of the culvert must be equal to, or greater than, the width of the stream. Use box or pipe-arch culverts with an inlet opening of at least 18 square feet for small streams.

- The best WLCDs keep beavers away from the culvert's intake pipe and regulate the water level in the pond. They muffle the sound and feel of rushing water, reducing the beavers' compulsion to build dams.
- Replace smaller, round culvert pipes with oversized ones, where possible. Unfortunately, the up-front cost may be too high, although in the long run, this may be more cost-effective than yearly maintenance.
- Low-profile box culverts may be the most practical solution for roads that require a lot of fill to meet the size demands of a beaver-resistant culvert design.

- Don't create depressions at the inlet when you install a culvert, because beavers may just decide to enlarge the small pond you've created.
- In all but a few situations (see next section), don't use grates or guards over your culverts! Beavers will plug them, too. If beavers have a history of plugging a certain culvert, they may attempt to plug your replacement culvert, even if it's oversized. If this happens, trap the family group.
- Pond drain tubes are long pipes with one perforated end that usually are suspended at an incline on posts 1 to 4 feet above the bottom of the pond. The pipes lead from a deep part of the pond through the dam, at the desired water level. The harder the bottom of the pond, the longer they will work. These WLCDs are less expensive and weigh less than some of the previously mentioned devices but require more maintenance.

## Trapping

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### ***General tips***

It takes experience and skill to trap beavers effectively. Don't wing it! Beavers easily become trap-shy, so a botched trapping attempt may leave the landowner with a worse problem. Excellent courses, videos, and books are available that explain how to trap beavers.

- Trapping can be used in combination with nonlethal controls or by itself. It may be a particularly important option at sites where beavers have been plugging very large culverts (over 38 square feet), or where a culvert can't be replaced with an oversized model.
- If lethal trapping is used as the sole control technique, be aware that other beavers may move into the site (depending on the conditions and the size of the beaver population), so you may need to continue trapping on a yearly basis.

- If the landowner wants to minimize the number of beavers removed from the pond, trap as close to the site of the problem activity as your permit allows. If allowed, breach the dam. The first beavers to investigate this hole most likely are the ones causing the most damage.
- If you want to remove the entire family, begin trapping away from the lodge so you don't spook the beavers.
- Trapping in front of a breach in a dam is difficult. The beaver may have a big stick in its mouth as it approaches the dam (because it wants to plug that hole). The trap may catch the stick instead of the beaver, allowing the beaver to escape. You may have greater success if you try to catch the beaver where it's looking for material to fix the hole. If you'd like to set near the dam and your permit allows this, try placing your trap perpendicular to the dam, or about 10 feet away.
- Beaver must be destroyed, unless specifically permitted. Don't expect to receive permission to trap and transfer beaver.

### ***How to avoid accidentally trapping river otters:***

Otters frequently use beaver ponds and may be killed in traps intended for beavers. Follow the tips in the following section to avoid accidentally trapping river otters and muskrats.

- Look for otters and their sign, which includes tracks, slides, chewed remains of fish, and fish scales and bones in feces.
- Get in, catch what you can, and get out. Don't spend weeks trying to catch the last beaver or a trap-shy individual. Instead, give them a few weeks to calm down, then return with specialized traps.
- If using a body-gripping traps, choose a #330 with an offset trigger. This trap provides enough room for otters to pass through without triggering the trap.

- Use a tension-adjustable trigger to reduce the otter catch even further.
- Avoid channel sets, especially in main channels.
- Set traps away from dams and other crossover locations.
- Use baited sets, where possible.
- Use castor mound sets with each trap set 8 to 10 inches deep, for hind foot catches.
- Avoid setting traps near beaver lodges or burrows made in banks, even if those areas are old and seem to be unused.
- Use cable restraints where legal because when set properly, they allow live release.
- Carry a catchpole to carefully release any otter caught in a cable restraint or foothold trap.

## Live traps

Several other live traps are designed for beavers, including the Bailey, Hancock, Breathe Easy, Koro, and Ram Ezee. Some are modified cage traps, some are funnel traps, and the Bailey and Hancock traps resemble suitcases. Cost and effectiveness vary.

## Lethal traps

- Body-gripping trap, #330, with a modified trigger to minimize the risk of catching otters.
- Foothold traps (#3, 4 or 5), equipped with submersion wires or cables that have sliding locks. Set the submersion rig in at least 3 feet of water to keep the beaver from surfacing. This method requires more skill than the use of the body-gripping trap.
- Trap placement is critical when using foothold traps. Beavers have short front legs. Consider where they will put down their feet. Pay attention to the water depth and distance from the shoreline. You might only catch belly fur.

- Specialized foothold traps for beaver (CDR 7.5, MB 750, Bridger #5) are expensive but well worth the cost, because they increase the chance of a good catch.
- Bait with castor (the secretion from the beaver's glands) or twigs or branches from aspen, alder, willow, or maple.
- Under ice, use channel, slanted-pole, and bait-pen sets.

## Preferred killing methods

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- Lethal traps (body-gripping traps or sets with submersion rigs).
- Blow to the head.
- Gunshot to the head if no rabies testing is required.

## Control strategies that don't work well, or aren't legal in some states

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- Installing several smallish culvert pipes instead of a single large one is a foolish choice. It doesn't matter how many pipes there are, if they're too small, chances are good they'll be plugged.
- Differences in culvert pipe materials (smooth vs. corrugated pipe) and design (flush vs. projecting pipe inlet) do not matter to beavers. They'll plug any of them if the culvert is too small.
- Large-scale removal of plants along roadsides may discourage beavers in certain situations but can lead to erosion and could hurt other wildlife.
- Although you may be able to secure a permit to destroy a beaver dam or lodge, this won't solve the problem by itself.
- Breaching a dam quickly can flood roads or downstream areas, which could be dangerous or cause a lot of damage for your neighbors. That's why you should consult with your state wildlife agency staff first.
- Harassment doesn't work.

# Canada Geese

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**Species of interest: Canada geese**  
(*Branta canadensis*)



Canada goose (*Branta canadensis*).  
Photo by Stephen M. Vantassel.



## Legal Status

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Federal and state permits are required if you are going to capture, handle, or kill geese or disturb their eggs or nests (if there are eggs



or young in the nest). The permits are issued to the landowner. A landowner may chase, haze, or disperse geese at any time without a permit, as long as the geese are not physically harmed.

## Damage Prevention and Control Methods

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### Habitat Modification

- Grow tall trees on pond banks to interfere with flight lines
- Allow grass to grow tall, avoid fertilizing grass
- Eliminate public feeding of geese
- Create vegetative or stone barriers near water
- Plant fescues

### Exclusion

- Grid wires
- Fences, non-electric and electric

### Frightening

- Human, coyote effigies
- Flags, balloons, and Mylar® tape
- Remote controlled boats or aircraft
- Lasers
- Pyrotechnics, propane cannons, and Long Range Acoustic Devices (LRAD)
- Bio-acoustic alarm and distress calls
- Herding dogs

### Repellents

- Anthraquinone
- Methyl anthranilate

### Toxicants

- None registered

### Shooting

- Hunting through regular and resident Canada goose seasons

- Sharpshooting with shotguns, suppressors, Metro-barrels, and subsonic rounds with depredation permits

## Trapping

- Netting
- Roundups

## Other Control Methods

- Nest control
- Egg oiling and puncturing

## Understanding Canada Geese

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### Identification

Canada geese (*Branta canadensis*, Figure 1) are a valuable natural resource that provide recreation and enjoyment to bird watchers, hunters, and the public. The “V” formation of a flock of flying Canada geese is a sign of the changing seasons. Geese that migrate do not necessarily cause damage. In this chapter, we refer mostly to flocks of “resident” or non-migratory geese that inhabit areas throughout the year.

There's an added twist to solving nuisance problems caused by Canada geese. Some Canada geese migrate, while others remain as residents in states year-round. Resident geese are not lazy birds that just woke up one day and decided to stop migrating, they're actually a totally different subpopulation.

You need to know whether you're dealing with migratory or resident Canada geese (in many suburban areas) before you plan your strategy. For example, summer roundups will only work if you're dealing with a resident population because the migratory geese will be in Canada all summer long. They look the same, so the best way to tell them apart is to determine if they migrate or if they nest locally. In urban areas, the problem is often caused by resident flocks, but migratory Canada geese may cause problems in rural areas, and they may temporarily join resident flocks.

**Size:** From 8 to 15 pounds. Males tend to be larger than females.

## Signs of their presence

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**The bird itself is the most obvious sign.** They are often seen flying in V-shaped flocks.

**Sounds:** The most familiar call is the honk, but they also make hissing, and snoring sounds.

**Nest:** Their bowl-shaped nest is about 1 1/2 feet in diameter, made from plants, lined with goose down. Most nests are very close to water, almost always within 150 feet of water. When choosing a nest site, Canada geese seek a good view of the surrounding area. They prefer islands and peninsulas but may nest in unusual places such as on ledges or rooftops, in the woods or flower gardens.

**Droppings:** A single goose produces a pound of droppings each day.

## Diet

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**Primarily herbivores.** They prefer tender young plants. In urban areas, they usually graze on grass lawns but they also eat grains, cattails, pondweed, and clover, and some small aquatic insects, snails, clams, and mussels.

## Typical activity patterns

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**Social style:** Canada geese form strong social bonds. They're usually seen with a mate, family group, or in a flock—rarely alone. If nesting close together, it's common to see "gang broods": 2–20 adults followed by 20–100 goslings. They'll eventually separate into family groups.

**Daily activity:** Diurnal.

**Hibernator?** No.

**Migrates?** Yes, but it's complicated. Migratory Canada geese migrate in the spring (from the US to their summer breeding grounds in Canada) and the fall (from Canada to their wintering sites in the US). Resident geese may migrate but usually don't go far. They may migrate within the state in which they were hatched or fly to a neighboring state. But some resident geese, usually young birds and those adults that didn't breed successfully, migrate to Canada right before the molting period (early June). They remain there during the summer, returning in late September. This "molt migration" (first reported in the late 1990s) can dramatically alter the approach to goose management.

**Molting:** Adult Canada geese molt each summer, usually beginning in mid-June. They congregate in large numbers near ponds and lakes, which provide a safe place to rest and feed, and the open water they need to escape danger. Most adult Canada geese molt in the same place they choose for raising their young (although sub-adults, and adults that didn't breed successfully, will often "molt migrate" as mentioned above). The molt lasts for about a month and during that time, geese cannot fly. This is critical! This is when it's easiest to capture Canada geese. Some techniques, such as barrier fencing, may be highly effective during the molt (see "protect vulnerable crops and sites").

## Where found

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**Distribution in the Northeast:** Most everywhere.

**Habitat:** In urban areas, they prefer lawns next to a body of water. Canada geese prefer fertilized lawns. They seek open areas, so they have a good view of potential predators. They like mowed lawns, parks, golf courses, industrial parks with ponds, and playing fields.

**Territory and home range:** Both parents are aggressively territorial around their nest until the young hatch. Both parents will defend their young until the goslings can fly, usually at about 10 weeks old.

## Breeding habits

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- **Pair bonding style:** Monogamous. They pair for life. Canada geese usually begin breeding at 2–3 years old.
- **Breeding dates:** Canada geese return to their nesting areas in late February or March (as soon as the ice thaws.)
- **Egg laying dates:** Peaks in early April–early May.
- **Clutch size:** 1 brood of 1–10 eggs, average 5. They don't begin incubating until all the eggs are laid. Incubation takes 26–28 days. If the nest fails before the young hatch, they may renest.
- **Hatching:** The eggs generally hatch within a period of 8–36 hours. Within one day of hatching, the adults may move their brood up to 2 miles away, seeking a grassy feeding area next to water, for safety.
- **Fledging dates:** at about 10 weeks old.
- **Amount of time young remain with parents beyond fledging date:** They'll migrate with their parents in the fall.

## Common conflicts:

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**Time of year:** Any time of year. Severe problems are often associated with their molt, when large numbers of geese may gather on lawns that are next to water. Some birds will travel hundreds of miles to a favored molting ground.

## What are they doing?

Large flocks may gather or nest in parks, playing fields, yards, or near ponds or other water sources. Some people find the resulting piles of droppings and the feathers disgusting and avoid these public areas. The birds can be quite noisy, too.

Their droppings contain nitrogen, which can pollute ponds and lakes. Their droppings may contain bacteria and viruses, but it's unclear whether they transmit any diseases to people. However, when there's a lot of bacteria in the water the health department may close beaches and swimming areas.

Canada geese aggressively protect their nest sites and young, and may attack pets, children, and adults.

They may overgraze grass, causing large dead spots on lawns.

They trample turf. In medium-heavy soils, this can cause the surface to harden, which may stop other plants from growing and lead to erosion. Overgrazing and trampling can change the habitat, which may harm other species that rely on grassy fields.

They eat farm crops, mostly grains. Heavy grazing can damage newly planted alfalfa and grain fields. They may pull up or eat seedling corn.

They may collide with airplanes, or be sucked into their engines, causing crashes.

**Disease risks:** they can infect other birds with coccidiosis, avian influenza, schistosomes, chlamydiosis, salmonella, and avian cholera. When Canada geese concentrate in very large numbers, this risk increases dramatically. Canada geese may also transfer salmonella to cattle. It's not known if they transfer diseases or parasites to people.

### **Control measures that affect wetlands may require other permits.**

To apply for the federal permit, contact:

U.S. Fish and Wildlife Service  
Region 5 Federal Permit Office  
U.S. Department of the Interior  
PO Box 799, Hadley, MA 01035-0779  
(413) 253-8643

Allow 2 months for processing of the request. There is an application fee. To read the regulations and apply online, see:  
[www.permits.fws.gov/mbpermits/birdbasics.html](http://www.permits.fws.gov/mbpermits/birdbasics.html).

## Management

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Canada geese have a strong homing instinct. They will usually return to the area in which they fledged and use the same nesting and feeding grounds year after year. That means that without any control, the local population will almost certainly increase, and the problem is only likely to grow worse over time.

It's best to address problems when goose populations are low. Some techniques that work for smaller populations fail with larger flocks, and most techniques work better when populations are of low to moderate size. The best time to begin your control activities is in the late winter—soon after the geese have shown up, but before they start nesting. You should plan ahead! You'll need about two months to secure any needed federal and state permits.

Nuisance problems associated with Canada geese usually affect an entire community, not just the residents of one property. The community may be willing to work with state wildlife agency or USDA-APHIS-Wildlife Services staff to craft a solution.

Most long-term solutions to goose conflicts involve the use of several techniques in combination, such as hazing, habitat modification, summer roundups, shooting, egg oiling, and persuading people to change their habits (most often, you must convince them to stop feeding the geese). Don't rule out any technique that may be feasible because every little bit may help. Persistence is critical in goose management. Most of these techniques only work well with repeated applications. The use of one technique by itself is less likely to work. Also, it may convince the geese to move to another site where they may cause similar problems.

With a community-wide problem, long-term solutions usually involve lethal techniques to stabilize or reduce the goose numbers, at least initially. Nonlethal techniques used by themselves may reduce the problem at an individual site, but this approach rarely solves large

scale problems. The most effective way to reduce the size of a flock is to remove adult geese. Canada geese can live for more than 20 years, and a female goose may have more than 50 young during her lifetime.

Lethal measures can be controversial. As with any community-wide nuisance wildlife problem, a public information campaign to explain management goals and methods is usually critical to success.

### **How molt migrations may influence your strategy**

One other major point to consider is the possible effect of molt migrations on your goose management strategy. This behavior isn't consistent; in some areas it's a big problem, but not at all sites.

If some birds in the flock you're trying to manage "molt migrate" in early June, then they may be off-site when certain control techniques, such as harassment and roundups, have traditionally been most successful. In these situations, it may take more than one year of roundups to solve the problem. However, at some sites, a molt migration might help solve the problem! How's that? Perhaps geese only cause problems during the summer. If some of the birds leave, that helps reduce the nuisance.

Here are options for goose management. Remember, start when the populations are low, be persistent, and combine methods for a better chance of long-term success.

### **Reduce their food sources (especially young shoots of grass):**

- If anyone is feeding the geese, persuade them to stop. Consider installing signs at popular feeding sites such as public parks that explain the problems associated with these handouts.
- Make lawns smaller by leaving areas unmowed.
- Let grass grow to a height of 6" (right around the water's edge, it's better to let plants grow as tall as they will). This makes it



harder for the geese to find the young grass shoots they like to eat.

- Reduce fertilizer use and stop watering lawns, to make the grass grow more slowly.
- Switch to grass and plant species the geese don't like to eat as much. They tend to avoid tall fescue, periwinkle, myrtle, pachysandra, English ivy, hosta or plantain lily, *Euonymus*, and ground junipers.

### **Lure them to another site:**

If migrant geese are feeding on crops, or resident geese are damaging a certain site, such as a park, you may be able to divert them to a different spot during the time of year when they'd cause trouble at the vulnerable site. Frighten them away from the vulnerable site, then lure them to an alternative area. Obviously, you need a nearby site where the geese will be tolerated, and that site must be attractive. This method won't work if people are feeding the geese at the vulnerable site. It may even attract more geese. At your sacrificial site, keep the grass well-mowed to make the field particularly attractive to the geese. If there are many geese, they may trample the grass, which might cause them to leave. If that's a problem, plant some clover, which is more resistant to trampling.

### **Protect vulnerable crops and sites:**

- Offer an alternative gathering site, as described above.
- Install fences. For small, high-use areas, such as a picnic site or play area, this may be a terrific solution.
- Fences work best before the geese nest, and during the early summer, when they're molting and can't fly. The fence must be long enough so the geese can't walk around it. It can be made from many materials including welded wire, chicken wire, snow fencing, silt fencing, corn cribbing, chain link, netting, mylar tape, picket, or monofilament lines, or an electric fence. These materials differ in their costs and durability.

- The mesh should be 3" or smaller, and the fence must be at least 30" high. If dealing with aggressive birds, switch to a fence that's 48–60" high.
- Fences may be even more effective when combined with a barrier of plants or rocks.
- Monofilament lines (at least 20-lb. test): set on poles that are 6 feet apart. Can use two lines, spaced at 7 and 12" above the ground, or five lines, set at 4, 8, 12, 18, and 24" above the ground (the lower wires deter goslings, too).
- Mylar tape: strands need support every 20 feet, secured with duct tape or electrician's tape. Twist the tape at least once within that span.
- Electric fences: Usually, two strands of poly-tape or 10-gauge high-tensile wire are attached to fiberglass or plastic posts at 8 and 16" above the ground.

### **Frighten the birds away:**

- If the geese aren't nesting, you may harass them without a federal or state permit as long as the geese are not touched.
- Visual scare devices: the most effective ones include the Avian Dissuader® (a laser); mylar tape or streamers strung along the water's edge (leave some slack in the line and twist the tape, to make it noisier and more reflective); and flagging or balloons on poles that are 6 feet high or taller, installed around the vulnerable area (make sure the materials don't become tangled in tree branches or power lines.)
- Frightening noises: gunshots, sirens, air horns, and various pyrotechnic devices (bangers, screamers, whistle bombs, shell-crackers, propane cannons).
- Hazing with dogs (especially border collies) or radio-controlled boats, aircraft, or cars. Geese will not overcome their fear of being chased by dogs, so this technique will not lose its effectiveness over time. However, it is labor intensive and can be expensive. At first, the dogs must chase the geese several times a day. Eventually, you can reduce the number of patrols.

In general, don't use dogs when the geese are nesting, molting, or have goslings. Dogs may not be able to chase geese away from large areas of water, or properties subdivided with fences. Roads can cause a problem, too. Don't let the dogs herd geese into traffic.

- As always, use an unpredictable combination of frightening techniques.

## Avian repellents

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There are chemical repellents registered for use against Canada geese, but results have been mixed. Methyl anthranilate (a nontoxic, biodegradable food ingredient) may make grass taste bad to geese. The product is costly and needs frequent application, so its use is best limited to small lawns. In some states, if this product is applied within 100 feet of a regulated wetland, you'd need a permit from your state agency. Also, this repellent is intended to stop geese from eating grass, not from using a site. If they're just loafing, it would be useless. A second repellent, anthraquinone (Flight Control™), gained registration in New York in 2003 for use on turf at airports, commercial sites, landfills, dumps, and on golf courses. This product includes a chemical that makes the geese sick. It also coats the grass with an ultraviolet sheen, which the birds can see, but people can't. The idea is that the geese learn to associate UV-colored grass with indigestion and avoid the area. Check to see if this product is legal in your state.

### **Block access to open water and the paths between the water and grassy areas (both flight paths and walking paths):**

Geese like to rest on open water, or on the nearby shore, where they feel safe from predators. If they're feeding on a lawn next to water, they tend to take off and land on the water. Deny them access to that water, and they may move away.

Install a grid of wires above the water's surface to keep the geese from landing on the pond (or on land). You can use #14 wire, 80–

100-lb. monofilament line, Kevlar®, twine, cotton rope, or mylar tape. Secure the wires 1 to 1 1/2 feet above the water, in parallel lines that are 10–15 feet apart. Attach brightly colored rope, flagging, or some other marker to the wires to keep the geese from flying into them. Install the grid before the geese arrive. For more certain success, add a perimeter fence to keep the geese from walking down to the water underneath the grid. Wire grid systems work best on golf course ponds, reflecting pools, wastewater ponds, and newly seeded lawns with limited public access. This isn't a practical method for ponds that are used for swimming, fishing, or other recreation.

Ropes can be strung between trees to block their flight paths and prevent landing. Ropes should be loose enough to move in the wind, and highly visible. Polypropylene rope and mylar tape have been used.

With small ponds, tall trees in the flight path between the water and grazing area may prevent geese from landing.

Create a visual barrier along the shoreline, with plants or rocks that will keep the geese from walking onto the land.

Locate playing fields at least 450 feet away from water to reduce their use by geese during the molting period. When the birds are unable to fly, they're reluctant to leave the favorite sites with: open water with great views (for safety) near grassy areas (for feeding, resting). When the geese can fly, they'll use fields that are more than a mile away from water, so this won't give year-round protection to the fields.

Install a fence around the pond, to keep geese from walking down to the water. (See details under "protect vulnerable crops and sites.")

**Reduce the number of favored nesting sites (islands and peninsulas with quiet, straight shorelines).**

- It's very hard to eliminate goose nesting sites, because they adapt to nesting in some unusual places. Certainly, you can make sure that you don't accidentally create prime nesting sites for them while building or landscaping around ponds. You may be able to prevent them from nesting at a site by harassing them in the early spring. Try to block their path to the water or their line of sight, which makes them nervous.
- In addition to the expected permits, you may also need permits from your state wildlife agency and the Army Corps of Engineers to modify some protected waterways.
- Remove any artificial nest sites, such as platforms, tubs, and up-ended hay bales.
- Plant (or protect) wetlands plants that grow along the shoreline, such as cattails and bulrushes, which create a visual barrier that may prevent geese from walking onto the land.
- Stop mowing grass along the shoreline.
- Eliminate islands and peninsulas that provide nesting sites by flooding the pond or reducing the water level. This is usually the most effective way to reduce the number of nesting sites, but it's expensive.
- Add boulders or shrubs every 10–20 yards along the shoreline to block the pathway and their line of sight. The boulders should be at least 2 feet wide. Plants must be dense and tall enough (30 in.) to prevent the geese from seeing through or over them. Shrubs, wildflowers, or prairie grasses may provide an effective barrier. Wide plantings tend to work better than narrow ones. A combination of a rock barrier with a hedge of thick plants may be more effective. This method works best with smaller goose flocks.
- Nest materials can also be removed to discourage nesting (works best in small areas where the nests are easily found, and when labor is cheap or free). This is a very labor-intensive

technique, requiring daily trips to the nest sites, which can be hard to find, and hard to reach. Another problem is that individuals within a flock may begin nesting during a period that lasts for several weeks. It takes the birds about a week to build their nest, but once it's done, they lay their eggs quickly—and once there are eggs, you'd need a federal permit.

### **Reduce the amount of good winter habitat for the geese:**

Turn off fountains to encourage earlier freeze-up of ponds.

### **Control their reproduction by disturbing their eggs so they don't hatch:**

Any egg treatment requires registration with the U.S. Fish and Wildlife Service. Applications are online. These techniques are most effective at keeping a small population small. For example, if there are one or two pairs of geese on a pond and that's tolerable, you may be able to maintain the status quo using these techniques. With larger populations, these techniques are probably impractical because they're labor-intensive and time-consuming. Also, you'd need to tamper with nearly every egg to ensure success, and that grows more challenging with larger flocks.

One disadvantage of these techniques is that if they take a long time to work (10 to 15 years)—if they work at all. New birds might join the flock, increasing the numbers you're trying to reduce. Birds that fail to hatch eggs successfully might move to a new breeding area and cause a nuisance there, so this approach might not be neighborly. Other lethal techniques, such as hunting, will almost certainly work faster and more effectively.

Oiling and puncturing eggs should be done as early in incubation as possible. They may require two trips to the nest to treat any eggs laid after the first visit (so you'll have to mark the nests). The second visit should be 7 to 10 days after the first trip. The male goose will probably defend the nest more aggressively on the second visit, so

you may need a partner to fend off the gander. With all three methods, after the eggs are treated, they are put back into the nest so the female will continue incubating them. If the eggs are removed or destroyed, especially early in the incubation, the geese may lay another clutch.

**Oiling eggs:** Coating eggs with corn oil prevents gases from passing through the shell, so the embryo suffocates. The eggs are either sprayed with oil or dipped into a container of oil.

**Puncturing eggs:** Use a barbeque skewer, turkey lacer, or sharpened nail to pierce the eggshell. The best place to make the hole is slightly off center, on the bottom of the egg (opposite the point). The tool must be strong enough to puncture the egg. Don't crack the egg because that might cause the birds to lay more. One problem is that the smell of the punctured eggs might attract predators, such as raccoons, skunks, coyotes, foxes, and crows. Even if your actions are unnoticed, if the geese realize that predators raided the nest, they may re-nest and lay more eggs.

**Addling eggs:** Addling, or vigorously shaking, the eggs, may kill the embryo. Many people choose oiling or puncturing eggs over addling because it's easier to tell immediately whether the technique worked. If you intend to addle or puncture eggs, wait until the female's been incubating for 1 to 2 weeks (mid- to late March in New York). By then, she's well-established. She's less likely to re-nest and may be less biologically able to lay eggs.

Removal of eggs and replacement with dummy eggs is another option. If it's at least 18 days into the incubation, the eggs can be replaced with dummy eggs (wood or plastic eggs, or real eggs that are unfertilized or hard-boiled). This is simpler than oiling, addling, or puncturing eggs. It only requires two visits to the nest: once after all the eggs have been laid (sometime after the first week of incubation) to place the dummy eggs, and then later to retrieve them. You may

need a partner to defend from the gander. The geese tend to continue incubating the dummy eggs.

Once the geese are off the nest, try to move them. If there are no goslings, you can harass them with such techniques as hazing. If there are immobile young or goslings, you cannot harass them without federal and state permits.

### **Allow hunting (during the legal Canada goose season):**

Hunting may be a cost-effective way to reduce goose populations. In addition to directly removing some adult birds, it may scare off others. Hunting also increases the effectiveness of noisemakers, because the birds learn that some loud noises really mean trouble.

Hunters must have a state small game hunting license, the federal Migratory Bird Hunting Stamp, and be registered in the Harvest Information Program. They must have the landowner's permission, be in an area that permits hunting, and hunt only during the legal season for Canada geese.

Even in areas where hunting is prohibited, a controlled hunt may still be possible. This has been done successfully on golf courses, for example. Such controlled hunts may require variances to local laws.

Hunting is also an effective way to target the specific birds that are causing the problems. How's that? Most goose problems are associated with resident geese, not migratory ones. Although you probably can't tell the two apart by looking at them, you don't need to because **the migrants leave**. Chances are good that geese removed in a September hunt are resident birds, because very few migratory geese would be around. (In some areas, hunting is also allowed later in the fall and winter, with stronger restrictions.)

### **Remove the birds using direct capture methods (the birds are usually killed afterwards)**



If you're only dealing with a few birds, you may be able to catch them with a dip net or use a super-sized duck funnel trap with grain, corn, or oat bait. Contact your regional wildlife staff for information about using the duck trap.

In the early summer when the geese are molting and can't fly, the adults can be easily herded into a holding pen. This is called a "roundup." The pen (a moveable fence made of netting) is set on dry, flat land, usually about 20 yards from the water. It should be 4 feet tall, made of snow fence or plastic or cotton net, supported every 5–10 feet with poles. The side facing the water should have V-shaped "wings" that funnel the birds into the pen. People in canoes or boats herd swimming geese toward the capture area. Then others walk slowly behind the geese with outstretched arms, herding the birds into the pen. Once the geese are in the pen, the open side is closed. The birds can then be handled. Young should be removed first, because if there are many birds in the pen, they might be trampled. In most cases, birds that are rounded up are then sent to a poultry processor and killed. Remember, if some of the birds migrated just before the molt period, you may need to return the next year to conduct another roundup.

## Preferred killing methods

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- Follow the conditions of your federal permit.
- Gunshot (using a shotgun with nontoxic steel shot)
- Carbon dioxide chamber
- Stunning and decapitation
- Commercial poultry processor

## Acceptable killing methods

- Cervical dislocation

## Control strategies that don't work particularly well, or aren't legal in some states:

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- Ultrasonics don't work. Birds can't hear them.
- Installing a fountain or aerator in the pond won't work well, and it may actually attract geese to the area.
- Dead goose decoys or swan decoys haven't worked well, especially with resident geese.
- Scarecrows or coyote models don't scare them, either.
- Joggers on paths along the shoreline are supposed to scare geese away, so some sources suggest that you add a jogging path to an area. Think about this for a minute. Are these geese afraid of people? Probably not. This is an expensive technique that hasn't worked well in many areas.
- Birds of prey are used to chase other birds, but we don't know if this works to scare away Canada geese. Right now, it's also impractical because there just aren't enough trained falconers around.
- Another technique that works well for other birds is the use of distress calls, but in limited trials, this did not work with geese.
- Releasing mute swans to keep Canada geese out of ponds is a bad idea and would be illegal in most locations. Swans are aggressive and territorial, and have even driven geese off their nests, but the swans may cause worse problems than the geese. Swans and geese like the same habitats, so the presence of swans might even attract geese.
- In the past, geese were captured and moved to new locations, sometimes even in different states. No more. We're full up. There are no known areas in New York that would welcome problem geese, and other states can't take them, either. Although relocating young geese without their parents did

work in some cases, moving adult geese usually doesn't work because they tend to return to their nesting areas.

- Some communities might want or be willing to tolerate a certain number of geese, but not a large breeding population. One suggestion was to create a single-sex flock for that area. Unfortunately, creating and maintaining a single-sex flock is difficult and costly. The birds must be captured and examined carefully to tell their gender. Then, all members of one gender must be killed or moved. But adult geese tend to return to their birth sites, and other geese might join the single-sex flock. This is a high-maintenance approach that has not worked well.
- Vasectomy (surgical sterilization) of male Canada geese is expensive. It's possible that the treatment changes the behavior of the goose. If other, fertile male geese mate more successfully than the neutered males, the technique would only work well if many geese received vasectomies.
- In a variation of the "sacrificial site" technique, bait (loose grain) is provided to lure the geese to the sacrificial site. Some sources suggest that a lure crop, such as Kentucky bluegrass or grain, be planted at that site. These preferred foods may draw the geese away from the vulnerable site, but you could end up attracting other geese, too. Also, how would you persuade people to stop feeding the geese at other sites, if they know you're feeding them? This is not recommended.
- There are no toxicants registered for use against Canada geese.

# Eastern Chipmunks

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## Species of interest: Eastern chipmunk



(*Tamias striatus*) Eastern chipmunk. Photo by Tom Tetzner, U.S. Fish and Wildlife Service.

## Damage Prevention and Control Methods

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### Habitat Modification

- Destroy burrows and habitat by deep soil tillage
- Allow growth of tall vegetation
- Plant crops as early as conditions permit before animals emerge from hibernation
- Provide alternative foods in minimum-tillage fields
- Remove or modify bird feeders
- Remove or modify harborage and cover

### Exclusion

- Buried galvanized hardware cloth
- Install ¼-inch mesh fence around individual plants

## Frightening

- Nothing effective

## Repellents

- Thiram
- Capsaicin

## Shooting

- 20-gauge shotgun
- .22-caliber rifle with birdshot

## Trapping

- Cage traps
- Rat-sized snap traps

## Legal Status

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Chipmunks are unprotected by federal law but may be protected by some state and provincial regulations. Most states allow landowners or tenants to take (capture and kill) chipmunks when they are causing or about to cause damage. Some states, (e.g., Georgia and Arkansas) require a permit to kill non-game animals. Other states are developing laws to protect all non-game species. In New York State, eastern chipmunks are classified as an unprotected wildlife species.

**Size:** Body is 5 to 6 inches long. Tail is 3 to 4 inches. About 3 ounces.

## Signs of their presence

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1. The animals themselves.
2. Sounds: Chipmunks use a sharp repetitive chirp to alert others of danger. When startled, they'll often respond with a single chirp followed by a short burst of chatter (1 to 2 seconds).
3. Holes that are about 2 inches in diameter. Holes usually go straight down, with no dirt mound in front.
4. Evidence of their feeding: Like squirrels, chipmunks leave gnawed nutshells.

5. Garden and landscape damage: they dig up and eat flower bulbs and seeds. The digging and tunneling also cause damage.
6. Occasionally, chipmunks will damage buildings, but not nearly as often as other rodents.

## Diet

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Opportunists, primarily herbivores. Their favorite foods are nuts, seeds, and fruits. Chipmunks eat nuts (acorns, hazel nuts, beechnuts), seeds (from many ornamental trees, wildflowers, clover, ragweed, and sunflowers, and birdseed), flower bulbs, berries (such as raspberries, strawberries, black berries, and chokecherries), fruit (watermelon, apples, pears, peaches, cantaloupe, cherries), and wild mushrooms. They will occasionally eat corn, wheat, oats, grass seed, insects, worms, snails, slugs, bird eggs, nestlings, mice, moles, frogs, salamanders, small snakes, and carrion. Although they spend most of their time on the ground, they will climb trees to take nuts, fruits, and seeds. Chipmunks cache food in a storage chamber in their burrow. During the breeding season, they must drink up to a quarter of their body weight in water each day.

## Typical activity patterns

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**Social style:** Generally solitary, except for female with dependent young. They can be aggressive towards each other.

**Daily activity:** Diurnal.

**Hibernator?** No. They'll stay in their burrows for days at a time during the winter, in a sleepy state. Chipmunks rely on their food caches during the winter. They may come out on warm days, often to travel to another food cache.

**Migrates?** No.

**Where found:** Chipmunks like to burrow in and near rocky banks and stone walls.

**Distribution in the US:** Everywhere.

**Habitat:** They adapt to a variety of habitats but are usually found in areas with at least a few mature trees. Common in rural, suburban, and urban yards, gardens, campgrounds, parks, urban lots.

Chipmunks often burrow under old stone walls bordering pastures or woods; under piles of brush, rocks, or garbage; among a tree's roots, or near buildings. The only places you're not likely to find them are marshy areas with very dense undergrowth.

**Territory and home range:** The home range varies from 1/10 to 3 acres, but most don't venture more than an acre. Males have larger home ranges than females. Densities may be as high as 10 chipmunks/acre. Will defend an area of about 50 feet around burrow entrance.

## Breeding habits

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- **Pair bonding style:** Polygamous. Females raise young alone.
- **Breeding dates:** They mate twice a year, in April and July.
- **Birthing period:** Two litters, in May and August. Gestation takes about 31 days.
- **Litter size:** 2 to 7 young.
- **Weaning dates:** 4 to 6 weeks.
- **Amount of time young remain with parents beyond weaning date:** not long. Young will leave the burrow at about 6 to 8 weeks old.

## Common conflicts

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**Time of year:** Spring through fall.

## What are they doing?

1. The most serious economic damage is caused by their burrowing under porches, stairs, patios, or into foundations. They may undermine the structure.

2. They gnaw on the tubes used to collect maple syrup.
3. Chipmunks raid bird feeders and stashes of pet food.
4. They dig in flower beds and vegetable gardens, uprooting plants. They eat flower bulbs, seeds, seedlings.
5. Their loud warning chirps in the morning may disturb some people's sleep.
6. Disease risks: minimal. They are host to a variety of parasites, including fleas, lice, mites, worms, and botflies.

## Management

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1. Chipmunks rely on food caches to survive the winter, so if you move them too far away during that time, they'll probably starve to death. Limit relocation to times when food is readily available.
2. Chipmunks raise their young in underground burrows. They usually don't raise their young in buildings (we can't say it would never happen, but it's extremely unlikely). Very young chipmunks might enter a building on their own, leading someone to believe there's a "nest" in there. No. Those chipmunks are mobile.

### **Remove artificial food sources (bird seed, pet food):**

1. If anyone is feeding the chipmunks, persuade them to stop.
2. "Squirrel-proof" bird feeders that use the animal's weight to close the feeder won't stop chipmunks unless the feeder's set so it will close when a very light weight is applied. Unfortunately, at that setting, you'll also stop all but the smallest birds from using the feeder.
3. Hang bird feeders on a rope between two pulleys. Ideally, feeders should be 15 to 30 feet away from the building so any



seed that collects on the ground doesn't lead the chipmunks right to the foundation.

4. Keep the area underneath the feeder clean.
5. Feed pets indoors.
6. Store food, birdseed, and pet food in metal, glass, ceramic, or heavy-duty plastic containers.

### **Block their travel routes:**

1. Screen gutter pipes, downspouts, and foundation drainpipes with ¼-inch hardware cloth.
2. Chipmunks often gain access to houses through attached garages. Screen the eaves and overhangs of the garage with 1/4-inch-mesh hardware cloth.
3. Remove ground covers and hedges that are next to the foundation and move firewood and piles of debris, rocks, and brush away from the foundation.
4. Maintain a foot-wide gravel border around the foundation that's free of vegetation (best) or keep the foundation plantings well-trimmed. Don't stack anything (such as firewood) against the foundation.
5. Interrupt any routes that connect woods to the foundation in one continuous line by removing plants or a section of stone wall.

### **Protect vulnerable crops and ornamental plants:**

1. Plant bulbs within a cylinder of 1-inch poultry wire. Lay the wire in a trench then plant the bulbs in it. Add some dirt, finish wrapping the wire around the bulbs, then cover with soil.

2. Another option for bulbs is to plant them, and then lay a piece of 1/2-inch hardware cloth over the soil surface to reduce the chipmunks' ability to dig up the bulbs. The hardware cloth should extend at least a foot around the plantings and be covered with soil. Its mesh must be large enough for the stems to grow through, so you may need to experiment with different sizes for different plants.
3. Establish a barrier around gardens and fields with fences (wire mesh, electric, or combination wire/electric fence). Use 1/4-inch hardware cloth or welded wire. The fence must be 30 inches high, buried 6 to 12 inches deep, with a foot-wide "L"-shaped shelf that sticks out to prevent the chipmunks from burrowing underneath it. Or use a 2-wire electric fence (if allowed by local ordinances) with the wires 1 inch and 3 inches off the ground. A combination fence should have an electric wire at 1 inch off the ground, and along the top of the fence.
4. If there aren't any mammals nesting in the tree, wrap two-foot - wide bands of sheet metal around fruit trees at 6-8 feet, to prevent chipmunks from climbing the tree. This will only work if the chipmunks can't leap from another tree or other object onto this tree. Attach the band loosely, so the tree has room to grow. Don't staple the band onto the tree because that can prove dangerous if someone needs to cut down the tree.

### **Prevent entry into building:**

1. Remove any current chipmunks. Exclude them with a one-way door.
2. Close the door! (Use screen doors.) Install door sweeps and weather-stripping (garages, too).
3. Seal openings with ¼-inch-mesh hardware cloth. Or poke steel wool, wire mesh, or flexible aluminum "gutter guard" into the hole, then caulk, or spray expanding foam (such as Great Stuff®) over it to strengthen the barrier. Focus on holes at ground level,

especially those in foundations. Chipmunks tend to stay on the ground, so you don't have to look for holes that are high up, as you would with squirrels.

4. Check vents (especially clothes dryer vents that are close to the ground). If the vent is damaged or dicey, replace it with an animal-proof design, or screen it with 1/4-inch hardware cloth.
5. Plug gaps around water, gas, and heating pipes with latex caulk. For large holes around pipes, use galvanized metal pipe chase covers, sheet metal plates, mortar, plaster of Paris, or cement.

## Trapping strategies

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### Live traps:

1. Small cage traps (app. 16- × 6- × 6-inch) or Sherman traps (app. 10- × 3- × 3-inch).
2. Bait with nuts, peanut butter, sunflower seeds.
3. Place the trap near the tunnel's entrance or along their travel route.

### Lethal traps

1. Rat-sized snap-back traps. There are now models that have built-in safety catches. The bait is under a cover, which must be lifted before the trap will fire. This means that an animal that's just investigating won't set off the trap. The design also helps ensure proper positioning, which is more humane.
2. If using a traditional snap-back trap, place it within a cage trap, a box, a coffee can with both ends cut out, or in PVC pipe, to prevent the capture of songbirds. If the trap's next to the foundation, you could lean a board over it.

## Preferred killing methods

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1. CO<sub>2</sub> chamber
2. Lethal trap
3. Shooting, using an air rifle, a shotgun, or a .22-caliber rifle with bird shot.
4. Cervical dislocation
5. Stunning and chest compression

## Control strategies that don't work particularly well or aren't legal in some states.

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1. There are brands of sunflower seed and suet that are treated with a repellent. The active ingredient is capsaicin, the chemical that makes hot peppers taste hot. Doesn't bother chipmunks, however, because they have fur-lined cheek pouches.

# Crows

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**Species of interest:** American crow (*Corvus brachyrhynchos*)



American crow (*Corvus brachyrhynchos*). Crow. Image courtesy of Wildlife Control Consultant, LLC.

**Size:** About a pound. Body is 17 to 21 inches long.

## Legal status

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Crows are federally protected migratory birds under the Migratory Bird Treaty Act. In many states, crows are a protected game species with an open season. An exception to the Migratory Bird Treaty Act allows the taking of crows without a federal permit when the birds are "found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner to constitute a health hazard or other nuisance."

# Damage Prevention and Control Methods

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## Habitat Modification

- Removal and modification of roost trees
- Secure trash cans and dumpsters
- Remove carrion
- Alternate foods - broadcast cracked corn through fields to protect newly planted corn seedlings

## Exclusion

- Nets and wires over high-value crops or small areas
- Cover ears of corn with paper cups or sacks after silk has turned brown
- Lines or wires spaced at 8 feet around sites needing protection

## Frightening

- Mylar® tape and effigies
- Noise-makers, pyrotechnics, and distress calls
- LRAD — Long Range Acoustic Device

## Repellents

- Methyl anthranilate
- Polybutenes

## Shooting

- Shotgun - 12-gauge with No. 6 shot
- Rifle - .22-caliber rifle or air rifle

## Trapping

- Australian crow decoy traps
- Cage traps - minimum size 60 x 23 x 26 inches
- Pole traps – Nos. 0 or 1 padded foothold traps

## Signs of their presence

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**The bird itself** is the most obvious sign.

**Sounds:** Loud, raucous, throaty, "caws."

**Nest:** Sticks, twigs, and coarse stems lined with shredded bark, feathers, grass, cloth, and string. Nests are 18 to 60 feet above the ground in tall trees, especially evergreens. Lacking trees, crows may nest on the crossbars of telephone poles or on the ground.

**Evidence of their feeding:** Poor seeding of corn may be due to crow damage.

Crows will sometimes poke holes in garbage bags, insulation, or through roofs (especially on flat roofs covered with a rubbery membrane).

## Diet

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Opportunist. Crows are excellent hunters, pirates, and scavengers. They eat over 600 foods. A third of their diet consists of insects, frogs, salamanders, fish, snakes, bird eggs and young, small mammals, carrion (including road-kills), and garbage (in landfills); the rest is plants, mostly corn or waste grains in fields that have been harvested. They'll also eat peanuts, sunflowers, pecans, various fruits, and sorghum. During the winter, they survive mostly on waste grain. From spring through summer, crows eat mostly worms, insects, and other invertebrates. One crow often acts as a sentinel while others feed.

## Typical activity patterns

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**Social style:** Sociable, living in family groups with the young of previous years, who may help bring up the current brood. Crows gather and roost in flocks of ever-increasing size as the season progresses through winter.

**Daily activity:** Diurnal.

**Hibernator?** No.

**Migrates?** Some do, some don't.

## Where found

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**Distribution:** Most everywhere.

**Habitat:** Prefer open agricultural lands, old fields, meadows, with nearby orchards, woodlots, or hedgerows for nesting and cover. Crows are adapting to using parks and tree-lined streets in suburban and urban areas as large roosting areas and nest sites. They will fly up to 12 miles during the day to feeding sites, then return to the roost at night.

**Territory and home range:** Territorial during the nesting season.

## Breeding habits

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- **Pair bonding style:** Monogamous. Crows have strong pair bonds that endure over the years, but they probably occasionally mate with others. Both sexes help build the nest and rear the young. Female incubates the eggs by herself, but the male will feed her and guard the nest when she leaves. (Other females may feed the incubating bird, too.)
- **Breeding dates:** From March to June. They lay their eggs in the end of March. One brood/year.
- **Clutch size:** 4 to 6. Young hatch in about 18 days.
- **Fledging dates:** About 35 days from hatching. The young leave the nest at 5 weeks to forage with parents.
- **Amount of time young remain with parents beyond fledging date:** Often one or more years.

## Common conflicts

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**Time of year:** Any time of year.



## What are they doing?

1. Huge flocks—up to 25,000 crows or more in some areas—may roost together in the winter, especially in urban areas. With so many birds present, they can make an astounding racket and their weight may even break tree limbs. Noise, droppings, property damage, and possible public health hazards are common complaints.
2. Eat farm crops, both vegetables and grains, especially corn. Crows will also damage home gardens, again, often for sweet corn. Ironically, crows may be attracted to the garden by the insect pests, but then stay to feast on the crop they protected.
3. Eat bird eggs and young chicken and turkeys.
4. Large flocks may spread diseases to other species: histoplasmosis to people, avian cholera to other birds (when the crows roost near wetlands), and gastroenteritis to swine (when they roost near farm buildings).
5. They'll sometimes poke holes in roofs, insulation, and garbage bags left outdoors.
6. Rarely, groups of crows will attack newborn lambs, goats, calves, and pigs, but that's more often the work of magpies or ravens.
7. During the nesting season, crows may store food in trees, in the grass, or even in birdbaths or rain gutters—whatever's handy to the nest. This collection of carcasses may not be appealing.
8. Crows are very protective of their young before they fledge and will attack predators that threaten the nest. Usually, this is a cat or dog, but if people are too close to the nest, the crows might mob them. This behavior stops as soon as the young can fly.

9. Rarely, young crows will play with, and damage, windshield wiper blades. Crows are very curious, and at that age, they'll play with objects that older crows ignore.

## De-bunking myths about crows

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1. *Crows will attack people.* Forget Hitchcock. Crows don't attack people (unless you seem to be threatening their young).
2. *Crows are vectors for West Nile virus.* Many crows have died from West Nile virus, but they may play little role in spreading the disease. Mosquitoes are the main vector.
3. *A crow roost nearby will increase your risk of catching West Nile virus.* Not true.
4. *Crows are impossible to distinguish from ravens.* Crows are often mistaken for ravens (also a federally protected bird). Ravens are larger and have a wedge-shaped tail; they're mostly found in the Adirondacks and Catskills. The fish crow is more often found downstate in the lower Hudson Valley and Long Island.

## Management

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Sometimes, damage blamed on crows is caused by other species such as blackbirds, starlings, pheasants, grackles, or mice. Often, community cooperation is critical for effective solutions to nuisance problems caused by a large urban roost.

### **Make roosting sites less appealing:**

1. In a dense grove, thin trees. If a tree is a preferred roost site, trim out about a third of its branches, concentrating on the inside center of the crown. This will reduce the number of available perches and increase the birds' exposure to weather. With less, and poorer shelter, fewer crows will congregate.

2. A combination of frightening techniques (noises and visual deterrents) may convince the crows to leave a roost. As always, your chance of success increases if the techniques are used together and in an unpredictable fashion. Try noisemakers such as tape-recorded distress calls (crow squalling while under attack), clappers, shell crackers, propane cannons, shotguns, beating on tin sheets or barrels, and alarms. The Avian Dissuader™, a laser, has proven effective against crows (it's a powerful tool so use it cautiously). Mylar tape, lights, bright objects, animated owl models (complete with a dummy crow attached to its talons) and dousing the birds with water from hoses or sprinklers that are mounted nearby may also work. Crows that are used to people and city noises may not respond.
3. If young crows are damaging windshield wiper blades, try to chase them away, using the harassment techniques mentioned above. Or try changing the car's appearance a bit to frighten them, by hanging a tassel on the antenna, for example. A car cover will protect the wipers, too.

### **Protect vulnerable crops:**

- Are you sure the crows are causing more harm than good? They eat insect pests; mice; waste grain that could result in unwanted "volunteer" corn the next season; and carrion, which could attract other pests. Assess whether the damage justifies control and remember to determine the real culprit.
- Exclusion is often impractical except for a valuable crop in a small area, where it may be cost-effective. Create a barrier with nylon or plastic netting.
- In a home garden, place paper cups or sacks over ripening sweet corn, once the silk has turned brown. Try frightening them, as described earlier.

### **Remove artificial food sources (garbage, compost, bird seed, pet food):**

- If anyone is feeding the crows, persuade them to stop.
- Enclose compost piles in a framed box using hardware cloth; in a sturdy container, such as a 55-gallon drum; or in a commercial composter.
- Feed pets indoors.

## Trapping strategies

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Trapping is probably impractical for large flocks. There may be some situations in which it makes sense, especially if there aren't many crows in the area.

### Live traps:

Australian crow trap. A large trap (8- to 10-feet square, 5 to 6 feet high) that uses both bait and a decoy to lure in the birds. This trap can be used with bait only, but be more patient, because that method is less effective. Bird eggs or carcasses are used as bait if there's little risk of attracting carnivores such as dogs; otherwise, try whole corn, watermelon, or poultry feed. The decoy is a few live crows, who of course need food, water, and shelter.

## Preferred killing methods

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1. CO<sub>2</sub> chamber
2. Cervical dislocation
3. Shooting (air rifle, shotgun, or .22-caliber rifle)
4. Stunning and chest compression

### **Control strategies that don't work particularly well, or aren't legal in some states:**

1. Ultrasonic devices don't work. Birds can't hear them.
2. There have been mixed results with grid-wire systems.

# Deer

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## Species of interest: White-tailed deer

(*Odocoileus virginianus*)



Female white-tailed deer. Photo by Greg Clements.

**Size:** Bucks (males) typically stand 3 to 3<sup>1</sup>/<sub>2</sub> feet tall at the shoulder and weigh 125 to 200 pounds. Males grow antlers each spring and summer and shed them in the winter. Does (females) are smaller and lighter and lack antlers.

## Legal status

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Game species with set season. Any control technique that involves the handling of deer requires a state permit.

# Damage Prevention and Control Techniques

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## Habitat Modification

- Harvest garden crops as early as possible
- Use deer-resistant plants

## Exclusion

- For trees – woven-wire or plastic cylinders
- Electric or non-electric fences

## Frightening

- Guard dogs

## Repellents

- Putrescent whole egg solids
- Animal fat-based sprays
- Ammonium soaps
- Thiram
- Capsaicin
- Blood meal

## Toxicants

- None registered

## Shooting

- Regulated sport and managed hunting
- Sharpshooting

## Trapping

- Cage traps
- Drop nets
- Rocket nets
- Dart projectors and chemical immobilization

## Other Control Methods

- Fertility control

## Signs of their presence

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- **Deer are commonly seen.**
- **Tracks:** Looks like a pair of bottom-heavy crescent moons.
- **Scat:** Jellybean-shaped pellets, usually seen in piles.
- **Trails:** Narrow, well-worn paths.
- Evidence of their feeding: browsed branches have a ragged, broken end. Rabbits or rodents clip off branches neatly. Also, deer can browse to a height of 6 feet off the ground. Unless there's deep snow, a rabbit or rodent would need a ladder to do that.
- Beds. An oval depression in grass, where the deer slept or rested. In snow, this may be a deep indentation.
- Scrapes: Bucks will tear up soil and plants using their hooves and antlers. May see a scrape that's 1 to 5 feet wide, often with nearby rubs.
- Buck rubs. When the antlers first grow, they're covered with "velvet," a layer of hair and blood vessels. This dries and is shed or rubbed off; bucks usually rub against saplings, shrubs, or rocks, probably to mark their territories.
- Shed antlers may be found in the woods, although this is rare because they're usually quickly eaten by mice, squirrels, and porcupines. Antlers are rich in minerals such as calcium.

## Diet

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**Herbivores.** They eat mostly grasses, herbs, crops, fruits, leaves, twigs, and buds in the spring and summer. Their fall diet includes beechnuts, acorns, and wild cherry seeds. By winter, they're surviving on twigs and buds. Deer prefer to dine on these ornamentals and crops: white cedar, yew, sumac, rhododendrons, azaleas, sassafras, basswood, various maples and dogwoods, corn, alfalfa, buckwheat, clover, apples, lettuce, celery, potatoes, turnips,

sugar beets, and strawberries. When they're food-stressed, deer will eat spruces, balsam fir, alder, tamarack, most pines, junipers, hawthorn, , and sweet fern. Deer eat about 3% of their body weight each day. For an average adult deer, that's about 6 to 8 pounds of plants.

## Typical activity patterns

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**Social style:** Males keep to themselves for much of the year, but during the spring and summer, they'll form groups of bachelor deer. Females care for their fawns by themselves. Groups of does and their young often feed together. During the coldest part of the winter, deer may gather for a few months in a sheltered part of the woods which protects them from deep snow and wind, called a "deer yard." Typical deer yards include swampy areas with spruce, balsam, cedar, and pines with some hardwood trees for food.

**Daily activity:** Most active at dawn and dusk but may feed throughout the night or day.

**Hibernator?** No.

**Migrates?** No. Though some deer will move to wintering areas when there is deep snow.

## Where found

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**Distribution:** Widespread and abundant.

**Habitat:** Deer are more likely to be found in the forest "edge," not in the deep woods (except for a few months in the winter when they retreat to their sheltered yard). Ideal deer habitat is a mix of woods and agricultural fields with brushy undergrowth, but they are highly adaptable and can live in suburban areas with a mix of lawns, gardens, and patches of forest.

**Territory and home range:** During the breeding season, or "rut," males are territorial. Some will defend large areas, while others will



be shut out. Males range over a larger area than females; in urban areas, that could be 200 acres, while in rural areas, as much as 600 acres. The home range of females is usually about 150 acres.

## Breeding habits

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- **Pair bonding style:** Polygamous.
- **Breeding dates:** Mid-September through late February, with peak in mid-November.
- **Number of young:** usually 1 to 2 fawns, triplets occasionally in good habitat.
- **Birthing period:** Late May to mid-June.
- **Weaning dates:** 3 to 4 months old.
- **Amount of time young remain with parents beyond weaning date:** Up to a year.

## Common conflicts

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**Time of year:** Any time of year. Damage to landscape plants and ornamentals is usually most severe in the late winter–early spring when other foods are scarce.

## What are they doing?

In the northeast, deer have essentially become our forest and wildlife managers. Many people are unhappy with the results. Deer populations in the northeast are so high that they are over-browsing many areas, severely reducing or eliminating certain plant species. Where once there was a thick under-story composed of many different plants, the deer may leave behind an open, virtually park-like forest floor that's dominated by grasses and ferns. Trees such as oak and sugar maple, which deer love to eat, are being replaced by beech, which they don't prefer. Wildflowers, such as several species of *Trillium* and Canada mayflower, have been eaten out of existence in some places. This dramatic change in our forests will hurt some

wildlife, such as ground-nesting birds, which need the cover of the understory, and help others.

Deer prefer to eat some economically valuable trees. The species they leave behind are less marketable. This is already hurting the forest industry, to the tune of \$750 million/year, according to government estimates.

Deer consume garden crops, field crops, fruits, and ornamental plants. The losses are estimated at \$100 million/year for agricultural crop damage throughout the US, and more than \$250 million for damage to landscape plants.

Their browsing has caused long-term damage that reduces the yield of fruit trees or permanently disfigures ornamental trees and shrubs.

Deer collide with cars, causing accidents (estimated cost >\$1 billion/year, nationally). The combined losses from vehicle collisions and plant damage amounts to >\$2 billion/ year, nationwide.

**Disease risks:** Lyme disease, leptospirosis, and chronic wasting disease. This deer disease has been found in Colorado, Wyoming, Montana, South Dakota, Wisconsin, Minnesota, Nebraska, Kansas, Oklahoma, Illinois, New Mexico, Saskatchewan, Alberta, and has spread to several eastern states. Deer are host to a variety of parasites, such as botflies, liver flukes, ticks, lice, and worms.

## Management

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Deer populations can double in size every 2 to 3 years, if unchecked. Solutions that address a community-wide problem will probably include a combination of options, such as harvesting female deer, fencing, replanting with less palatable species, and repellents. “Buck-only” harvests will not reduce or stabilize the population.

Site-specific problems can often be solved with fencing, replanting, and the application of repellents. There are a few deer repellents

that may be effective. They work best in small areas during for a few months.

### **Reduce food sources:**

If people are feeding the deer, persuade them to stop. Even off-site feeding to try to lure the deer away from the vulnerable area is a bad idea that may only increase problems. Feeding deer is currently illegal within 300 feet of a public road in New York State.

Switch to plants that deer find less tasty. No plant is completely deer-proof—if deer are hungry enough, they'll even eat plants with little nutritional value—but under normal conditions, they'll avoid certain plants.

### **Protect vulnerable gardens, crops, and landscapes:**

Fences work well to protect a specific site, such as a home garden, agricultural field, airport, or schoolyard. There are many choices for the material and design of the fence. Several factors influence the choice, including the size of the vulnerable area, the intensity of deer feeding, the amount of damage that can be tolerated, and local laws, which may restrict the use of fences, for example.

Individual plants, or small clumps of flowers, can be protected with plastic netting or wire cages. Wrap the plastic netting around the plants or place the wire cage over them. The deer will be able to eat any part of the plant that sticks out of the net, but this usually reduces damage a great deal.

Vegetable and flower gardens can also be protected with a temporary electric fence used during the growing season. Install the fence before there's damage to prevent a problem from developing, or at the very first sign of damage. Never directly connect a fence to household current—it should run through a fence charger, to convert the current from AC to DC. Adding an attractant, such as peanut butter, to an electric fence will entice the deer to touch the fence with their noses, so they'll get shocked. Wrap a clump of

peanut butter in aluminum foil, then staple it to the fence. This may teach them to avoid the area. Adding cloth strips to an electric fence every 6 feet or so and spraying the strips with an odor-based repellent, will work well also.

Small groups of trees or shrubs (within a circle of about 20 yards) can be enclosed with snow fencing during the winter and early spring. This will provide decent but not perfect protection.

For year-round protection, the best barrier is a permanent woven-wire fence that's at least 8 feet high. In some cases, a high tensile electric fencing with a 7-wire design works well, too (best if the spacing between the wires is no more than 9 inches). Entrances must be protected with gates or cattle guard.

Combination fences work well. To reduce the overall cost, you can use woven wire on the bottom, and then switch to high-tensile electric wire for the top 4 feet of the fence. This is cheaper than a fence constructed of only woven wire.

Dogs may be able to keep deer out of fenced areas. Some growers have enclosed their orchards with an "invisible fence," allowing dogs to freely patrol the area. One study showed that two dogs could patrol about 60 acres in the summer, 10 acres in the winter. This technique is most effective with large dogs that patrol aggressively and are kept outdoors all the time.

For a small vegetable garden or flower bed, string a rope fence 30 inches above the ground, with the posts set 3 to 4 feet apart, and spray the rope with an odor-based repellent. Or you can spray the repellent onto cloth strips and attach them to the rope every 3 to 4 feet.

Adding repellents to an electric fence may also teach the deer to avoid the area. Repellents seem to be more effective than attractants.

*If you're asked for advice about how communities can prevent or reduce the number of traffic accidents caused by collisions with deer, here's what you can say:*

- Contact the Department of Transportation or the state wildlife agency for information.
- Reducing the size of the local deer herd may reduce the number of collisions. Although that seems like common sense, there's only limited research on this point.
- Keep roadside areas well-mowed and keep shrubs well-groomed, so drivers have a better view of deer approaching from the edges.
- Encourage drivers to slow down during dawn and dusk, especially from April through June and again from October through December.
- Deer often travel in family groups, so if you see one, look for more. Slow down.
- People are usually hurt when a driver tries to avoid hitting a deer and swerves into the oncoming lane or hits a solid object. There's really no way to predict the direction the deer will choose to run. Don't swerve if an accident is unavoidable, hit the deer.
- If the problem is concentrated along a short section of road, fencing may be the best option.

## Preferred killing methods

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- Shooting (using a shotgun with 20-gauge or larger slugs, a center-fire rifle, or other implement specified in the permit)
- Lethal injection of barbiturate, if possible, with appropriate licenses
- Stunning using a penetrating captive bolt pistol, followed by exsanguination
- follow the conditions of your permit.

## Control strategies that don't work particularly well or aren't legal in some states.

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No scare devices are recommended because they don't work well and many of them can annoy the neighbors. Deer generally habituate to scare devices within a few days. So don't waste your time with lights, loud noises, scarecrows, fireworks, gunshot, crackers, bangers, propane cannons, deer whistles, ultrasonic devices, strobes, water sprays, or sirens. Deer can hear ultrasonic sound, but it doesn't appear to frighten them. It doesn't remind them of a predator or any other dangerous situation.

Roadside reflectors have been used with varying success to reduce the number of collisions between deer and cars. Deer may get used to them. It may work better in rural areas because deer in suburbs are more used to human activity and lights.

# Coyotes

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**Species of interest: Coyote** (*Canis latrans*)



Coyote (*Canis latrans*). Photo by Forest Wander.

**Size:** 30 to 45 pounds. 4 to 5 feet long with tail.

## Legal Status

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The legal status of coyotes varies depending on state and local laws. In some states, including most western states, coyotes are classified as predators and can be hunted throughout the year, regardless of whether they are causing damage to livestock. In other states, coyotes may be hunted only during specific seasons, and often only by specific methods. Some eastern states consider coyotes to be game animals, furbearers, or a protected species. Always review state regulations before initiating control.

## Damage Prevention and Control Methods

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### Habitat Modification

- Reduce cover for prey species
- Eliminate all intentional and unintentional feeding of coyotes
- Remove carrion or bury livestock carcasses

- Change the season and use shed practices for lambing, kidding, and calving
- Raise livestock in confinement or put them in pens at night

## Exclusion

- Net-wire, electric, and coyote-roller exclusion fences

## Frightening

- Sonic and visual frightening devices - propane cannons, sirens, strobe lights
- Haze and harass coyotes in residential areas
- Guard animals- dogs, donkeys, llamas

## Repellents

- None registered

## Shooting

- Rifles- .223, .22-250, .220, or .243
- Shotgun- 12-gauge with No. 4 shot

## Trapping

- Foothold traps- Nos. 1.75 or greater
- Cable-restraints- passive and spring-loaded
- Cage traps- 54 x 20 x 24-inch (minimum)

## Signs of their presence

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1. Coyotes run with their tails down, while wolves and dogs hold their tails straight out. The tails of domestic dogs often curl; coyotes have straight tails, with a black tip.
2. Sounds: May yip, yelp, howl, growl, bark, or woof. Family units (the adult pair and their pups of that year) often yip-howl when they reunite.



3. Tracks: More compact, linear, and forward-directed than a dog's, often splayed, sloppy-looking track.



4. Scats: are twisted, often containing hair or berries. Often found on rocks, logs, or at trail intersections. Their scat has a mild, musky odor, unlike that of the domestic dog.



5. Large carcasses: Coyotes tend to eat the organs first. They'll pick bones clean, unlike dogs. Dogs start at the rear of a larger carcass and eat their way towards the head.

## Diet

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**Opportunist.** About 80% of their diet consists of small rodents and rabbits. Coyotes will also eat insects (especially grasshoppers); fruits (berries, watermelon); fish and crayfish; frogs; snakes; bird eggs;

larger mammals, such as raccoons, opossums, muskrats, and deer; garbage; carrion; dog or cat food; bird seed, and even doughnuts. They can kill housecats and dogs. Some individual coyotes will kill livestock, especially chicken, ducks, and lambs.

## Typical activity patterns

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**Social style:** Most often, will see mated pairs (usually, life-long mates) but coyotes may live in family groups or alone, and may switch from one lifestyle to the other. Sometimes, "teenaged" coyotes form a loose group, often much larger than the family group, perhaps as with many as 15 individuals. Such groups may behave more aggressively towards people and dogs. The sub-adult group is probably just a temporary arrangement.

**Daily activity:** They're usually nocturnal, especially during hot weather. Coyotes may be active throughout the day when they're rearing their pups, and in areas where they're left alone by people. In suburban areas, coyotes may alter their activity patterns, especially if there are daytime food sources available, such as dog food that's left outdoors.

**Hibernator?** No.

**Migrates?** No.

## Where found

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**Distribution in the Northeast:** Rural and suburban areas.

**Habitat:** They prefer forested areas, shrubby fields, and marshy areas but are highly adaptable and will live in suburban areas.

**Territory and home range:** Home ranges cover 5 to 25 square miles. Coyotes will scent-mark their territory. Home ranges often do not overlap with other coyote groups, especially when they're raising their pups.

## Breeding habits

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- **Pair bonding style:** Usually monogamous. Coyotes are thought to mate for life. Both parents cooperate in rearing the young, sometimes with the help of an older pup. Sometimes, a male may mate with several females, and they may share the den, raising more than one litter there.
- **Dens:** Coyotes seek sheltered areas for rest or protection from severe weather but use dens to raise their young. Coyotes commonly move their pups from one den to another if disturbed. Most often, coyotes will renovate a burrow that was built and then abandoned by another animal, such as a woodchuck, but they can dig their own dens. Their dens are often found near rocky ledges, or steep or brush-covered slopes. In urban areas, they may den in storm drains, under sheds, or in holes in parks, golf courses, and vacant lots. Coyotes may reuse dens from year to year.
- **Breeding dates:** February. Females are only receptive for a few days. Gestation takes about nine weeks.
- **Litter size:** 5 to 7. The better the food supply, the larger the litter.
- **Birthing period:** late April.
- **Weaning dates:** Pups begin exploring when they're three weeks old and are usually weaned by six weeks old.
- **Amount of time young remain with parents beyond weaning date:** Pups are usually driven out of their parents' territory between September and March.

## Common conflicts

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**Time of year:** Peaks in late winter (Feb. to March) when the coyotes are establishing their territories, then again in early spring and summer, when they need more food to raise their pups. During the winter peak, coyotes aggressively defend the area around their den

site. This is when they often come into conflict with dogs (March to April), who they view as a threat to their pups. This is especially true if the coyotes are trying to move into the dog's turf (a yard).

In the early spring and summer, coyotes seek easy prey to keep up with the food demands of their pups. "Easy prey" may include rodents in suburban areas, and young livestock (lambs, chicks) in rural areas. There may also be complaints during the fall, as young coyotes try to establish their own territories, because that can be a noisy process. But they're fussing among themselves and tend not to wrangle with dogs then.

### **What are they doing?**

1. Their yipping and howling may disturb some people.
2. Their mere presence may frighten some people. Many people aren't used to seeing coyotes and may fear them.
3. They can kill housecats or small dogs. Large and medium-sized dogs (over 35 pounds) are rarely physically threatened, because the coyote recognizes that it's outmatched. They'll usually work out the territorial dispute (loudly) without either being hurt. Small dogs are at risk. The coyote expects to be dominant and will discipline the dog until it offers the correct submissive behavior. If the dog doesn't submit easily, it could be badly injured or killed. Very small dogs and cats are easily killed. Free-roaming pets should be brought inside to keep them safe from cars and pesticides, as well as predators.
4. Some coyotes kill livestock (in the northeast, mostly free-ranging chickens, ducks, and sheep).
5. They'll eat some vegetables and fruits, especially melons.
6. Coyotes (and foxes) will chew holes in irrigation pipes in fields and orchards.
7. Nationwide, a few people have been attacked. Most coyotes don't bother people. Some coyotes become bold and

aggressive. If you see individuals showing these behaviors, take action. The potential does exist for coyote attacks in New York. People and coyotes can usually coexist if the coyotes maintain their natural fear of people (more on this later).

8. They may travel along an airport's runways, causing delays and hazards to aviation.
9. Disease risks: Distemper, hepatitis, parvovirus, rabies, mange, and tularemia.

## De-bunking myths about coyotes

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1. *Some coyotes are crosses of dogs and coyotes.* Coyotes are often mistaken for "coydogs." A cross between a coyote and dog is possible but highly unlikely because of differences in their breeding habits. There are enough coyotes; they can easily find mates.
2. *A coyote that is active during the day is rabid.* Not necessarily. Most likely, it's a healthy animal that's feeding more often than usual, because of the demands of its young.

## Management

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### **Remove artificial food sources (garbage, compost, pet food, pets):**

1. If anyone is feeding the coyotes, persuade them to stop.
2. Use "coyote-proof" garbage cans or dumpsters with a tight-fitting lid. Secure garbage can with heavy-duty straps or bungee cords, or attach it to a post, or keep it out of reach in the garage (close garage doors at night) or place the can in a covered and secure bin.
3. Enclose compost piles in a framed box using hardware cloth; in a sturdy container, such as a 55-gallon drum; in a commercial composter.

4. Feed pets indoors. Any food left outdoors should be removed at night. Bring pet food dishes inside, too.
5. Keep the area around bird-feeders clean because coyotes will eat spilled seed. They'll also eat animals that are attracted to the bird feeder, such as birds, mice, and squirrels, so in some cases, you may want to remove the feeder.
6. Do not allow pets to roam freely.

### **Protect children and pets and keep coyotes out of yards.**

Some coyotes in suburbia have lost their fear of people. A coyote who does not fear people should be considered dangerous. The foods they find in residential areas (garbage, pet food, and pets) are full of human odors, so these coyotes quickly learn to associate food with people. That's bad. Many people become frightened when they see coyotes and run into their homes. That's even worse. To a coyote, that person has just behaved like prey (running triggers their attack response). In short, food smells like people and people behave like prey. Add to the mix people intentionally feeding coyotes, and the potential for a coyote attack becomes very real.

Certain changes in coyote behavior seem to indicate a growing risk that coyotes will become aggressive toward people (based on studies of coyote-human conflicts in California). The signs are shown in the order they usually happen.

1. During the night, coyotes kill more pets than they did before.
2. During the night, coyotes are seen on streets and in yards more often than before.
3. Coyotes are now seen in those areas during the day, especially early morning and late afternoon.
4. During the day, coyotes chase or kill pets (previously, only a night-time activity).

5. During the day, coyotes kill pets that are on leash (previously, they only took free-roaming pets), or chase joggers and bikers.
6. At midday, coyotes are seen near children's play areas.

Coyotes are generally nocturnal, so increasing daytime activity is often a sign that those animals have become used to people. Such boldness should be taken seriously. The California study suggests that if the situation is addressed before pet attacks are common, further problems can probably be avoided.

### **What can you do?**

1. Act tough. Be very aggressive. Yell, make loud noises, wave your arms, spray the coyote with water from a hose, and throw sticks or stones near the coyote.
2. Teach children that coyotes are not dogs, and they are not pets. Watch coyotes from a distance.
3. Small children are most vulnerable, so don't leave kids in the yard unattended.
4. Don't let pets roam freely. And don't feed them outdoors!
5. Keep the yard clean and well-mowed to remove cover for the coyotes (trim shrubs at ground level). Remove brush and junk piles that attract rabbits and other prey that might entice coyotes into the yard.
6. Hunting and trapping help to keep coyotes from losing their fear of people.
7. Fences will help a great deal, but coyotes can climb over, burrow under, or squeeze through fences. So, build them right and keep fences well-maintained.
8. Construct net wire fences (using 4-inch" mesh) that are 5 1/2 feet high. To prevent coyotes from digging under the fence, either add barbed wire at ground level or bury the fence 6 inches deep and bend a foot-wide section outward into an "L"

shape. To discourage coyotes from climbing over the fence, add an electric wire at the top or create an overhang of regular wires.

9. Electric fences: a fence of thirteen strands of high-tensile electric wire is proven to protect sheep from coyotes. Other designs using fewer wires may work in some areas.
10. Combination net wire and electric wire fence: If there's an existing net wire fence, add an electric strand that's placed 6 to 8 inches above ground and 8 to 10 inches outside the fence, using an offset bracket. If the coyotes are climbing over the fence, add a top wire that's also outside the fence.
11. Invisible fences may be an attractive solution for keeping pets within an area, but they will not keep wildlife out. To protect pets from predators, switch to a traditional fence design.
12. Ask neighbors to follow these same steps.

### **Scare them away.**

In some cases, you may be able to successfully scare off coyotes and solve the problem. This is most likely to work when you have access to the coyotes' den. It's reasonably easy to harass a coyote (or fox) enough to convince them to move their pups. These ideas haven't been well-studied, but we believe they're worth trying.

1. Act tough, as described previously.
2. Use slingshots, an air rifle, or a shotgun loaded with rubber buckshot to frighten a coyote that's further away (30 feet). You don't have to hit it to scare it off, but if you can, that will more effectively train the coyote to stay away (this refers to the use of the less lethal projectiles mentioned above).
3. Experiment with noisemakers, such as bangers and screamers.
4. One scare device, the Critter Gitter®, combines a siren and flashing lights. It's triggered by a motion detector. The device



switches patterns, so it should be effective longer than a scare device that doesn't vary.

5. As with many scare tactics, some of the ideas above are labor-intensive. You might have to sit and wait a long time before the coyote shows up.
6. In some situations, such as when the landowner really doesn't want the coyote killed, you may be able to train the coyote to become wary of the capture location. Some biologists believe that if a coyote is trapped and released, it will avoid the area in which it was caught. If the landowner's property is large enough, and you don't think the coyote will move on to trouble a neighbor, you may want to trap it and release it on site. This is a riskier technique because if it doesn't work, the job has just become much harder. Consider this a last-resort technique.

### **Protect vulnerable livestock (poultry, sheep).**

1. It is much easier to prevent a problem than it is to stop it once it starts.
2. Close and tightly fasten the doors to poultry houses.
3. Fence areas (see previous section). Another fencing option is to create a temporary pen for confining livestock at night. Portable electric fences can be installed quickly and easily. They're usually made of thin electric wires running through polyethylene twine or ribbon, called "poly-wire" or "poly-tape."
4. Herd livestock into pens and corrals at night, and during foggy or rainy days, when coyotes are more likely to hunt. Also, bring livestock into sheds or paddocks when they're ready to have young. If a particular pasture seems to be more enticing to predators, move the livestock into a less vulnerable area.

5. Keep pastures open. Clear away brush and weeds that provide cover for the coyotes. Remove brush and junk piles that attract rabbits and other prey that might entice coyotes into the pasture.
6. Sheep or goats kept near cattle are less likely to be preyed on by coyotes.
7. Keep herds and flocks healthy. Coyotes often prey on smaller, weaker lambs and calves.
8. If possible, change to a fall lambing and calving season. This doesn't coincide with the period when coyotes are raising their pups (late spring through September), which is when they are most likely to prey on young livestock.
9. Concentrate the lambing and calving period (using synchronized or group breeding) to reduce the amount of time that young, vulnerable animals are present in the herd or flock.
10. Well-trained guard dogs (usually of these breeds: Great Pyrenees, Komondor, Anatolian Shepherd, Akbash) and donkeys and llamas help prevent predation on sheep. This technique works even better if you keep the livestock and guard animals within proper fences.
11. Add lights to corrals. Strobe lights may work best to discourage coyotes.
12. Propane exploders and sirens may give temporary relief.
13. The USDA's Denver Wildlife Research Center developed a device for protecting sheep in fenced pastures. The "Electronic Guard" combines a strobe light and siren. Or try the Critter Gitter®, described in the scare tactics section.
14. Parking a car or truck in a pasture may frighten away coyotes for a short time. If the coyotes are hunting during the day, put a dummy in the car.

15. Remove and properly dispose of livestock carcasses. Do not allow coyotes to develop a taste for livestock, live or dead! Carrion will attract coyotes to an area.
16. Contact your state wildlife agency staff or USDA APHIS-Wildlife Services for more information.

## Trapping strategies

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The International Association of Fish and Wildlife Agencies has published ***Best Management Practices for Trapping Coyotes in the Eastern United States***

1. It takes experience and skill to trap coyotes effectively. Don't wing it! Get help before you start. Coyotes easily become trap-shy, so a botched trapping attempt will leave the landowner with a worse problem. There are excellent courses, videos, and books that explain how to trap coyotes.
2. Good trap locations: Look for coyote tracks and scat! Favorite spots include high hills; near isolated land features or isolated bales of hay (which they may use as scent posts); trail and stream crossings; fences; roads through pastures; deer trails; dry or shallow creek beds; near the border of fields, or tree groves, or pond dams; and near brush piles.
3. Set traps to one side of the trail, not directly in the trail. Look for a place where coyotes would naturally stop, such as near a gate, on a hilltop, or where the cover changes.
4. Place traps in an open, flat area, upwind of the path, to carry the scent of the bait (or lure, or both) across the coyote's normal trail. Bury the traps.
5. In the fall and winter, a dirt-hole set may work best. Flat sets and urine post sets are generally more effective during the summer.

6. The trap should be clean and not smell of people. Minimize human scent around the trap, too. Wear clean gloves and rubber footwear.
7. Traps should be dyed and waxed, or cold-dipped in a commercial product.
8. Coyote urine is a good lure for year-round use.
9. Use baits and lures that have mild scents during the warmer months, because a strong-smelling bait or lure might prompt the coyote to roll on the trap. The trap might fire without capturing the coyote, who might become trap shy as a result.
10. Coyotes are powerful. Use strong, well-anchored, and well-balanced traps. But don't overpower your traps because that could cause injuries.
11. Options for anchoring traps: two stakes, inserted crosswise, and disposable earth anchors with aircraft cable. "In-line" shock springs on the anchors will help prevent the coyote from lunging and pulling out of the trap.
12. Many trap manufacturers and suppliers now offer versions of traps with the modifications suggested below or will modify their models upon request. Or you may choose to modify your own traps.
13. Nuisance coyotes should not be relocated, especially if the problem concerned a threat to human safety. They might cause a problem in the new location. Once caught, the coyote is extremely likely to be trap shy.

**Live traps that meet the BMP performance criteria:**

1. #1 1/2 padded coil-spring trap: four-coiled.
2. #1 3/4 coil-spring trap: standard model; one with offset, laminated jaws; or one with wider, offset jaws.

3. #2 coil-spring: standard model; or a 4-coiled model with offset, laminated jaws.
4. #3 coil-spring: padded coil-spring, 4 coils; or an offset double laminated coil-spring, 4-coils.

## Lethal techniques

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1. Hunting coyotes with a pack of trained dogs (usually larger breeds, such as greyhounds and some of the larger fox hounds). This is a more specialized and costly technique.
2. Shooting, with a shotgun or accurate rifle, depending on conditions. May use light at night. The shooter(s) will need effective cover (camouflage, blinds) and must stay as still and quiet as possible.
3. Two approaches: 1. If the coyote's keeping to a regular schedule, sit and wait. 2. Attract the coyote within shooting range using a predator call (howls or distress calls). Call when you're downwind of the coyote.
4. Howls, barks, and yips: you can try to mimic these sounds yourself, but they're harder to master than distress calls. There are recordings and commercial mouth-blown devices that will do the trick. Once you know what they mean, you may be able to use these sounds (perhaps in combination with a distress call) to locate the coyote or its den, or to draw a coyote into shooting range.
5. Distress calls (usually of prey, but some people use distress calls of competing predators or coyote pups): Most people use recordings or commercial mouth-blown devices. Coyotes respond because they hear an injured animal. They're coming in to eat it (coyotes are nearly always hungry).

## Preferred killing methods:

1. Shooting, using a shotgun with BB-sized shot or larger, or a .22-caliber rifle, or a center-fire rifle (target the head, if no rabies testing is required, or the heart/lungs)
2. Lethal injection of barbiturate, if possible

### **Acceptable killing methods:**

1. Stunning and CO<sub>2</sub> chamber (you can probably fit a coyote into a cooler-sized chamber. The animal must be restrained or unconscious.)
2. Stunning and shooting
3. Stunning and exsanguination (take care to reduce your exposure to body fluids)

### **Control strategies that don't work particularly well, or aren't legal in some states:**

1. Bells placed on sheep, and radios blaring in pastures, don't work.
2. Many repellents have been tested to keep coyotes from preying on sheep and cattle, but none have worked. Coyotes rely on visual cues when hunting. Taste and smell are not as important, so even when the repellent offended the coyotes, it didn't keep them from killing the animals—just from eating what they'd killed.
3. In some states, it's not legal to fumigate a coyote den with carbon monoxide bombs (also called "smoke bombs," "gas cartridges," and "smoke cartridges").
4. Cable restraints are not legal for coyotes in many states.

# Foxes

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**Species of interest:** Red fox (*Vulpes vulpes*) and Gray fox (*Urocyon cinereoargenteus*)



Red fox (*Vulpes vulpes*). Photo by (USFWS).



Gray foxes (*Urocyon cinereoargenteus*).

Photo by Brandon M. Jones.

**Size:** 10 to 15 pounds. Body is 20 to 25 inches long. Gray fox is smaller.

## Legal Status

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Foxes are listed as protected furbearers or game animals in most states. Most state wildlife agencies allow for the taking of foxes to

protect private property. Check state regulations before initiating control.

## Damage Prevention and Control Methods

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### Habitat Modification

- Remove potential food (e.g., pet food, bones, and scraps), ground cover, and shrubs
- Control rodents around structures
- Move trash indoors or secure trash cans

### Exclusion

- Cover window wells
- Wire-mesh fences around crawl spaces
- Secure poultry pens to prevent entry by foxes
- 3-wire electric fences for livestock and poultry

### Frightening Devices

- Flashing lights
- Dogs, llamas, alpacas, mules, and donkeys as livestock guards

### Shooting

- Shotgun (12- or 20-gauge)
- Small caliber rifle (center fire .17- to .243-caliber)
- Trained hunting dogs

### Trapping

- No. 1.5 coil or No. 2 long-spring foothold traps
- Cable-restraints (where legal)
- Cage traps, minimum 10 x 12 x 32 inches

### Other Control Methods

- Catch poles



## Signs of their presence

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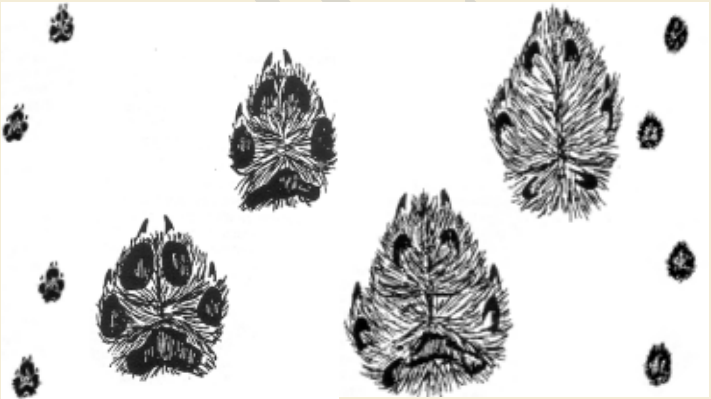


**Gray fox scat**



**Red fox scat**

1. Sounds: May scream, yap, growl, or bark.
2. Scats: Twisted, often contain hair or berries, deposited on rocks or logs.
3. Odor: Their scent markings have distinctive odors. Red fox urine smells skunky, while gray fox urine smells musky.



**Gray fox tracks (not to scale)**

**Red fox tracks**

## Diet

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Opportunist. Foxes eat mostly mice, voles, bird eggs, rabbits, insects, and native fruits such as blueberries, blackberries, chokecherries, and black cherries. They'll also eat poultry, lambs, piglets, carrion,

and cats. Both species will bury food for later use, especially around the den site, when they're raising their pups.

## Typical activity patterns

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**Social style:** Solitary except during breeding season, when mated pairs and their young live as a family unit.

**Daily activity:** Both day and night, but generally most active at dawn and dusk.

**Hibernator?** No.

**Migrates?** No.

## Where found

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**Distribution:** throughout, in rural and suburban areas and parks.

**Habitat:** The red fox prefers woodland edges along open fields, meadows, and lawns, while the gray fox tends more toward forested and brushy areas. Typical den sites: red foxes may dig their own den or use an abandoned woodchuck burrow. Gray foxes often den in wood or brush piles, rocky outcrops, or hollow trees. Foxes will often reuse these dens from year to year.

**Territory and home range:** Varies. Sometimes the red fox is aggressively territorial; other times it has overlapping home ranges. Perhaps this varies according to season, breeding cycle, habitat, or population density.

## Breeding habits

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- **Pair bonding style:** Polygamous and promiscuous. Among red foxes, males rarely help females raise the young, but male gray foxes may help raise the pups. Sometimes, females will raise their young alone, and sometimes one male and several females den together, with more than one female raising

young. Both species will cache food around the den for the pups.

- **Breeding dates:** December through March, peaking in late January. Gestation takes about 52 days.
- **Litter size:** Red fox: 4 to 9. Gray fox: 3 to 7. Most average 4 to 6 pups.
- **Birth period:** March through April. Most red fox pups are born in mid-March, with the gray foxes following a few weeks later.
- **Weaning dates:** 2 to 3 months.
- **Amount of time young remain with parents beyond weaning date:** Most disperse in the fall, between September and December.

## Common conflicts

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Time of year: any time of year.

## What are they doing?

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1. Their mere presence may frighten some people.
2. Getting into the chicken (or turkey, duck, or goose) coop or yard. May take piglets, lambs, and small pets.
3. In the spring, they may den underneath a porch or in a yard for a while, while they're raising their pups. Foxes generally use more than one den to raise their pups and may move them as many as 2 to 4 times, so this may be a short-term situation. They'll usually leave by the end of June at the latest. These dens aren't used during other seasons.
4. Foxes (and coyotes) will chew holes in irrigation pipes in fields and orchards.

5. Disease risks: Rabies, distemper. Red foxes, but not gray, get mange.

## De-bunking myths about foxes

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1. *Foxes can be big.* Foxes are much smaller than many people think. They're about the weight of a house cat (10 to 12 pounds).
2. *Foxes attack dogs or people.* They don't often attack dogs or people (unless the fox is rabid). These are relatively small predators which usually hunt mice.
3. *Pups that are alone during the day have been abandoned.* Not necessarily. Their parents are probably out hunting for food for them. (This is also true of coyotes.).
4. *A fox that's active during the day is rabid.* Not necessarily. Most likely, it's a healthy animal that's feeding more often than usual, because of the demands of its young.

## Management

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### **Do nothing:**

In some cases, the mere presence of a fox will be perceived as a nuisance. As mentioned above, foxes will sometimes den for a short time under a porch. They will leave on their own, usually by the end of June. Can you tolerate the situation? If you can't wait until July, then nonlethal controls, such as harassment to scare the foxes away from the den site, will likely work. Legally, a fox must cause damage to private property before it can be removed.

### **Scare them away.**

This is most likely to work when you have access to their den. It's easy to harass a red fox enough to convince them to move their pups (this also works with gray foxes and coyotes, although not as easily).

1. Make noise near their den site. Run motors, shout, and increase your activity in that area.
2. Use slingshots or a shotgun loaded with rubber buckshot to frighten a fox that's further away (45 feet). You don't have to hit it to scare it off, but if you can, that will more effectively train the fox to stay away (this refers to the use of the less lethal projectiles mentioned above).
3. Experiment with noisemakers, such as bangers and screamers. You may be able to use predator calls (such as the Coyote Howler™) to frighten foxes away from their dens.
4. One scare device, the Critter Gitter®, combines a siren and flashing lights. It's triggered by a motion detector. The device switches patterns, so it should be effective longer than a scare device that doesn't vary.

#### **Remove artificial food sources (garbage, compost, pet food).**

1. If anyone is feeding the foxes, persuade them to stop.
2. "Fox-proof" garbage cans or dumpsters with a tight-fitting lid. Secure garbage can with heavy-duty straps or bungee cords, or attach it to a post, or keep it out of reach in the garage (close garage doors at night) or place the can in a covered and locked bin.
3. Enclose compost piles in a framed box using hardware cloth or welded wire; in a sturdy container, such as a 55-gallon drum; or in a commercial composter.
4. Feed pets indoors. Any food left outdoors should be removed at night. Bring pet food dishes inside, too.
5. Remove and properly dispose of livestock carcasses.

## **Keep foxes out of yards, prevent them from denning under porches and decks, and protect vulnerable livestock:**

1. Close and tightly fasten the doors to poultry houses.
2. Bring livestock into sheds or paddocks when they're ready to have their young.
3. Well-trained guard dogs, usually Great Pyrenees or Akbash breeds, may prevent predation on sheep.
4. Fences will help a great deal, but foxes will try to climb over, burrow under, or squeeze through fences. So, build them right and keep fences well-maintained. You can fence the whole yard, or just the area underneath the deck, porch, or around the poultry house or other vulnerable spot.
5. Use a 2-inch net wire fence, hardware cloth, welded wire, or galvanized sheet metal. (You may wish to use smaller mesh because this will also prevent other animals, such as skunks and woodchucks, from gaining access). Create a "rat wall." Attach the hardware cloth to the bottom of the deck. Then bury the bottom of your "wall" 6 to 12 inches, with a foot-wide shelf that sticks out, to prevent animals from digging underneath the barrier (this will look like the letter "L").
6. Three-wire electric fences, with wires spaced at 6, 12, and 18 inches, can repel foxes.
7. Combination net wire and electric wire fence: If there's an existing net wire fence, add an electric strand that's placed 6 to 8 inches above ground and 8 to 10 inches outside the fence, using an offset bracket. If the foxes are climbing over the fence, add a top wire that's also outside the fence.
8. Invisible fences may be an attractive solution for keeping pets within an area, but they will not keep wildlife out. To protect pets from predators, switch to a traditional fence design.

## **If young are present, remove the entire family before blocking the entrance to their den:**

1. Do you see fur or feathers outside the den during the early summer? That shows the adult fox is bringing food to young pups.
2. Can you wait it out? They'll leave on their own once their pups are old enough (usually 12 to 14 weeks old).
3. Cage traps may be effective in capturing young foxes. Place the trap near the den's entrance.
4. A device called a "mechanical wire ferret" may help you chase the young out of the den. It's a long piece of steel wire that has a spring and wooden plug on one end, and a handle on the other. Twist the spring through the den to flush out the foxes so you can capture them directly, using a dip net, net bag, or cage trap as they leave the den. The mechanical wire ferret can become entangled in a young fox's fur, so use it carefully.
5. If young are separated from their parents, you can place the pup in a different litter. If that female is nursing, she'll probably adopt the pup.

## **Trapping strategies**

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### **Live capture:**

1. Trapping foxes requires great skill. The amateur is likely to simply educate the fox, thus making it difficult for even experienced trappers to succeed later.
2. For adult foxes, use foothold traps, #1 1/2 or #1 3/4 coil-spring. For pups, use a cage trap or #1 coil-spring. Offset, padded, or laminated jaws may reduce injuries.
3. You may be able to use a cage trap to capture a young red fox in an urban area, but don't expect to catch adult red foxes in cage traps. This may work to remove young from a den, too.

4. Set traps along trails or at entrances to fields.
5. In the fall and winter, a dirt-hole set may work best. Flat sets and urine post sets are generally more effective during the summer.
6. Traps should be dyed and waxed, or cold-dipped in a commercial product.

### Preferred killing methods:

1. CO<sub>2</sub> chamber (if caught in a cage trap, simply place the trap in the chamber. If caught directly, using a catchpole, for example, stun the fox, then transfer it into the chamber).
2. Shooting, using a shotgun with #6 shot or larger, or a .22-caliber rifle (target the head, if no rabies testing is needed, or the heart/lungs). Especially with gray foxes, may be able to successfully call the fox into the area with a predator call.
3. Lethal injection of barbiturate, if possible and with appropriate licenses.

### Acceptable killing methods:

1. Stunning and chest compression (remember, foxes are rabies vector species, so handle them carefully).

### Control strategies that don't work particularly well or aren't legal in some states.

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1. In some states, it's not legal to fumigate a fox den with carbon monoxide bombs (a.k.a. "smoke bombs," "gas cartridges," and "smoke cartridges").
2. Noisemakers, such as propane cannons, radios, and tape recordings, may convince the foxes to move a den, but these techniques aren't generally effective in preventing livestock depredation.



3. The same holds true for flashing lights such as strobe lights or beacons. They're most effective in an enclosure or small area, when used intermittently with other techniques.
4. Cable restraints are not legal for use on foxes in some states, including New York.

AMNCTP

# Gulls

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## Species of interest: Gulls



Herring gull. Photo by Ron Case.

**Ring-billed gull** (*Larus delawarensis*) is the most common of the four species described in this account. Likely to nest on flat roofs.

**Herring gull** (*Larus argentatus*) is common, especially around coastal areas.

**Laughing gull** (*Larus atricilla*) is less common but may cause some complaints and are most likely to be found near airports.

**Great black-backed gull** (*Larus marinus*) largest of the four species.

**Size:** Laughing gull is the smallest, at 16 to 17" high. Next is the ring-billed, then the herring, with the great black-backed gull standing 28 to 31" tall.

## Legal status

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Federally protected migratory birds under the Migratory Bird Treaty Act.

Federal and state permits are required to capture, handle, or kill gulls, or disturb their eggs or nests (if there are eggs or young in the nest). Most gull management is handled by USDA-APHIS-Wildlife Services or state wildlife agency staff.

A landowner may chase or disperse gulls at any time without a permit if the gulls are not physically harmed.

## Damage Prevention and Control Methods

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### Habitat Modification

- Remove standing water
- Prohibit feeding of gulls
- Allow plants to grow at least 18 inches tall
- Secure dump and trash sites
- Remove or reduce nesting and loafing sites
- Control insects

### Exclusion

- Porcupine wires or electric ledge products
- Plastic or wire mesh
- Suspend parallel wire or monofilament strands over areas needing protection

### Frightening

- Auditory, and visual frightening devices
- Daddy-long-legs devices on structures

### Shooting

- Rifle
- Shotgun with non-toxic steel shot

### Other Control Methods

- Remove nests, eggs, and young
- Egg oiling or puncturing

## Signs of their presence

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- The bird itself is the most obvious sign.
- Feathers and droppings.
- Sounds: Varied, depending on species. May hear the kleew kleew, hiyak, kyow, the ha ha ha of the laughing gull, a plaintive mewing, and a stacatto gah gah alarm call.
- Nest: Size is proportional to the size of the bird. They'll nest in low trees and on flat roofs, especially those covered with gravel or rocks. The nests are often a mere scrape in sand or gravel, but they will add natural materials and bits of trash. Herring gulls make the most elaborate nests of the four, using sticks, other plants, and debris. Ring-billed gulls also use debris, but they favor lighter plant materials, such as dried grasses and weeds.

## Diet

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Opportunist. Gulls eat fish; shellfish; bird eggs and nestlings (they prey mostly on colonial waterbirds); insects; worms; grubs; mice; carrion; and garbage. They will steal food out of a person's hand.

## Typical activity patterns

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**Social style:** Gregarious. Most are colonial nesters.

**Daily activity:** Diurnal.

**Hibernator?** No.

**Migrates?** In the spring, they'll migrate north as the ice breaks open on lakes and rivers. In late spring, they'll seek a more secluded area, such as an island, for breeding. In late summer, they'll gather along the coast and then migrate south with the onset of cold weather. Some gulls remain all year, spending the winter near the open water of oceans or estuaries, the Great Lakes, and the Niagara River. Most gulls no longer migrate far because people provide abundant, year-round food sources.

## Where found

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**Distribution in the Northeast:** Widespread, from coastal to inland areas.

**Habitat:** Lakes, rivers, beaches, estuaries, mudflats, islands, harbors, ponds. Gulls adapt well to rural, suburban, and urban environments and will use agricultural fields, fish hatcheries, airports, landfills, reservoirs, parking lots, flat roofs, parks, malls, and athletic fields. In the winter, gulls seek open water, moving to the ocean, estuaries, and the Great Lakes. The Niagara River is a major wintering area for gulls.

**Territory and home range:** Highly territorial on their breeding ground, defending their nest sites, which they'll likely return to the next year. Prime territories are in the center of the colony.

## Breeding habits

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- **Pair bonding style:** Monogamous. Both parents care for the young.
- **Breeding dates:** April to May.
- **Egg-laying dates:** May to June. Most have one brood/yr.
- **Clutch size:** 3 to 5 eggs.
- **Eggs hatch:** 21 to 28 days after they're laid.
- **Fledging dates:** 4 to 5 weeks.
- **Amount of time young remain with parents beyond fledging date:** Remain with colony.

## Common conflicts

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**Time of year:** Any time of year.

## What are they doing?

- Steal fish from boats and hatcheries.

- They are involved with more aircraft collisions than any other group of birds, because they're plentiful, widespread, gather in large flocks, and are large birds.
- Eat livestock feed and fruits (such as cherries).
- Gather in large numbers in parking lots, near restaurants, marinas, food-processing plants, and parks. Their droppings foul objects and buildings. They can be raucous.
- If they gather in large numbers, their droppings can contaminate public water supplies.
- Mob people, trying to steal food from them.
- They may eat the eggs and nestlings of endangered waterbirds, such as the piping plover.
- They sometimes cause a nuisance when they nest on rooftops.
- Disease risks: cryptosporidiosis, *E. coli* bacteria

## Best practices

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Often, community cooperation is critical for effective solutions to nuisance problems caused by gulls. If you're confronted with a large colony nesting on a rooftop or at a landfill or airport, work with government wildlife biologists, because they have the option of using additional techniques that require federal permits. In some cases, these techniques are far more effective, or are an important part of the strategy. If this is a new problem, you may be able to deal with it successfully using only the techniques that don't require permits.

## **Remove artificial food sources (garbage, livestock feed, fish from hatcheries and boats):**

- It's not easy to control their food sources because gulls are highly adaptable. Focus on the areas that provide their most favored foods and restrict the gulls' access as much as you can.
- If anyone is feeding the gulls, persuade them to stop.
- Clean up any garbage piles. Keep garbage cans and dumpsters closed securely, and the areas around the containers clean.
- Gulls also feed at fish docks, sewer outflows, food-processing plants, trawlers, and feedlots. Keep those areas clean and try to frighten the birds away.
- Use a grid-wire network of highly visible stainless-steel wire (28 gauge) or 80-lb. nylon monofilament line to protect large outdoor areas, such as fish hatcheries, garbage dumps, landfills, reservoirs, livestock feedlots, and fields. String the lines parallel to each other, about 15 feet apart and about 8 feet off the ground (a 15x15' grid also works well). This technique is highly successful with gulls.

## **Make roosting and loafing sites less appealing:**

- Turn off fountains to encourage earlier freeze-up of ponds.
- Let the grass grow to a height of 8" or more to discourage gulls from resting in parks, playing fields, airports, and around ponds. This may work for ring-billed and laughing gulls but not herring gulls.
- Filling or draining ponds, such as those near malls and office parks, may discourage gulls. With natural wetlands, this would require additional permits.

- To keep them off ledges:
  - fasten wood, stone, sheet metal, styrofoam, or plexiglass "plates" to the ledge at a 45° angle so they can't comfortably perch there.
  - Install one of the sharply pointed, steel exclusion devices, such as porcupine wire (prongs point out in many angles), ECOPIC™ (vertical rods), Bird Coil® (a steel coil that looks like a slinky), or nets.
  - Stretch steel wire (28-gauge) or monofilament line (80-pound) in parallel lines across the area. The lines must be very tight, so fasten the wires to L-brackets with turn buckles to remove slack. Attach the brackets to the wall using cable clamps or aircraft hose clamps, which can handle the high torque load on the wires. Commercial versions are available, too, and may be easier to use. Steel wire is more permanent and requires less maintenance than monofilament line.
- To keep them off rooftops or away from parking lots and other flat areas: Install a 15x15-foot grid-wire network (described earlier) or nets.

### **Frighten them away:**

- Visual scare devices, such as heli-kites (a kite with an attached balloon) or a laser (the Avian Dissauder®) may frighten the birds away from the site.
- Try noisemakers such as tape-recorded gull distress and alarm calls, shell crackers, and propane cannons. They're most effective when the birds are airborne.
- Hazing, with trained birds of prey (usually falcons) or radio-controlled aircraft that look like falcons may also work. This technique is often used at airports.



- **Control their reproduction by removing their nests or disturbing their eggs so they don't hatch:**
- These methods will require state and federal permits. Many factors influence this control strategy, including the size of the colony, how long the birds have nested at that site, and whether the goal is to chase them away or to stop them from breeding. Let's say the wildlife biologists will be removing eggs as part of their gull management. If the gulls have just chosen a new site, the wildlife biologists may remove eggs as soon as they're laid because the gulls may just fly off and seek a better breeding site. But if it's a large colony that's well-established, the gulls will not easily abandon the site. In this case, the biologists may focus on trying to break their breeding cycle. They may wait until the birds have been incubating for a week or two before they remove the eggs, because then the gulls will be less likely to lay more eggs. The biologists may repeat the egg removal after another two weeks.
- **Egg disturbance techniques** (oiling, puncturing, or removing eggs, or substituting dummy eggs) are most effective when the colony is small. With larger populations, some of these techniques, such as puncturing, and substituting dummy eggs, are probably impractical because they're labor-intensive and time-consuming. Also, you'd need to tamper with nearly every egg to ensure success, and that grows more challenging with larger flocks.
- One disadvantage of these techniques is that if they may take several years to work—if they work at all. New birds might join the flock, increasing the numbers you're trying to reduce. Birds that fail to hatch eggs successfully might move to a new breeding area and cause a nuisance there, so this approach might not be neighborly. Some biologists believe that gulls that have taken to nesting on roof tops will continue to seek roof

tops, for example. In such cases, they recommend removing the adult birds.

- Of all these egg disturbance techniques, the only ones that are practical in most situations involving gulls are removing the eggs outright or oiling them. Generally, the colony is just too large for the other techniques.
- **Oiling eggs:** Coating eggs with corn oil prevents gases from passing through the shell so the embryo suffocates. The eggs are either sprayed with oil or dipped into a container of oil, then put back into the nest so the parents will continue incubating them. If the eggs are removed, the gulls usually seek a more secure area in which to lay another clutch. In an established colony, if used by itself, this technique may not eliminate the problem.
- **Removal of eggs:** If it's at least 1 to 2 weeks into the incubation, the eggs can probably be removed without prompting the female to renest. She may be less biologically able to lay eggs, but don't count on it. Return in two weeks to remove any new eggs. Once the gulls are off the nest, try to move them. If there are no chicks, you can harass them with such techniques as hazing. If there are chicks, you cannot harass them without federal and state permits. Then install a barrier, such as a net, to keep the gulls from landing in the area. If you can't install an exclusion device you may need to repeatedly remove the eggs, but in time, this treatment may convince the gulls to abandon the site.
- **Nest removal:** If there are no eggs or young in the nest you would not need a federal permit if you do not accidentally take birds. The gulls will often attempt to find a more secure nesting area and start again, so expect to repeat this treatment every two weeks. Eventually, this may convince the colony to abandon the site.

## Trapping strategies

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Permits would be required, from both the U.S. Fish and Wildlife Service and state wildlife agency. You need specialized equipment, and it tends to take a lot of time and effort. Gulls are likely to return to the site, too. The nonlethal methods described in this account are a much more practical approach to dealing with the problem, especially in urban areas.

## Preferred killing methods

- Requires a federal depredation permit from the U.S. Fish & Wildlife Service and a state wildlife agency permit.
- CO<sub>2</sub> chamber
- Shooting, using a shotgun (non-toxic steel shot)

## Acceptable killing methods

- Stunning and cervical dislocation
- Stunning and decapitation

## Control strategies that don't work well, or aren't legal

- Ultrasonics don't work. Birds can't hear them.

# House Mice

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House mouse (*Mus musculus*). Photo by NIHS

## Species of interest

- **House mouse** (*Mus musculus*) is an exotic and invasive species.
- **Deer mouse** (*Peromyscus maniculatus*) is a native and sometimes troubling species
- **White-footed mouse** (*Peromyscus leucopus*) is a native and sometimes troubling species

**Size:** Under one ounce. Body is 2 to 3 1/2 inches long, excluding the 3- to 4-inch-long tail. The best way to tell these mice apart is to capture them. The house mouse has grayish brown fur and a nearly naked tail. Both wild mice are two-toned, with reddish-brown backs and white bellies. They have furry tails that are also two-toned.

## Legal Status

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House mice are not protected by laws and are considered pests. They can be controlled using pesticides that are registered for the control of mice, or they may be trapped.

## Damage Prevention and Control Methods

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### Habitat Modification

- Practice proper sanitation - reduce sources of food, water, and shelter
- Store food in rodent-proof structures or containers, and properly store and dispose of refuse and garbage
- Control weeds and remove debris from around the foundation of structures

### Exclusion

- Rodent-proof construction - seal all openings larger than ¼ inch wide
- Cover openings with ¼-inch wire mesh or fill with stainless-steel or copper wool

### Frightening

- Ultrasonic devices are not effective

### Repellents

- None are effective

### Toxicants

- Commercial rodenticides

### Shooting

- Shooting is not practical

### Trapping

- Snap-back traps
- Cage and box traps (Sherman-type, Ketch-All®, Tin Cat®)
- Glue boards can work but are not recommended

### Signs of their presence

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1. Sounds: Squeaking, scuttling, or gnawing inside the walls, ceilings, or between floors of buildings.

2. Scat: 1/8 to 1/4 inches long, slender. Found in kitchen cabinets, drawers, and corners, on counters, under sinks, and near food. Urine stains on the woodwork can be seen with an ultraviolet light. If you notice a musty odor, the urine was from a house mouse.
3. Trails: Mice use the same routes over and over. Eventually, a faint, dark "trail" of body oil and dirt may be noticeable on baseboards. Look as well for smooth, worn paths in insulation. Their burrow holes, often seen in baseboards, corners, walls, and foundations, are usually about an inch in diameter. They can fit through a dime-sized hole.
4. Nests: A loosely woven ball of shredded fibers, such as clothing or paper, about 5 inches in diameter. Deer and white-footed mice line their nests with fur, feathers, cloth, and other fine materials. You will often see droppings, seeds, and pet food near the nest. If possible, mice will choose to nest near food.
5. Damage to household goods and buildings: tooth marks on packaged goods, electric cables, baseboards, door and window casings, and cabinets. Piles of wood chips or shavings. Their teeth grow constantly, so they gnaw to keep them trimmed.

## Diet

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Mice are primarily herbivorous although during the summer, they may eat mostly insects. The house mouse will sample everything in your larder, including your lard—and perfumed bar soap, too. They prefer seeds, grains, and grain products, like bread but are happy with cheese, peanut butter, bird seed, potatoes, and pet food. They'll eat chocolate, bacon, and other foods high in sugar, protein, or fat. Deer and white-footed mice are mostly seed-eaters. If they get in your walls, they're more likely to bring in acorns, the scales of pine and spruce cones, and beech nuts to stash between the studs.

## Typical activity patterns

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**Social style:** House mice are generally solitary, except a female with young. Mated pairs of deer and white-footed mice usually stay together during the breeding season.

**Daily activity:** Nocturnal, with peaks at dawn and dusk. Daytime activity is seen.

**Hibernator?** No, but mice living outdoors may den up for a few days in very cold weather.

**Migrates?** No.

## Where found

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**Distribution in the Northeast:** Everywhere.

**Habitat:** The house mouse prefers a house, cabin, garage, barn, attic, shed, office, warehouse, or similar locale. Deer and white-footed mice prefer forested or brushy areas. White-footed mice spend a lot of time in trees and will take over abandoned bird or squirrel nests. Other preferred nest sites include small pre-existing burrows, brush piles, knotholes of trees, under rocks or logs, and in bird boxes and attics.

**Territory and home range:** House mice tend to stay close to their food, ranging up to 10 to 30 feet in diameter. In contrast, the wild mice tend to forage outside, ranging from 1/3 to 4 acres, but will nest indoors, when such shelter is available. Deer and white-footed mice are probably territorial around their nests, and avoid contact with each other within their home ranges, although they nest together in family groups during the winter. They may establish a dominance hierarchy. Males' home ranges may overlap; females' apparently don't. Females in mixed habitats tend to have smaller but better-quality home ranges, and those females can be larger than males.

## Breeding habits

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- **Pair bonding style:** Mice are polygamous. Female raises the young alone.
- **Breeding dates:** Indoor residents may breed year-round, but wild mice tend to breed in the spring and fall. They may have 4 to 10 litters per year. Gestation takes about 23 days. Females may breed again within a day or two of giving birth. Mice are sexually mature at 6 to 10 weeks old.
- **Litter size:** 3 to 5. May see as few as 2 or as many as 8. A female house mouse can produce over 40 young in a year.
- **Weaning dates:** Between 2 to 4 weeks of age.
- **Amount of time young remain with parents beyond weaning date:** not long!

## Common conflicts

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**Time of year:** Any time of year.

### What are they doing?

1. Mice can damage buildings and household goods as they seek food and nest sites. They'll gnaw through or foul woodwork, aluminum siding, sheetrock, insulation, plastic food containers (including garbage cans), papers, packaged goods, clothing, mattresses, furniture, even lead or copper pipes. Indoors, they nest in walls, kitchen cabinets, attics, basements, garages, sheds, barns, under appliances. Outdoors, they'll nest in thick vegetation, wood or rock piles, and junk.
2. Their nests might block a vent, causing a fire hazard.
3. They also chew on wires, which in addition to creating a fire hazard, could also short-circuit electrical systems, causing failures of alarm systems or refrigeration.



4. Mice eat many human foods but prefer seeds and cereal grains. In barns and outbuildings, they get into stored grains, corn, feeds, and seeds. They'll raid bird feeders and pet dishes. They damage much more than they eat because they tend to nibble and discard foods.
5. Scurry about at night. The noise may drive you and your pets to distraction.
6. May dig up recently planted seeds in home gardens, agricultural fields, and areas that were supposed to be reforested.
7. Contaminate stored foods, especially grains. They ruin a good chunk of the world's food supply.
8. Foul items stored in warehouses, museums, libraries, and other sites.
9. Disease risks—among the possibilities are:
  - all three species:** Lyme disease, salmonellosis (food poisoning), leptospirosis (Weil's disease), typhus, rat bite fever, ringworm, tapeworms
  - deer and white-footed mice:** hantavirus pulmonary syndrome
  - house mouse:** lymphocytic choriomeningitis (LCM) virus, rickettsial pox

## Management

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The best way to deal with a mouse infestation is to clean up, get rid of the mice, and keep them from finding a way back in. Keep three words in mind: sanitation; eviction; and exile.

**Safety tips (for contact with mice, their droppings, urine, or nest materials).**

1. Wear rubber gloves and a proper respirator.

2. Ventilate the area, if possible.
3. Don't stir up dust by vacuuming or sweeping. The dust could contain hantaviruses, LCM virus, or other airborne disease organisms.
4. Instead, thoroughly wet the materials with a 10% bleach solution (1 part bleach in 9 parts water) or household disinfectant. Wipe up with a damp sponge.
5. Spray dead mice and their nests with disinfectant, then double-bag for disposal.
6. Disinfect toys, silverware, or other items that may have been fouled. Throw away any contaminated foods, drinks, napkins, paper plates, or cups.
7. For more information, refer to chapter four and the resource list.

**Remove artificial food sources (garbage, compost, bird seed, pet food).**

1. Store food, birdseed, pet food, garbage, compost, and recyclables in metal, glass, ceramic, or heavy-duty plastic containers.
2. Promptly clean up spills and crumbs.
3. Feed pets at scheduled times, and then put unfinished food in the refrigerator. (Relax, with a proper trapping and exclusion program, you won't have to do this too long).
4. Keep the area around bird feeders clean, especially of spills underneath the feeder.
5. Clean garbage cans, dumpsters, and garbage chutes regularly. Screen dumpster drainage holes with hardware cloth.

6. Elevate compost heaps or enclose with 1/4-inch hardware cloth or welded wire mesh.

### **Remove their nesting sites.**

1. Keep stored items off the floor and away from walls. In a warehouse, paint a 12-inch white band on the floor all the way around the room to make inspections easier, and to remind people to keep items away from the walls.
2. Reduce clutter and remove cardboard boxes.
3. Move firewood, debris piles, and garbage cans away from the house foundation.
4. Maintain a foot-wide gravel border around the foundation that's free of vegetation (best) or keep the foundation plantings well-trimmed. Don't stack anything (such as firewood) against the foundation.

### **Prevent entry into building.**

1. Close the door! (Use screen doors.)
2. Install door sweeps and weather-stripping (garages, too).
3. Repair holes in walls and screens. Poke steel wool, wire mesh, or flexible aluminum "gutter guard" into holes then caulk, or spray expanding foam (such as Great Stuff®) over it to strengthen the barrier.
4. Plug gaps around water, gas, and heating pipes, heat registers, air ducts, electrical chases, and false ceilings with latex caulk.
5. For large holes around pipes, use galvanized metal pipe chase covers, sheet metal plates, mortar, plaster of Paris, or cement.
6. Seal openings beneath and behind sinks, stoves, and dishwashers with latex caulk.

7. Check vents (sewer, stove, clothes dryers, roof, ridgeline, soffit, furnace ducts, attic fans). If it's damaged or dicey, replace the vent with an animal-proof design, or screen it with 1/4-inch hardware cloth. End caps on ridge vents may loosen, providing access to the attic. Soffit vents are best protected with metal louvers.
8. White-footed and deer mice are excellent climbers. They will often enter buildings through holes in the roof, even on two- or three-story buildings. Inspect thoroughly.

### **Protect valuable trees and shrubs.**

1. Commercial tree wrap or hardware cloth will protect young trees.
2. Plant seedlings instead of seed.

### **Trapping strategies**

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The house mouse is an exotic species, so please do not release any into the wild. Deer and white-footed mice can be live-trapped and released. If their entry points have been sealed, they shouldn't be able to get back inside the building.

1. To increase your success, trap intensively for several days. More is better.
2. Place the traps in their runways, in corners, near food sources, nests, or holes—wherever the mice are most active. You may be able to lift some ceiling tiles to place traps in a dropped ceiling. Set traps at night when mice are most active and check them in the morning.

### **Live traps**

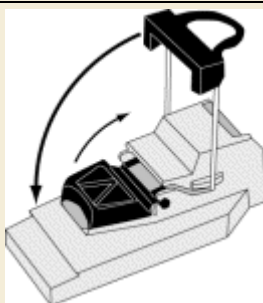
1. Various models of small cage and box traps, such as Sherman traps.

2. Multiple-capture traps, that shunt them into a holding compartment.
3. Set live traps parallel to the wall.

## Lethal traps

1. The familiar mouse trap is a type of body-gripping trap called a "snap-back trap." There are many designs.
2. The Quick Kill Mouse Trap made by Victor has a lid over the bait cup. Only animals that are motivated to seek the bait will lift that lid—and that's what fires the trap (the "lid" is actually the trigger). This means that an animal can accidentally step on the lid without setting off the trap. There's another advantage to this design. The bait cup is located to position the mouse in the perfect strike position. So, this trap is both more selective and more effective than the traditional mouse trap. It also has a safety catch and will not fire if it's picked up.
3. Other snap-back traps have expanded "triggers" (properly, it would be called the "pan") or a clothespin design (shown). These features make the traps easier to set than traditional mouse traps.
4. Place traps right against the wall, every 5 to 6 feet.
5. Set snap traps in pairs. This is much more effective. Two sets work well:
  - Side-by-side, perpendicular to the wall, with the trigger snapping towards the wall.
  - Parallel to the wall, with the triggers snapping to the outside (not into the center).
6. Traps may be attached to rafters with nails, or to pipes with wire or "Velcro" strips.

7. Bait with peanut butter, bacon, dried fruit, nutmeat, chocolate candy. Or tie a cotton ball to the trigger (it is enticing nesting material).
8. To protect young children, place lethal traps inside a cage trap with 1-inch mesh, or a coffee can with both ends cut out, or in PVC pipe. (Make sure the trap will still fire.)



**Quick Kill Mouse Trap**



**Snap-back traps  
with "pan" design**

9. In severe situations, glue boards may be needed as an additional tool to knock down mouse populations quickly. In general, snap-back traps are preferred; they are often as effective and are more humane. If using glue boards, set them in protected areas, such as within a dropped ceiling. Check them frequently (at least every 12 hours) and kill any captured mice by stunning them. Do not leave dead mice to rot on the glue boards because the carcasses will stink and likely attract other pests.
10. Wildlife rehabilitators may appreciate donations of mice, which are used to feed some snakes, birds of prey, and other animals. If you're going to do this, don't spray the mice with disinfectant and be sure that no poisons (rodenticides, poisonous tracking powder) have been used in the building during previous control efforts. You can double-bag the mice and freeze them.

## Other lethal techniques

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1. Poisons (in various forms, such as baits, fumigants, and tracking powder) can be effective and may be warranted in some situations. Rodenticides can be hazardous to children, pets, and animals that eat poisoned mice. The mice may die in walls and stink, while providing a fine breeding place for flies. Trapping is often a better solution.

## Preferred killing methods

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1. Lethal trap
2. Cervical dislocation
3. Stunning, and if necessary, chest compression
4. Carbon dioxide chamber (use a small chamber)

## Acceptable killing methods

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1. Pesticides

## Control strategies that don't work well or aren't legal in some states.

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1. Ultrasonics don't work against mice. Loud or unusual noises will briefly frighten them and may drive them off for a short time.
2. Electromagnetic devices don't work, either.
3. Cats may kill some mice, but a single female house mouse can bear up to 40 young in a year. The mice also travel in places that a cat can't reach, so don't expect to solve a problem.

# Moles

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Eastern mole (*Scalopus aquaticus*). Note the large, powerful front feet.  
Photo by AAAC Wildlife Removal.



Star-nosed mole (*Condylura cristata*).

## Species of interest:

- **Eastern mole** (*Scalopus aquaticus*)
- **Hairy-tailed mole** (*Parascalops breweri*)
- **Star-nosed mole** (*Condylura cristata*)



**Size:** Depending on the species, 1 to 5 ounces. The hairy-tailed and star-nosed moles are about 5 to 5 1/2 inches long, including the short tail, while the eastern mole is about 3 1/4 to 8 3/4 inches long. The snout of a star-nosed mole is ringed with 22 small, pink, fleshy projections that make it look like it has a sea anemone on the tip of its nose.

## Legal Status

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Moles are unprotected in most states.

## Damage Prevention and Control Methods

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### Habitat Modification

- Pack the soil to destroy burrows
- Reduce soil moisture and food

### Exclusion

- Generally not practical. In small, high-value areas, barriers of sheet metal, brick, or wood might restrict moles

### Frightening

- Not effective

### Repellents

- Generally not effective

### Toxicants

- Warfarin gel bait (Kaput®)
- Bromethalin worm bait (Talpirid®)

### Shooting

- Not practical

### Trapping

- Several specific mole traps are available

## Signs of their presence

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1. Tunnels, or "runs," in the soil or lawn. Runs of star-nosed moles are usually deeper and less noticeable than those of hairy-tailed moles, except, at times, in well-watered golf courses. These tunnels are seen most often in the spring and fall, when the soil is moist, soft, and easy to dig. Moles make two kinds: feeder and travel tunnels. Feeder runs look like a long, squiggly, rounded ridge that's about two inches wide. Feeder tunnels tend to be short and very crooked, because if a mole finds an area that's full of food, it tends to dig all around, feeding. They'll abandon these runs when there's not much food left in them. Dead grass over the run is usually a sign of an old, abandoned run. (Moles don't eat grass, but they may loosen the roots from the soil, which can kill it). Their travel tunnels are usually long and straight and often follow an edge, such as a driveway, fence, or foundation. Look for travel tunnels that continue into wooded areas because these will be the best spots in which to set traps.
2. Molehills (also called boils or mounds): small, cone-shaped piles of soil that are usually just a few inches high and anywhere from a few inches to a foot wide. They vary in size. Often seen in the late fall, as the moles prepare for winter by digging deeper tunnels that are under the frost line. At that depth, the moles can't toss up the soil as they go, which is what they do when they're near the surface. So, they'll usually dig forward for a while, then stop, and carry the soil up to the surface where they dump it, creating the molehill. Moles also dig deep tunnels in the summer when the soil is dry. Then, they're following the earthworms, one of their favorite foods.
3. It's unlikely you'll see or hear moles or find scat or tracks because they spend their time underground. Although they feed and travel in the shallow, surface tunnels described

above, they find shelter and raise their young in deeper tunnels that could be 6 to 24 inches below ground.

4. Moles are often accused of crop damage that was actually caused by voles. Although moles rarely eat roots, their tunnels may damage them. So how do you tell a mole from a vole?

MOLES have:	Voles have:
very small eyes	small eyes
no external ears	small, but noticeable ears
a naked, pointy snout	furry noses
large front feet that are turned sideways, and big claws. (Excellent shovels).	small, mouse-like feet

### Diet

Mostly insects. Grubs, beetle larvae, earthworms, and some carrion. Occasionally, frogs and mice. Star-nosed moles may catch minnows. They must eat 70 to 100 percent of their body weight each day to have enough energy to burrow. Occasionally, they'll eat seeds, roots, or bulbs.

### Typical activity patterns

**Social style:** Hairy-tailed moles are solitary, except briefly while mating. Star-nosed moles are thought to live in colonies.

**Daily activity:** Moles are most likely active throughout the day and night. They need to eat a lot to keep up their energy levels.

**Hibernator?** No. They simply move deeper into the soil, tunneling below the frost line.

**Migrates?** No.

## Where found

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**Distribution in the Northeast:** The hairy-tailed and star-nosed moles are found throughout the region.

**Habitat:** Lawns, meadows, orchards, and woods with moist, loose soil. Hairy-tailed moles prefer loamy, sandy soils well covered with plants and avoid wet, dry, or heavy clay soils. Star-nosed moles prefer swamps, bogs, and low, wet meadows (they've even been seen swimming under ice in the winter) but can manage in somewhat drier locales.

**Territory and home range:** Territorial. Two moles usually fight when they meet, except during the mating season. The home ranges of male and female moles overlap, but the home ranges of the females do not seem to overlap with those of other females. Some tunnels overlap territories and are used like highways by two or more moles. The males range over about 2 acres, females over a half-acre.

## Breeding habits

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- **Pair bonding style:** Polygamous. Female raises the young alone in an underground nest chamber lined with leaves and grasses. The nest chamber is usually found in a deeper tunnel, perhaps as far as two feet underground.
- **Breeding dates:** Late February to March. Gestation takes about 42 days.
- **Birthing period:** April to May.
- **Litter size:** 3 to 7.

- **Weaning dates:** Between 4 to 5 weeks of age.

## Common conflicts

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**Time of year:** Spring (April to May) and fall (September to November), when surface soil is moist and easy to dig, and grubs and worms are nearest the surface. You may receive a few calls as soon as the snow melts, which reveals old damage, but should wait to see if there are still moles present.

## What are they doing?

1. While helping rid lawns, gardens, and golf courses of grubs, moles create unsightly runs. Their tunnels disfigure lawns and can wreak havoc in a garden.
2. Disease risks: almost none.

## De-bunking myths about moles

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1. Moles are often mistaken for voles, mice, and shrews. If in doubt, check your field guides.
2. Many people believe that there's a mole in every tunnel they see. The good news is that even though you may see dozens of tunnels, there are probably only a few moles in the yard. Possibly only one or two. Really! Moles dig fast: about 18 feet per hour. They may be able to tunnel 100 feet a day or more, depending on soil conditions. You may think your lawn is full of moles, when it's just the home of a few, very busy little guys.

## Management

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First, decide whether this is really a problem or not. Moles eat a huge number of grubs that damage lawns and gardens. Is the sight of the tunnels tolerable? If not, trapping is currently considered most effective, but exclusion and habitat modification techniques may also contribute to an effective strategy.

## **Protect vulnerable plants and lawns:**

1. Small areas can be fenced with hardware cloth or sheet metal. The fence should be two feet high, buried a foot deep, with the bottom edge bent outward into an "L"-shaped shelf that sticks out a foot. This should form a 90° angle. This keeps the moles from burrowing under the fence.
2. Bulbs can be dipped in a repellent (20% thiram) before planting. This may protect them for a few weeks, or until the first heavy rain.

## **Make the area less attractive for moles:**

Moles prefer wet, low areas that are rich in grubs. Moles follow their food sources, so if there are fewer grubs, the moles may move on—just remember that moles eat worms and other foods, too.

1. Don't over water your lawns.
2. Improve soil drainage and try to eliminate low spots.

## **Trapping strategies**

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### **Lethal traps:**

1. There are several effective lethal traps for moles, including harpoon-shaped or scissor-jawed traps. A newer model, the NoMOL® trap, doesn't contain a spear or heavy springs so you may find it easier to use.
2. Trap in the spring or fall, when the soil is moist, and the moles are closer to the surface.
3. If the lawn is so dug up that you can't tell the feeder tunnels from the travel tunnels, roll it flat (if it's small, walk it flat). Flag the area so you can find it easily, then watch for a few days. If the flattened area is raised again, you're looking at an active run.

4. Watering a dry lawn will entice worms and moles closer to the surface, where the moles will be easier to catch.
5. Set multiple traps. If you can't choose between locations, set traps in both.
6. Set locations: Best: an active travel tunnel that extends into a wooded area. Good: any active travel tunnel, or a molehill. Questionable: feeding tunnels. The moles may not return to them.
7. Place two traps in each tunnel, one in each direction.
8. Homeowners can help you by checking lawns daily for new damage.
9. Check traps frequently. If the mole is still alive, remove the stake carefully and grasp the wire to pull out the trap. Use a spare NoMol® trap to kill the mole. Slide the trap's arms so that the jaws are just behind the mole's front feet, then release the tongs.

### Preferred killing methods

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1. A lethal trap.

### Acceptable killing methods

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1. Pesticides (gel bait and grain-based baits), but these are often not effective.

### Control strategies that don't work well

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1. Chewing gum, mothballs, thumpers, ultrasonics, windmills, and flooding the tunnels—none have proven effective.
2. Grub treatments (insecticides) may get rid of the grubs in your lawn, but there will still be plenty of worms for the moles to

eat. And the insecticides may not work well in heavy, clay soils, anyway. It's just not a good strategy for discouraging moles.

3. Grain-based baits (containing zinc phosphide) don't work that well because moles don't normally eat grain. If they aren't attracted to the bait, they're not likely to ingest the poison.
4. Borders of marigolds are thought to repel moles but haven't been tested.
5. Castor-oil based repellents haven't been well-studied yet, so their effectiveness is unknown.



# Muskrats

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**Species of interest: Muskrat** (*Ondatra zibethicus*)



Muskrat (*Ondatra zibethicus*). Photo by R. Town.

**Size:** About 18 to 26" long, including the 10–12" long tail. Weigh 11/2–4 lbs.; most average about 2 1/2 pounds. They look like a large rat with a long, narrow tail (the tail is flattened vertically).

## Legal Status

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Muskrats are furbearers, so state fish and wildlife agencies have regulations regarding the taking of muskrats. Check state regulations before attempting to remove muskrats.

## Damage Prevention and Control Methods

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### Habitat Modification

- Eliminate aquatic vegetation
- Plant crops >200 yards from water
- Draw down ponds in winter
- Rip-rap on shorelines
- Over-build dams

## Exclusion

- Fences

## Frightening

- Not effective

## Repellents

- None registered

## Toxicants

- Zinc phosphide (in some states)

## Shooting

- Shotguns and small-caliber rifles to eliminate individuals

## Trapping

- Conibear-style traps (Nos. 55, 110, 120, 160)
- Foothold traps (Nos. 1, 11, or 1.5); stop-loss and double-jaw varieties preferred
- Cage traps (7 x 7 x 24 inches or larger)
- Colony traps

## Signs of their presence

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**Tracks:** Hind print about twice as long as front, may overlap front track. May see foot drag and tail drag.

**Scat:** Oval pellets, often seen in clusters on rocks, logs, or any object that sticks out above the water line. Usually, the 1/2" long pellets are stuck together, but may flatten with age.

**Dens** (also called "bank burrows"). Muskrats may burrow into the banks of streams or ponds. The entrance, usually 5 to 6 inches in diameter, is often found about 6 inches below the water's surface; this tunnel, which connects to the den, could be up to 45 feet long. Muskrat dens are found above the high-water line (this may still be 4 to 5 feet below ground level). The den is usually only a bit bigger

than the tunnel that leads to it, often 6 to 8 inches wide. A small air shaft at the top connects it to the surface; it's often "screened" with loose twigs or plants. Dens generally have several underwater entrances. In fast-moving water, muskrats are more likely to burrow into the bank than to construct a lodge. Muskrats may build a den in the outer wall of a beaver lodge, even when the beavers are using their lodge.

**Lodges.** If the water's shallow and plants are abundant, muskrats may build a lodge that looks a bit like a smaller version of a beaver lodge. Muskrat lodges are usually a dome-shaped hut of weeds, sticks, and leaves piled on a platform of mud and rotted debris. They're often slightly lopsided, 3 to 6 feet wide, and about 1 ½ to 4 feet above the high-water line. The walls of the lodge are often a foot thick. Its inside is hollowed into several chambers. There are several underwater entrances, called "plunge holes." Muskrats will add to the lodge as long as they're using it. (The same is true for feeding platforms.)

**"Runs."** As the muskrats enter and leave their dens, their hind feet scour out a path in the muck in the bottom of the pond. You may be able to see the run in clear water or feel the smoothed trail with your hands or feet. Muskrats will also travel over land, especially in the fall and right after ice-out. Trails, both in the water and on land, are kept open by frequent use and pruning, and are noticeable. You may see tracks and scat in their trails.

**Feeding stations.** They may look like a small lodge. Muskrats will tow food out to this platform. They'll also push mud and aquatic plants up through a hole in the ice (called a "push-up"). When the mud freezes, it keeps the hole open and creates a shelter for the muskrats, protecting them from both predators and the cold. They'll rest in the push-up instead of returning to the lodge, which may be further away. May see floating blades of cattails, sedges, or other plants near their feeding platforms, or piles of clamshells on the platform.

**Scent posts.** Male muskrats will secrete an oily, pungent liquid on a scent post, which is often a twist of grass at the water's edge, to mark their territories. The musky odor of muskrats (both genders) is especially noticeable during the breeding season.

## Diet:

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Mostly aquatic plants and some field crops, such as corn, soybeans, wheat, oats, grain sorghum, sugar cane, and rice grown as a flooded crop. Muskrats prefer cattails, pickerelweed, bulrushes, sedges, arrowheads, reeds, pondweeds, water lilies, and young willow. They can survive entirely on upland plants such as Bermuda grass, clover, and Johnsongrass, if grown near a farm pond. They will eat freshwater clams, crayfish, mussels, snails, crustaceans, small fish, turtles, and frogs when aquatic plants are scarce.

## Typical activity patterns

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**Social style:** In the winter, 3–4 muskrats may share a lodge temporarily to stay warm, but they are not colonial, like beavers. As the breeding season approaches, they will become territorial. Dens are occupied only by a female and her young while she's raising them. When populations are high, males are more likely to fight.

**Daily activity:** Most active at dawn and dusk but may be active throughout the night or day. Spends most of its time in the water and can remain submerged for a long time.

**Hibernator?** No.

**Migrates?** No. During the spring (usually late February to early March), males will leave in search of mates. In the fall, young muskrats may seek new territories. These dispersals are more likely to happen when their populations peak. The muskrats may travel over a half-mile from their home.

## Where found

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**Distribution in the Northeast:** Widespread and abundant. Found throughout New York, except in the higher regions of the Adirondacks.

**Habitat:** Wetlands (both fresh and slightly salty water), especially with still or slow-moving water and dense cattail stands. They're found in marshes, beaver ponds, lakes, swamps, streams, drainage ditches, canals, reservoirs, and mine pits. Expect to find muskrats in beaver ponds, farm ponds, and any semi-permanent waterway.

**Territory and home range:** Both sexes are aggressively territorial just before and during the breeding season and may kill other muskrats, even their own young, during a squabble. Home range is small, usually within 200 yards of den.

## Breeding habits

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- **Pair bonding style:** Polygamous. A pair may remain together for a breeding season. Both male and female may build and maintain the den, but the female mostly cares for the young by herself.
- **Breeding dates:** Mid-March to September. Females may breed while still nursing.
- **Litter size:** Usually 1 to 8, typically 5 to 6 young. Average 2 to 3 litters/year.
- **Birth period:** 1st litter: April–May. 2nd litter: June to July (about half of New York's muskrats have a second litter). 3rd litter, less common: August. The young are born in a grass-lined nest in the lodge or den.
- **Weaning dates:** About 1 month old.
- **Amount of time young remain with parents beyond weaning date:** Young are driven off after weaning.

*Special note:* Muskrat populations boom and crash every 10 years, in a regular cycle. Droughts and floods may cause population crashes, too.

## Common conflicts

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**Time of year:** Spring.

### What are they doing?

**Most muskrat damage is caused by their burrowing.** They burrow into earthen dams, dikes, levees, and railway embankments, weakening their structures. They also burrow into the banks of ponds, canals, and irrigation and drainage ditches. Their tunnels may drain a small farm pond. They may damage floating docks, marinas, and boathouses.

**Musk rats occasionally eat field crops** and may cause substantial financial losses in states with major rice and aquaculture operations, because they eat rice, cut it down to use as building material for their lodges, and damage the field by burrowing through levees and damage aquaculture sites by burrowing into levees or pond banks.

Musk rats may **damage ornamental aquatic gardens** by eating water lilies or cattails or other plants. When their populations grow too high, they may “eat out” all the aquatic plants in the area, reducing the quality of the habitat for other species, such as waterfowl.

**Disease risks:** tularemia, hemorrhagic septicemia, leptospirosis, salmonellosis, ringworm, pseudo-tuberculosis. They are hosts for many ticks, mites, fleas, and various worms.

## Legal status in some states

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Game species with set season. In New York, special DEC permits are needed for the taking of nuisance muskrats. Actions that change the nature of freshwater wetlands or protected streams may require additional DEC permits.

## Management

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### **To prevent damage, “overbuild” a dam or farm pond:**

- Normal water level should be at least 3 feet below the top of the dam.
- Spillway should be wide enough to prevent the water level from rising more than about 6” during heavy rainfall.
- Inside face of dam (towards water) should be built at a 3:1 slope (three feet out for every foot of height)
- Outer face of dam should be built at 2:1 slope. Top of dam should be at least 8 feet wide, best if it’s 10–12 feet wide.

### **To solve an existing conflict, reduce their food sources (this may be necessary if there’s extensive damage):**

- Around a pond, mow grassy areas frequently.
- Remove the aquatic plants that muskrats eat. They prefer starchy foods including cattails, pickerelweed, bulrush, smartweed, duck potato, horsetail, water lily, sedges, young willow trees, and rice, when grown as a flooded crop.
- Remove the following upland plants from around the pond (and replant with other species): Bermuda grass, clover, Johnsongrass, and orchard grass. Muskrats can survive entirely on those plants.
- If muskrats are traveling from the pond to feed in fields or gardens, fence those areas. Muskrats will eat corn, soybeans, wheat, oats, grain sorghum, sugarcane, and ornamental flowers.
- If you don’t want to remove plants from your pond, try to attract muskrat predators instead. Increase cover in and along the pond’s edge to attract mink, one of the main predators of muskrat.

### **Protect vulnerable ponds and dams.**

- Before attempting to modify a wetland environment, speak to wildlife agency staff. In some cases, permits would be needed.

- Riprap the inside of the pond's dam with rocks or cover it with vinyl-coated welded wire. Rocks should be flat and closely-fitted. The rock layer must be at least 8" thick, extending 3 feet below and 1 foot above the normal water line.
- "Draw down ponds" during the winter (requires a permit). Remove the muskrats, and make sure they're gone. Reduce the water level to expose their burrows (this often means lowering the water from 1 ½ to 3 feet). Then fill in any burrows and tamp down the soil. Cover them with rocks.

## Trapping strategies

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Trapping is often a critical part of a strategy to control muskrat damage. When possible, invite licensed trappers to remove muskrat during the legal season.

**To avoid catching beaver, otter, mink, and birds:** Avoid trapping if there's sign of otter nearby.

Use natural baits (in the spring, try muskrat musk. In the fall and winter, use sweet-smelling oils such as oil of sweet flag, spearmint, or anise; apples, parsnips, or carrots also work well). Do not use baits made from beaver or otter glands.

Use only small foothold or body-gripping traps and anchor all traps so they'll hold any live animal that may be accidentally caught. Put crossed hoops over a floating log set to discourage birds from landing on the log.

Use catchpoles to release any otters or beavers that are accidentally caught in the trap.

Don't set traps in spillways, channels, large bank holes, or other natural funnels.

**Live traps:** Cage traps, 8x8x24"



## Lethal traps:

Body-gripping trap, #110 or 120, set in the water. The underwater set is more selective.

Foothold trap, #1 or 1 ½, set in 1 to 2 inches of water and anchored in at least 18 inches of water. Set traps in active runs as close to the den's entrance as possible. Traps must be set 5 feet or more away from a muskrat lodge, unless allowed by permit. Pole sets, under-ice sets, and float sets also work.

If the water is less than 18" deep, use a body-gripping trap (preferable) or a guarded foothold trap.

## Preferred killing methods

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- lethal trap
- foothold trap in a submersion set
- shooting (practical if removing a few muskrats from a small pond)

## Acceptable killing methods

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- CO2 chamber
- stunning and chest compression
- stunning and cervical dislocation

Control strategies that don't work particularly well or aren't legal in some states.

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- Conventional frightening techniques aren't effective against muskrats.
- Several trap designs, including barrel traps, stovepipe traps, and multiple-capture traps, are not legal for use on muskrats in some states.
- There are no repellents or poisons registered in most states for muskrats.

# Raccoons

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**Species of interest: Raccoon** (*Procyon lotor*)



Photo by Greg Clements.

**Size:** 12 to 36 pounds. Body is 26 to 38 inches long including 10-inch tail.

## Legal Status

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Raccoons are protected furbearers in most states with seasons established for running, hunting, and trapping. Most states have provisions for landowners to control furbearers that are damaging their property. Check with your state wildlife agency before using any lethal control methods.

## Damage Prevention and Control Methods

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### Habitat Modification

- Remove obvious sources of food or shelter around the premises
- Close outbuilding and exterior laundry room doors.

## Exclusion

- Usually the best method for coping with raccoon damage

## Frightening Devices

- Effective for a short time

## Repellents

- None are effective

## Toxicants

- None registered

## Shooting

- .22-caliber
- Shotgun with No. 6 shot

## Trapping

- No. 1 longspring
- No. 1.5 coil spring
- No. 160, 220 Conibear®-style
- Species-specific traps
- 10- x 12- x 32-inch single-door cage or box traps
- 10- x 12- x 42-inch double-door cage or box traps

## Other Control Methods

- Direct capture
- Chimney removal methods
- One-way doors

## Signs of their presence

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1. Visual sightings of the animal.

**Sounds:** Cries include a whistle-like tremolo, hisses, soft grunts, barks, growls, and a churr-churr noise while feeding. Cry when attacked is a piercing cascade of snarling screams.

2. The young are quite noisy; they are easily heard in the house, and often mistaken for birds. Raccoons can make a lot of noise when they lumber around in your attic.

3. **Tracks:** Flatfooted, like people, so track is big for the animal's size. The length and width of the front paw is about equal, about 2 inches long. The hind paw is much longer than it is wide, about 3 1/4 to 4 1/4 inches long; described as "a miniature human footprint with abnormally long toes."

4. **Scat:** likely found at the base of trees, on logs, big rocks, woodpiles, or other prominences (such as roofs). The scat often shows what they've been eating and can give clues about what is attracting the raccoons to the site.

5. **Building damage:** black smudges on walls or downspouts; bent gutters; holes in the siding or boards torn off; damaged soffits or louvers; damaged insulation; odors.

6. **Crop damage:** partially eaten corn ears with the husks pulled back, or broken stalks; hole in the rind of watermelons, through which the contents have been pulled out.



**Tracks**



**Scats**

## Diet

Opportunist. Eats fruits, berries, and mast (acorns, and nuts and seeds from trees); insects; worms; frogs; fish; turtles; mice; crayfish, clams, and snails; eggs and young of birds and reptiles; garden, orchard, and field crops; birdseed; pet food; garbage; and carrion.

## Typical activity patterns

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**Social style:** Generally solitary, except female with young.

**Daily activity:** Nocturnal, but may be active during the day, especially in the spring and summer when the female is nursing her young and needs more food.

**Hibernator?** Sleeps for days at a time during the coldest weather (below 25°F). Adult females (with their young) often den together, especially in a preferred den. Raccoons may lose half of their body weight during the winter, as they live off stored fat.

**Migrates?** No.

## Where found

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Everywhere. Can reach densities of 30 to 40 raccoons per sq. mile in rural areas, 100+ raccoons per sq. mile in urban areas.

**Habitat:** Prefers hardwood forests near streams, rivers, swamps, or ponds. Highly adaptable. Dens in tree cavities and hollow logs, rock crevices, burrows, brush piles, haystacks, beaver lodges, chimneys, attics, crawl spaces, barns, buildings, culverts, storm sewers, and abandoned autos. Usually has a central den (and a few spares) within its range. Females may den together in groups of up to a dozen. Males den by themselves.

**Territory and home range:** Not territorial but may fight to establish dominance in common feeding grounds (such as a dumpster). The adult's home range is about a mile in diameter.

## Breeding habits

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**Pair bonding style:** Polygamous. Female raises the young alone. If an adult male comes across the young, he may kill them.

**Breeding dates:** Peaks in late January to February. Gestation takes about 63 days.

**Birth period:** March through May. Late-breeding females may give birth in June, July, or August.

**Litter size:** 3 to 5, average 4. May see as few as 1 kit or as many as 8.

**Weaning dates:** Between 2 to 4 months of age.

**Amount of time young remain with parents beyond weaning date:**

Young males leave in the fall, but young females may remain with their mother through their first winter, dispersing the next spring.

## Common conflicts

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**Time of year:** Any time of year. Calls from clients often peak from mid-March through mid-May, when the females are looking for den sites in which to raise their young. From mid-May through July, clients may call about "sick" or "rabid" raccoons that are active during the day (see explanation below). From the late summer through the fall, raccoons may dig through lawns and turf in search of grubs.

## What are they doing?

1. They den in attics, chimneys, sheds, and barns, annoying people with their noise and odors.
2. Their nest materials might block a vent, causing a fire hazard. They also chew on wires.
3. Raccoons can damage buildings, either purposefully, to gain entry or create a nesting area, or accidentally, because they're heavy enough to bend gutters as they move through them. Raccoons enter buildings through the roof (using rain gutters, brick chimneys, and overhanging branches to reach the roof); push their way through louvers or soffits; or climb directly up the siding. They may tear shingles, vents, or roofing material to gain entry.

4. Raccoons also cause damage as they feed, pillaging gardens and agricultural crops, knocking over and chewing through garbage cans, getting stuck in dumpsters, pulling down and chewing holes in bird feeders, and pulling up turf and lawns for worms and grubs.
5. Their scat fouls yards and children's play areas and may present a health hazard (parasites found in scat).
6. Disease risks: rabies (they are a rabies vector species), raccoon roundworm. Raccoons are currently the main carrier of rabies in the northeast.

## De-bunking myths about raccoons

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1. *A raccoon that's active during the day is rabid.* Not necessarily. It may be a healthy female that's feeding more often than usual, because of the demands of her young.
2. *In raccoons, the symptoms of canine distemper are unique.* Symptoms of canine distemper can be easily mistaken for rabies. This leads some people to overestimate the number of rabid raccoons.

## Legal status in some states

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Protected. Game species with set season. Rabies vector species, so you may need to consult with the county health department and follow their guidelines for disposing of the animal if there has been a potential rabies exposure.

## Management

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**Remove artificial food sources (garbage, compost, bird seed, pet food):**

1. If anyone is feeding the raccoons, persuade them to stop.
2. Put trash out in the morning, instead of the evening, if possible, or keep trash in a protected area.

3. Raccoon-proof garbage cans or dumpsters with a tight-fitting lid (coons seem to have more trouble opening the type of can that has a 4—inch-high lid that twists on). Secure garbage can with heavy-duty straps or bungee cords, or attach it to a post, or keep it out of reach in the garage (close garage doors at night) or place the can in a covered and secured bin.
4. Feed birds during the fall and winter and gradually stop by May. If the homeowner really wants to feed birds during the warmer months, install a predator guard on the bird feeder pole. Use sturdy poles. Keep the area underneath the feeder clean.
5. Enclose compost piles in a framed box using hardware cloth or welded wire; in a sturdy container, such as a 55-gallon drum; or in a commercial composter.
6. Feed pets indoors. Any food left outdoors should be removed at night. Pet food bowls should also be brought indoors because they retain attractive odors.

#### **Protect children at play:**

1. Cover children's sandboxes.
2. Teach kids to wash their hands thoroughly after outdoor activity.
3. Wash toys that were used outdoors with a mild bleach solution (10% chlorine bleach, which is one part bleach to nine parts water).
4. Keep kids away from typical raccoon latrine areas (base of trees and wood piles).
5. As best you can, keep kids from putting things in their mouths. Young children may put raccoon scat, wood chips, soil, or other potentially contaminated objects (including their own dirty hands) into their mouths.



6. If there's a known latrine site on the property, you may wish to alter the site conditions to make it less attractive, so the raccoons will stop using it. Remove piles of logs or debris.

### **Protect vulnerable crops:**

1. Establish a barrier around gardens and fields with a 2-wire electric fence (if allowed by local ordinances) with the wires placed at 5 and 10 inches above the ground. Fences can be turned off during the day. Best to install fences at least 2 weeks before crops reach an alluring stage, so the coons haven't developed the habit of feeding in the garden or field.
2. Wrap filament tape around ripening ears of corn (tape should have glass-yarn filaments in it so the coons can't tear through it). Remove the tape before eating.
3. One scare device, the Critter Gitter®, combines a siren and flashing lights. It's triggered by a motion detector. The device switches patterns, so it should be effective longer than a scare device that doesn't vary.

### **Prevent entry into building:**

First step: if there are no definitive signs of coon activity, determine if coons are still inside by plugging the entry hole with newspaper. If the paper is still there when you return two days later, you can begin exclusion. In the winter, they may be napping, so it may be more difficult to determine whether they're inside or not. Inspect the site as thoroughly as possible.

### **If this is a preventive action, or there are no young present, you can:**

1. Replace plastic vents and louvers with metal designs that are securely attached to the building. This is most important for gable louvers, soffit ventilation openings, and roof vents.

2. Half-inch hardware cloth (or, even better, welded-wire mesh) or galvanized sheet metal may be used to screen holes, decks, or other vulnerable areas. To protect the area underneath a deck or porch, create an "L"-shaped "rat wall." Attach the hardware cloth to the bottom of the deck. Then bury the bottom 6 to 12" deep, with a 12-inch shelf that sticks out, to prevent animals from digging underneath the barrier.
3. Cover chimney flues with commercial caps. Coons can remove some covers, so choose a design that bolts securely to the flue. Raccoons can usually remove the type of chimney cap that simply slips inside the tile liner of the chimney.
4. Trim overhanging tree branches 6 to 8 feet away from the house to make it harder for them to reach the roof (if you also want to foil squirrels, trim to 10 feet away from the building).
5. Attach a 2-foot-wide band of metal flashing around trees at chest height, to prevent raccoons from climbing the trees.

**If young are present, remove the entire family before blocking the entrance to their den:**

1. If the coons are older and mobile, install a one-way door over the entry hole. The mother and young will leave on their own but won't be able to re-enter. The mother may bring her young to one of her other dens.
2. Trap and release strategies to reduce the risk of orphaning wildlife: The best way to prevent orphaning is to convince your clients to wait until the young are mobile before removing, repelling, or excluding the family from the site. If that's unacceptable, you can try to capture and remove both the female and all her young and hope that she will retrieve them and continue to care for them. Some removal techniques may increase the chances that the female will retrieve her young. Here are suggestions.

3. Remove the female at dusk or in the evening, preferably using a direct capture technique such as a catchpole. Release them on-site, at dusk or in the evening.
4. Place the female and young in a release box. Use a simple cardboard box, a wooden nest box, such as a wood duck box, and or heavy plastic boxes. Use a large box (2- × 2- × 1-foot box) with at least a 7-inch hole for raccoons.
5. Make sure the animal cannot immediately get out of the box by covering the hole. Then move them to a quiet place outdoors. Unless they're likely to be disturbed, keep the box at ground level. Remove the cover so the female can get out of the box. Another option is to build a box with a sliding door. Leave the door open about an inch, to keep the heat inside but make it easy for the female to slide it fully open so she can retrieve her young.
6. Some people prefer to use heated boxes. Make sure that the box doesn't get too hot. You may want to provide heat in just one area. Also, assume that if you put something in the box, they will chew on it. Don't give them access to anything that they shouldn't eat, such as wires. That means that if you choose to use a household heating pad as the heat source, make sure the animals can't reach the wires. To avoid that problem, one can build boxes with a double floor, placing the heating pad in the space between the floors. Other options for heat sources include microwaveable heating pads and warm soap-stones.
7. If you can't catch the female, put the young in the heated box and locate it as close to the entry site as possible.
8. Check the next day to see if the young are still there. If so, they've probably been abandoned. There hasn't yet been enough research on this technique, so its effectiveness is unknown. It's likely to be more effective with older, more

experienced females; younger females might abandon their young more readily.

## Trapping strategies

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### Live traps:

1. Ideally, a cage trap should be at least 10 × 12 × 32 inches for a single-door model, longer for double-door models. Bait them with marshmallows or sweet paste baits. Sardines will attract cats, so be cautious if you use that bait.
2. Place a board (or some other sturdy object) underneath the trap to protect the lawn or roof shingles. The board should be 6 to 8 inches wider than the trap, all the way around. Coons often reach outside traps, grabbing and tearing at anything they can get their paws on as they try to escape.
3. New cylindrical foothold trap designs specifically for use with raccoons (Little Grizz Get-rz<sup>®</sup>, EGG trap<sup>®</sup>, Duffer trap<sup>®</sup>) reduce both the chance of catching the wrong species and the chance of the captured coon injuring itself.
4. Traditional foothold traps, #1 or #1 1/2, baited with marshmallows or other sweet baits. (If there's a risk of capturing cats, use marshmallows).
5. Foothold traps are not recommended for use inside a building because the captured coon may damage whatever it can reach.

### Lethal traps

1. Body-gripping trap, #120, #160 or #220, in a restricted-opening set that reduces the risk to dogs and cats (vertical cubby, deep-notch box, or a bucket with a restricted opening). These sets also work well if the entry site is on a building, such as a soffit vent or roof vent.

2. Modify the trigger to help ensure a top-to-bottom strike (which is more humane) and to prevent the raccoon from refusing to enter the trap. Raccoons don't like to have anything brush against their eyes or whiskers, so separate the trigger and center it on the top or bottom of the trap. Proper positioning helps to ensure a cleaner, more humane catch.

## Preferred killing methods:

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1. CO<sub>2</sub> chamber
2. Lethal trap
3. Shooting, using a shotgun with #6 shot or larger, or a .22-caliber rifle (target the head, if no rabies testing is required, or the heart/lungs)

## Acceptable killing methods

1. Stunning and shooting
2. Stunning and CO<sub>2</sub> chamber
3. Stunning and chest compression, for a smaller raccoon (one that weighs less than 8 pounds)

## Control strategies that don't work particularly well or aren't legal in some states:

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1. Lights, radios, dogs, scarecrows, streamers, and aluminum pans often don't work.
2. Ammonia is dangerous to raccoons and people. Its odor may persuade an adult raccoon to vacate a chimney, but there's no guarantee that she'll remove her young—she may simply abandon them. There are better removal methods. You should not use ammonia because it's not registered as a raccoon repellent.

3. In most states, no pesticides are currently registered for raccoon control. The registered repellents that have been tested have proven ineffective.
4. The commercial raccoon eviction fluid isn't registered in many states.

NWCTP

# Norway Rats

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**Species of interest:** Norway rat (*Rattus norvegicus*)



Norway rat (*Rattus norvegicus*). Photo by U.S. Health and Human Services.

## Legal Status

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Norway rats are not protected by laws. Most communities have sanitation regulations that are designed to reduce populations of urban pests.

**Size:** This exotic species may weigh up to 1 pound. They're 12 to 18 inches long, from the nose to the tip of the tail. The tail is somewhat shorter than the body.

## Damage Prevention and Control Methods

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### Habitat Modification

- Good sanitation - reduce sources of food, water, and shelter
- Remove debris and control weeds around structures

### Exclusion

- Seal all openings larger than ½-inch wide
- Store food in rodent-proof containers

- Properly store and dispose of refuse and garbage

## Frightening Devices

- Ultrasonic devices do not control rats

## Repellents

- Repellents are generally not effective for control of rats

## Toxicants

- Rodenticides

## Shooting

- Rifles- .177- and .22-caliber
- Shotguns. 12- or 20-gauge

## Trapping

- Snap-back traps
- Cage and box traps
- Glue boards

## Other Control Methods

- Some cats and dogs catch individual rats, but they cannot be depended upon for control of Norway rats.

## Signs of their presence

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1. **Sounds:** Squeaking, scuttling, scratching, or gnawing inside the walls, ceilings, or between floors of buildings.
2. **Scat:** 1/2 to 3/4 inches long with blunt ends. Look in kitchen cabinets, drawers, and corners, on counters, under sinks, behind appliances, near food, and in cellars, attics, along walls in barns, warehouses, and feed storage areas. Use an ultraviolet light to look for their urine stains on woodwork (it



glows a blue-white color). Rat urine smells musty and with experience, you can distinguish it from mouse urine.

3. **Runs, smudge marks:** Rats use the same route over and over. Eventually, a faint, dark "trail" of body oil and dirt may be noticeable on baseboards and along walls, on beams, rafters, and pipes. Look as well for smooth, worn paths in insulation.
4. **Nests and burrow holes:** They will nest indoors and out. If outdoors, their burrows are usually about 1 1/2 to 2 feet deep and 3 feet long, with 2 or more entrances, and usually, a well-hidden escape route. Their outdoor burrows are often found in riverbanks and under sidewalks, platforms, boards, junk piles, foundations, and slabs. They may nest indoors in basements and the lower floors of a building, in crawl spaces, storage rooms, under floors, pallets, junk, and boards, or behind stored items. They may nest in sewers or storm drains. Rat nests are usually 8 to 12 inches in diameter, made of shredded paper, cardboard, insulation, and bits of fabric or plastic. Their burrow holes are usually 2 to 4 inches wide.
5. **Damage to stored goods and buildings:** Gnaw marks are often seen on the bottoms and corners of doors, on ledges, in the corners of walls, and on stored materials. Look also for holes and piles of wood shavings. Check cabinets, electric cables, pipes, baseboards, window casings, and foundations. They will gnaw on almost any building material: wood, cinder blocks, aluminum, sheet metal, glass, adobe, asbestos. Their teeth grow constantly, so they gnaw to keep them trimmed.
6. **Evidence of their feeding:** Rats are steady feeders and will settle down and eat large quantities at a sitting. Their leftovers are usually half-eaten pieces of grain. Rats need water every day. You may see and smell scat or urine.

## Diet

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Opportunist. Norway rats prefer fresh food over garbage, but they'll make do with what's available. They prefer cereal grains and high-protein foods such as meats (sandwich meats, insects, mice, bird eggs, young birds), fish, nuts, insects, and pet food, and garbage. They'll eat some fruits (especially dried fruit), cheese, peanut butter, bird seed, potatoes, and vegetables, bacon, butter and lard, compost, and manure. They'll even eat paraffin wax, leather products, and the feces of dogs, cats, or horses.

## Typical activity patterns

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**Social style:** Generally colonial, with an established hierarchy, although you may find solitary rats.

**Daily activity:** Nocturnal. If populations are very high, they may be active during the day, too.

**Hibernator?** No.

**Migrates?** No.

## Where found

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**Distribution in the Northeast:** Widespread, in urban, suburban, and rural areas. Rats are generally found near people. Though many people think of rats as an urban problem, about half of North America's rats live on farms.

**Habitat:** Any building that provides food and shelter, usually in the basement and on the lower floors of the building. They're found in apartment buildings, homes, kennels, warehouses, stores, slaughterhouses, barns, livestock buildings, silos, granaries, even sewers and dumpsters. Rats will nest underneath buildings and concrete slabs, along stream banks, around ponds, and in dumps. They like to nest near water.

**Territory and home range:** Territorial, especially among males. Daily, rats will travel through an area that's up to 100 to 150 feet in diameter, more than 10 times the size of the foraging range of a house mouse. Rats generally stay within 300 feet of their burrows.

## Breeding habits

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**Pair bonding style:** Rats are polygamous. Female raises the young alone.

**Breeding dates:** Peaks during the spring and fall. Females may breed again within a day or two of birthing and may produce 4 to 6 litters a year.

**Litter size:** 6 to 12. Gestation takes about 21 to 23 days.

**Weaning dates:** Between 3 to 4 weeks of age.

**Amount of time young remain with parents beyond weaning date:**  
Not long!

### Estimating rat populations:

1. There are probably about 10 rats in the area for each one spotted at night. Medium population: see 1 or 2 rats at night, but none seen during the day; or find old scat, or old gnaw marks. High population: see 3 or more rats at night, or see rats during the day; find fresh scat; gnaw marks and tracks are abundant.
2. Another way to estimate populations: Put out food, then record how much is eaten by the rats to estimate the minimum number of rats in the area. Use finely ground grain, not whole grain or pellets, which the rats can carry off. Remember, rats are cautious, so give them some time to get used to this food source before you begin your data collection. When you're ready to collect data, weigh the food (in ounces) then place it where you believe the rats are active. The next day, weigh whatever's left. That tells you how much food they

ate. Multiply that number by two, because one ounce of food/day typically supports two rats, and you'll have an estimate of how many rats are in the area. Of course, rats have other food sources, so this isn't exact.

Example:

- a. Day one, place 40 ounces of grain near a rat hole
- b. Day two, measure what's left over: 12 ounces
- c. Subtract the amount left over from the total bait:  $40 - 12 = 28$  ounces eaten
- d. Multiply the amount of grain eaten by 2 (each ounce supports 2 rats):  $28 \times 2 = 56$  rats

## Common conflicts

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**Time of year:** Any time of year.

### What are they doing?

1. Rats can cause extensive damage to buildings and household goods as they seek food and nest sites. They'll gnaw on siding (even aluminum), woodwork, sheet metal, sheetrock, insulation, plastic food containers (including garbage cans), papers, packaged goods, clothing, mattresses, furniture, even lead or copper pipes.
2. Their nest materials might block a vent, causing a fire hazard.
3. They also chew on wires, which in addition to creating a fire hazard, could also short-circuit electrical systems, causing alarm systems and refrigerators to fail.
4. Their burrowing may cause roads and railroad beds to settle or damage the banks of irrigation canals and levees. It may also undermine foundations and slabs.
5. Rats bite and terrify some people. They transmit several diseases to people.

6. Rats may damage crops in the field, in silos, granaries, and warehouses. They contaminate stored foods, especially grains, in commercial settings such as restaurants and warehouses or homes. Rats ruin a good chunk of the world's food supply.
7. They'll raid bird feeders and pet dishes.
8. Their noise and smell may drive you and your pets to distraction.
9. They foul items in museums and libraries.
10. Disease risks: The diseases that rats are more likely to transmit to people or livestock include murine typhus, leptospirosis, trichinosis, salmonellosis (food poisoning), and rat bite fever. Bubonic plague is more closely associated with roof rats (*Rattus rattus*), which are not currently residents of New York, than it is with Norway rats. Rats are often infested with lice, fleas, and mites that transmit other diseases.

## Management

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It's critical to consider how well rats climb, jump, and swim when planning your control strategy. If you had the physical abilities of a rat, you might be an Olympic athlete. Here's what a Norway rat can do:

1. Climb up: Brick buildings (or any building with a rough exterior), wires, conduit, pipes (inside and outside!), vines, shrubs, trees. Rats can climb inside a pipe that's 1 1/2 to 4 inches in diameter, or along the outside of any pipe that's within 3 inches of a wall or other support. Otherwise, rats can climb up an exterior pipe that's up to 3 inches in diameter, and if the surface is rough, they can climb up an even larger pipe.
2. Run along: Telephone wires, power lines, pipes, conduit, and tree branches.
3. An adult rat can squeeze through a hole that's about 3/4 inch wide. A young rat can squeeze through a 1/2-inch hole.

4. Jump vertically about 3 feet and horizontally 4 to 8 feet, depending on whether they start on a flat or elevated surface. If people could match that, they'd be jumping about 18 feet up or 24 to 48 feet out, without poles or a running start.
5. Stretch up about a foot on a smooth wall.
6. Swim up to a half-mile in open water, underwater for about a half-minute; against strong currents; and up through toilet traps (water seals). Rats can tread water for up to 3 days.
7. Burrow 4 feet into the soil.
8. Fall from a height of 50 feet without serious injury.
9. Gnaw through lead and aluminum sheets, cinder block, plastic, and other materials.

The best way to deal with a rat infestation is to clean up, get rid of the rats, and keep them from finding a way back in. Keep 3 words in mind: **sanitation; eviction; and exile.**

### Remove artificial food sources (garbage, compost, bird seed, pet food)

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1. Garbage is usually the main food source for rats in urban areas. Ideally, garbage would be removed daily, before dusk. This often isn't possible, so make sure that garbage is kept in secure containers.
2. Clean garbage cans, dumpsters, and chutes regularly, at least once a week.
3. Screen the drainage holes in dumpsters with 1/2-inch hardware cloth.
4. Steel garbage cans are a better choice than plastic, which the rats may chew through.
5. If rats, raccoons, or dogs tip over the garbage cans, either use a spring-loaded fastener or bungee cord to keep the lids on or

put the garbage cans on a platform that's 18 inches above the ground and 3 feet away from buildings.

6. At a dump, cover the garbage with soil every day.
7. Store food, birdseed, pet food, garbage, compost, and recyclables in metal, glass, ceramic, or heavy-duty plastic containers with tight-fitting lids.
8. Near buildings, rake up and dispose of fruits and nuts that fall from trees. It's not a bad idea to wrap these trees with sheet metal, so the rats can't climb up and feed in them. Prune low-hanging branches, too.
9. Put unfinished pet food in the refrigerator.
10. Store large bags of flour, grain, pet food, or livestock feed on open-wire shelves. Bottom shelf should be at least 18 inches off the ground.
11. Especially in kitchens and food storage areas, elevate equipment (mixers, stoves, refrigerators) so you can clean underneath it easily. If you can't elevate it, then close it off so the rats can't get underneath the equipment.
12. Elevate compost heaps or enclose with 1/2-inch hardware cloth or welded wire mesh.
13. Keep livestock feeding areas and feed storage areas as secure as possible.
14. Remove dog, cat, and horse feces daily; rats will eat them.
15. Keep the area around and underneath bird feeders clean, especially of spilled seed. Use baffles to keep rats (and squirrels) out of feeders.

## Remove their nesting sites

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Keep stored items off the floor and away from walls. In a warehouse, paint a 12-inch white band on the floor all the way around the room to make inspections easier, and to remind people to keep items away from the walls.

Reduce clutter and remove cardboard boxes.

Move firewood, junk piles, and garbage cans away from the house.

Maintain a foot-wide gravel border around the foundation that's free of vegetation (best) or keep the foundation plantings well-trimmed. Don't stack anything (such as firewood) against the foundation.

Rats find shelter in dense ground covers such as Algerian ivy. Either keep it well-trimmed or replace it with English ivy, which they don't like as well.

Break up large expanses of dense ground cover with exposed pathways. Rats don't like to cross areas where they can easily be seen.

## Prevent entry of rodents into buildings.

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1. Close the door! (Use screen doors.) Install mechanical door-closers in warehouses or other areas where people forget to close doors.
2. Add metal kick-plates (26-gauge sheet metal) to the bottoms of doors, especially those leading to warehouses and food storage areas.
3. Repair every crack and hole that's more than 1/2 inch wide. Seal openings beneath and behind sinks, stoves, and dishwashers with latex caulk. Fix cracks in foundations and floors with concrete or masonry grout. Remember to check around pipes, sewer outlets, cables, stairs (inside and out),



roof joints, and the areas where chimneys and fireplaces come through the floor from the cellar or crawl space. Use strong materials to repair holes, such as 1/2-inch hardware cloth, welded-wire mesh, sheet metal plates, concrete mortar, or coarse steel wool with expanding foam (Stuf-Fit™) sprayed over it.

4. Plug gaps around water, gas, and heating pipes, heat registers, air ducts, electrical chases, and false ceilings with latex caulk.
5. For large holes around pipes, use galvanized metal pipe chase covers, sheet metal plates, mortar, plaster of Paris, or cement.
6. Wrap pipes that run along exterior walls with sheet metal guards that fit closely to the wall, sticking out 12 inches from the pipe.
7. Check vents (sewer, stove, clothes dryers, roof, ridgeline, soffit, furnace, and air-conditioning ducts, attic fans). If it's damaged or dicey, replace the vent with an animal-proof design, or screen it with 1/2-inch hardware cloth or welded wire. End caps on ridge vents may loosen, providing access to the attic. Soffit vents are best protected with metal louvers.
8. Add guards to power lines to keep rats from traveling along them (consult with your power company first).
9. Paint a foot-wide band around the perimeter of block or concrete buildings at a height of three feet. Use hard, glossy (slippery!) paint. This technique may also be used to make it harder for rats to climb up vertical pipes.
10. Monitor structures routinely for structural cracks and openings. Places that might be overlooked, and yet are attractive to rats, include elevator shafts, laundry chutes, the compressors of refrigerators or freezers, and the insulated walls of large coolers.

11. Trim branches at least 3 feet back from buildings.
12. Rats can live in sewers and may enter buildings through toilets or water pipes. A toilet can be rat-proofed by adding a one-way flap valve called a "rat guard" or by feeding the pipe from the toilet bowl into a wider pipe. Screen drains in basements and shower rooms with 1/2-inch hardware cloth or welded wire.
13. Repair broken sewer pipes.
14. Add "rat wall" barriers underneath floors, around foundations and footings, or as linings for walls and ceilings. Use 1/2-inch hardware cloth or welded wire. Bury it 6 to 12 inches deep, then bend the bottom edge outward into an "L" shape that sticks out one foot to prevent the rats from burrowing underneath it. Or install a concrete curtain wall.
15. In double-wall construction, add a barrier between the exterior and interior wall. Nail galvanized sheet metal between the studs, joists, floor, and sill.

## Rat-proofing tips for new construction

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1. Fit pieces together carefully so all joints are tight. These are vulnerable areas that may warrant protection with sheet metal.
2. Use concrete when building new grain storage facilities. If you need to build with wood, line the floors, walls, and ceiling with welded wire (1/4-inch mesh) or hardware cloth (19-gauge).
3. Ground floors should be 1 1/2 feet above grade, or made of concrete, stone and mortar, or brick and mortar.
4. Footings should be buried to a depth of 2 feet and be protected by "rat walls" and "termite shields," a metal cone that's attached upside-down to footings and building piers.

5. Build "rat wall" barriers underneath floors, around foundations and footings, or as linings for walls and ceilings (see previous description).
6. Install metal kick plates on the outside of doors and protect door casings with sheet metal. Fasten metal thresholds to floors.
7. Steel pipes embedded in concrete create a strong metal door threshold that allows the door to swing freely. This is a good option wherever heavy equipment or livestock travel through the doorway.
8. Corrugated metal siding can provide many entry holes. You can butt the siding against a solid material, such as concrete or metal flashing, to seal these holes. (This may cause the metal to rust faster).
9. In double-wall construction, add a barrier between the exterior and interior wall. Fireproof stops of concrete or brick are best.

## Trapping strategies

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1. The Norway rat is an exotic species, so please do not release any into the wild.
2. Rats avoid new objects. Place baited, unset traps for up to a week, until the rats are used to the sight of the traps.
3. To increase your success, trap intensively for several days. More is better. A good rule-of-thumb is to place one trap for every rat. In homes with moderate to heavy infestations, use 12 to 24 traps. In barns or large buildings, 50 to 100 traps may be in order.
4. Place the traps in their runways, in dark corners, along rafters, near food sources, nests, or holes—wherever the rats are most

active (look for droppings and gnaw marks). You may be able to lift some ceiling tiles to place traps in a dropped ceiling.

5. Set traps at night, when rats are most active, and check them in the morning.

### Live traps:

1. Use a squirrel-sized cage trap ( $6 \times 6 \times 24$  inches) for adults. You may be able to capture younger rats in a chipmunk-sized cage trap ( $16 \times 6 \times 6$  inches).
2. Set live traps parallel to the wall.

### Lethal traps:

#### Lethal traps:

1. The familiar mouse trap is called a "snap-back trap." There are larger models for rats. Don't try to use the mouse-sized traps because they're too small. Look for some of the newer designs, such as traps that have bait covers, which are triggered when that lid is lifted; traps with expanded "triggers" or a clothespin design (shown). The design with the bait cover is more selective, while all these newer models are easier to set than the traditional mouse trap.
2. Place traps right against the wall, every 5 to 10 feet.
3. Set snap traps in pairs. This is much more effective. Two sets work well:
  - Side-by-side, perpendicular to the wall, with the trigger snapping towards the wall



**Clothes pin trap**

- Parallel to the wall, with the triggers snapping to the outside (not into the center)
- 4. Traps may be attached to rafters with nails, or to pipes with wire or "Velcro" strips.
- 5. Bait with bacon, hot dog, liver, peanut butter, or nut meats. You can sprinkle oatmeal around the trap to make it even more attractive. You may want to put the bait on the bottom of the trigger, which increases the chance that the rats will spring the trap.
- 6. To protect young children and pets, place traps in bait stations, a cage trap with 1- × 2-inch mesh, a coffee can with both ends cut out, or in PVC pipe (remember to test that the trap will spring within its container). Alternatively, keep your pets locked in a safe room at night and don't release them until you've sprung all the traps.
- 7. Body-gripping trap, #55. Use a one-way trigger to increase the selectivity of the trap.
- 8. In severe situations, glue boards may be needed as an additional tool to knock down rat populations quickly. In general, snap-back traps are preferred; they are often as effective and are more humane. If using glue boards, set them in protected areas, such as within a dropped ceiling. Check them frequently (at least every 12 hours) and kill any captured rats by stunning them. Do not leave dead rats to rot on glue boards because the carcasses will stink and likely attract other pests.

## Other lethal techniques

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1. There's a fair amount to consider when using rodenticides. Poisons can be effective and may be warranted in some situations. Rodenticides can be hazardous to children, pets,

and animals that eat poisoned rats. The rats may die in walls and stink, while providing a fine breeding place for flies. Trapping is often a better solution.

2. Rats are generally cautious when approaching a new food, including poison baits. They sample just a bit at first, and it takes several days for them to overcome their fear. Nor is any bait a universal favorite. Young rats may imitate their mother's food preferences, so if their mother avoids poison baits, the young may, too. This can lead to bait shyness in large populations of rats. This is why testing various baits and pre-baiting with nontoxic baits is so helpful in controlling rats.

### Preferred killing methods:

- Lethal traps
- CO<sub>2</sub> chamber
- Shooting, using an air rifle or .22-caliber rifle

### Acceptable killing methods:

- Stunning and chest compression
- Rodenticides

### Control strategies that don't work well or aren't legal in some states.

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1. Ultrasonic and electromagnetic devices don't work against rats. (Loud or unusual noises will frighten them and may drive them off for a short time.)
2. Mothballs and ammonia don't do much, either. Ammonia isn't a registered pesticide in most states, and mothballs may be harmful if used incorrectly.
3. Cats may kill some rats, but the rats may also kill the cat, especially if it's vastly outnumbered. Other predators that kill

rats include snakes, owls, dogs, coyotes, and birds of prey. They'll help to reduce rat populations but shouldn't be relied on as the sole source of control. You may wish to encourage any predators to stay in the area by providing roost sites, for example.

NMCTP

# Opossums

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**Species of interest:** Opossum (*Didelphis virginianus*)



Opossum (*Didelphis virginiana*) with young. Photo by Dave Schmidt.

North America's only marsupial (mammals whose young develop in a pouch). They're more closely related to kangaroos and koalas than to the other animals in the neighborhood!

**Size:** 4 to 14 pounds. Body is 15 to 20 inches long. They often suffer frostbite and lose part of their tails and ears.

## Legal Status

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Laws protecting opossums vary among states. Most states have open seasons for hunting or trapping opossums. Contact local wildlife authorities before removing opossums.

## Damage Prevention and Control Methods

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### Habitat Modification

- Remove pet food, fruits, and other foods
- Remove or modify bird feeders



- Cover trash cans with lockable lids
- Secure compost piles in bins

## Exclusion

- Install sunken perimeter fences around crawl spaces
- Cover openings with hardware cloth
- Electric fences or porcupine wire to prevent climbing
- 1-way doors (6- x 6-inch) to remove opossums from structures

## Frightening

- Not practical

## Repellents

- None registered

## Toxicants

- None registered

## Shooting

- .22-caliber rifle or pistol
- Shotgun- 12-gauge with No. 6 shot

## Trapping

- Cage traps (10 x 12 x 32-inch single door, 7 x 7 x 24-inch double-door)
- Body-gripping traps (Nos. 160 or 220)
- Foothold traps (Nos. 1 or 1½ padded jaw trap)

## Other Control Methods

- Direct removal
- Dogs may deter opossums

## Signs of their presence

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### Tracks and scats

1. Sounds: growl, hiss, screech when threatened.
2. Evidence of their feeding: Eggs that have been chewed into many small pieces. (Raccoons usually remove one end of the shell without crushing it. Foxes carry eggs away. Weasels and mink crush the entire egg.) Opossums maul chickens beginning at the rear, while raccoons bite their heads off.
3. Tracks: look like they were made by little human hands, fingers spread wide apart.
4. Scats: are semi-liquid and don't last long. Left everywhere, even in the den. When scared, possums may secrete a smelly, greenish fluid out of their butts.

## Diet

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Opportunist. Opossums eat mostly meat (mainly insects or carrion) but they also eat many plants, especially fruits and grains. They may eat garbage, compost, pet food, bird seed, bird eggs, and young birds (turkeys, chickens, geese, and game birds). They also eat voles, shrews, worms, and toads.

## Typical activity patterns

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**Social style:** Solitary.

**Daily activity:** Usually nocturnal.

**Hibernator?** No, but does den up for days at a time when the weather is bad.

**Migrates?** No.

## Where found

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**Distribution in the Northeast:** rural, suburban, and urban areas; parks.

**Habitat:** Wide ranging—arid to moist, woodsy to open, but more common near streams and swamps. Dens in a different place 3 out of 4 nights (except in the cold of winter). They find shelter under buildings, in brush heaps, hollow logs or trees, old crow or squirrel nests, and rock crevices. Opossums may share quarters with woodchucks, skunks, and rabbits.

**Territory and home range:** not territorial. They have constantly-shifting home ranges and may be considered nomadic. Home range is usually 10 to 50 acres.

## Breeding habits

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- **Pair bonding style:** Polygamous. Females raise the young alone.
- **Breeding dates:** February to June. Most females, though, have just 1 to 2 litters per year. The young are born about 13 days after breeding.
- **Litter size:** 6 to 16, average 8.
- **Life in a pouch:** The tiny (about 1/2-inch long) young are born blind and helpless. They must crawl into the mother's pouch and attach to a nipple. They'll remain in the pouch for 7 to 8

weeks, firmly attached to that nipple. Then, for about 2 weeks, they'll begin to explore the world, often riding on the mother's back. They'll return to her pouch to nurse. They're weaned at about 3 months old and are generally fully independent by the time they're 7 inches long.

- **Amount of time young remain with parents beyond weaning date:** 3 to 4 weeks.

## Common conflicts

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**Time of year:** Any time of year.

### What are they doing?

1. Raid gardens, chicken coops, bird feeders, pet food, and garbage.
2. Sometimes den in garages or attics and make a mess.
3. A parasite found in the feces of opossums can contaminate water and food sources for horses (both hay and feed). This parasite can transmit a disease to horses, called "equine protozoal myelitis." This disease affects the nervous system and can cause lameness.
4. Disease risks to people: mange, rabies (rarely).

## De-bunking myths about opossums

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1. *A hissing or drooling opossum is rabid.* Not necessarily. When threatened, a healthy opossum may bare its teeth, make a lot of noise, drool, bite, or leak a nasty fluid out of its rear. Stress may cause them to play dead, which might confuse predators and keep them from being eaten.

## Management

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### Relax:

Opossums move around a lot, and usually don't stay in one den site. If the problem was caused by an individual opossum, it will probably leave on its own. Just realize that the problem could be caused by different animals who are all attracted by the same source of food, water, or shelter.

### Remove food sources and shelter.

1. Put trash out in morning instead of the evening.
2. Opossum-proof garbage can with a tight fitting lid or secure it with straps.
3. Don't leave pet food out at night.
4. Enclose compost piles in a framed box using hardware cloth; in a sturdy container, such as a 55-gallon drum; or in a commercial composter.
5. Keep the area under bird feeders clean.
6. Remove brush piles and debris.
7. Close garage doors at night.

### Protect vulnerable livestock.

1. Close doors to poultry houses, and if birds are caged, keep those doors closed, too.
2. To keep opossums from climbing over a wire mesh fence, install a tightly stretched electric wire near the top of the fence, about 3 inches out from the mesh.
3. Install an electric fence around the hen house or use hardware cloth to cover holes and potential entrances.

## Trapping strategies

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### Live traps:

1. Opossums are easily caught with cage traps.
2. Foothold traps (#1 or #1 1/2) are also effective.
3. Set traps along fence rows or trailways in a dirt hole, cubby, or running pole set.
4. They prefer slightly spoiled baits, such as cheese or fruit. If you use a box trap with these baits, you may also capture skunks so be prepared to release them.
5. They're slow, so it's possible to capture them by hand, or with the use of a catchpole. Grasp the end of the tail (wear heavy gloves because they have sharp teeth). If you're holding an opossum and it tries to climb its tail to reach (and bite) your hand, lower it to the ground, where it will attempt to crawl away.
6. Assume that a female opossum has young in her pouch during the rearing season (March to August). The females are not likely to retrieve young, so make sure that all her babies are either in her pouch or clinging to her before you release her.

### Lethal traps

1. Body-gripping trap, #120 or #160, set in a vertical cubby for greater selectivity.

### Preferred killing methods:

1. CO<sub>2</sub> chamber
2. Lethal trap
3. Shooting, using a shotgun with #6 shot or larger, or a .22-caliber rifle (heart/lungs shot is preferred). Why is just the heart/lungs shot

listed as preferred? The head shot is difficult because opossums have very small brains located in a relatively large skull—and there's a strong crest on their skull, which can deflect the bullet. See the illustrations on the next page for more information about the head shot.

1. Properly targeting a head shot for an opossum is challenging because their brains are much smaller than you'd guess, looking at the size of their heads. Looking at the side of the opossum's head, imagine a direct line between the eye and ear. Now, aim slightly below that, closer to the base of the ear. Position the gun very close to the head.

### Acceptable killing methods:

1. Gunshot to the head (this is a difficult target and should only be attempted by people who are experienced and skilled in the use of firearms).
2. Stunning and chest compression.
3. Stunning and exsanguination.

# Pigeons

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**Species of interest:** Pigeon (*Columba livia*) also known as rock dove



Image by Jon Sullivan

**Size:** This exotic species is about 11 inches long and weighs 13 ounces.

## Legal status

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Unprotected. The pigeon is an exotic species; an exemption to the Migratory Bird Treaty Act allows for its control without a federal permit. Local ordinances may prohibit certain control measures.

## Damage Prevention and Control Methods

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### Habitat Modification

- Eliminate food supply. Discourage people from feeding pigeons in public areas. Clean up spilled grain around elevators, feed mills, and railcar clean-out areas. Eliminate standing water.



## Exclusion

- Screen eaves, vents, windows, doors, and other openings with 1/4-inch-mesh hardware cloth.
- Change angle of roosting ledge to 45° or more.
- Attach porcupine wires (Cat Claw™, Nixalite™), ECOPICTM, or Bird Barrier™ to roosting sites.
- Install electrical shocking device (Avi Away™, Flyaway™, Vertebrate Repellent System [VRS™]) on roost sites.
- Construct parallel or grid-wire (line) systems.

## Frightening

- Visual and auditory frightening devices are usually not effective over long periods of time.

## Repellents

- Tactile: various nontoxic, sticky substances (4 -The Birds™, Hotfoot™, Tangle foot™, Roost No More™, and Bird-Proof™).

## Toxicants

None available for public use

## Shooting

Where legal

## Trapping

- Several live trap designs are effective.

## Other Control Methods

- Nest removal

## Signs of their presence

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1. **The bird itself** is the most obvious sign.

2. **Sounds:** Distinctive cooing, clicking as wing tips touch during take-off.
3. **Droppings:** May accumulate on rafters, building ledges, public areas.
4. **Nests:** Crude-looking platform nests of sticks, twigs, and grasses. Find them near dormer tie-ins (the joint where the dormer meets the roof), on building ledges, in steeples, attics, and lofts, on top plates of pole barns, on the girders of bridges, and on ornamental architectural features of classic buildings.

## Diet

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Mostly herbivorous. Pigeons eat mostly seeds and grains, but will eat garbage, livestock manure, insects, and the bread and crackers that people feed them.

## Typical activity patterns

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**Social style:** Sociable, nesting and foraging in large flocks.

**Daily activity:** Diurnal.

**Hibernator?** No.

**Migrates?** No.

## Where found

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Common in cities and around farms and certain agricultural businesses (especially with stored grain).

**Habitat:** Prefer domestic environments such as town and city parks, buildings, and bridges; grain elevators, feed mills, and farmyards.

**Territory and home range:** Pigeons will defend a small area immediately around their nest site.

## Breeding habits

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**Pair bonding style:** Monogamous, but both sexes may occasionally mate with others, too. The male guards the female and nest. Both sexes feed the young.

**Breeding dates:** Year-round, with peaks in the spring and fall. Females lay more eggs even before the young leave the nest.

**Clutch size:** 1 to 2 eggs. Young hatch in about 8 to 12 days.

**Fledging dates:** Young leave the nest about 10 days after hatching.

**Amount of time young remain with parents beyond fledging date:** Very little, if any. If the young return to the nest site when the parents are raising a second brood, they will be driven off.

## Common conflicts

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**Time of year:** Any time of year.

### What are they doing?

1. Droppings deface and corrode building facades and may kill plants. They're unpleasant on park benches, statues, and cars. Under certain conditions, the droppings can promote the growth of the fungus that causes histoplasmosis, an airborne disease that affects people.
2. Eat or contaminate stored grain.
3. One of their parasites, the northern fowl mite, is also a major pest of poultry. Other pigeon parasites (mites, fleas, lice) will bite people. Some of their parasites destroy fabric or stored foods.
4. Like other birds, pigeons may cause plane crashes.
5. May transfer disease from one livestock facility to another.

6. Disease risks: histoplasmosis, salmonellosis (food poisoning), cryptococcosis, pigeon ornithosis, encephalitis, and Newcastle disease, among others.

## Management

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### **Remove artificial food and water sources (bird seed, pools):**

1. If anyone's feeding the pigeons, persuade them to stop. This can be challenging because many people love to feed pigeons.
2. Clean up spilled grain around feed mills, grain elevators, railcar clean-out areas, and barns.
3. Clean up spilled bird seed around feeders.
4. Eliminate pools of standing water.

### **Make outdoor roosts less appealing.**

1. An overhead grid-wire system will keep pigeons from landing in a courtyard. Use 80-pound-test monofilament spaced in a square grid, with the lines 1 to 2 feet apart.
2. To keep pigeons off support cables, narrow ledges, conduit, and other narrow areas, use a commercial "post-and-wire" system (Bird Barrier, Birdwire™). With care, you can create a homemade version, but it will probably be much harder to install, so it's probably not a practical approach. But if you'd like to try, here's how. Stretch steel wire (16- to 18-gauge) or monofilament line (80-pound) in parallel lines across the area. The lines must be very tight, so fasten the wires to L-brackets with turnbuckles to remove slack. Attach the brackets to the wall using cable clamps or aircraft hose clamps, which can handle the high torque load on the wires.
3. Dousing the birds with water from hoses or sprinklers that are mounted near their roost may work. Be persistent.

## **Keep them out of, and off, buildings.**

Seal all openings to eaves, lofts, steeples, and vents. Many materials work including metal, wood, glass, masonry, galvanized ¼- to 1-inch hardware cloth, and plastic or nylon netting.

1. To keep them out of sheds, barns, garages, hangars, and warehouses, staple ¼- to 1-inch polypropylene netting to the underside of the roof beams.
2. To keep them off ledges:
  - install a "post-and-wire" system, as described above.
  - fasten wood, stone, sheet metal, Styrofoam, or plexiglass "plates" to the ledge at a 45° angle so the birds can't comfortably perch there.
  - attach a sharply pointed steel device to the ledge. There are a few variations, including porcupine wire (prongs point out in many angles), ECOPICTM (vertical rods), and a steel coil that looks like a slinky. Pigeons don't like to land on these objects because they hurt, but some will foil these devices by layering nesting materials over them. If that happens, remove the nest. (If the prongs are too widely spaced apart, the pigeons will find it easier to perch on them.)
  - install electric shock devices on the ledge (Avi-Away™, Flyaway™, and Vertebrate Repellent System™). When the bird lands, it receives a nasty shock but is not killed.

## **Pesticides:**

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There are pesticides registered for use against pigeons in some states:

1. Nontoxic repellent: Polybutenes are sticky, and pigeons don't like to land on ledges, signs or other surfaces that have been

treated with them. Polybutenes can affect other species, and they can be messy and hard to remove. For these reasons, consider restricting your use of this tool to indoor applications.

2. Toxic repellent: Avitrol® may be registered for use in your state. This restricted-use pesticide is available only to certified applicators trained in bird control.
3. There is a registered fertility control agent (Ovocontrol-P®) that may reduce pigeon populations and conflicts. The product contains nicarbazin, which solidifies the egg yolk when nesting birds consume the bait. Several years of consistent use may be needed to see results. This product is available only to certified applicators trained in bird control.

### **Trapping strategies**

The pigeon is an exotic species, so please do not release any into the wild in large numbers. If a few pigeons are causing some trouble and you prefer nonlethal techniques, rest assured that releasing a few birds is not going to make a significant difference in the pigeon population. Unfortunately, they are both abundant and well-established.

### **Live traps**

1. Pigeon traps vary in size. If you need to capture more birds, use a bigger trap or several smaller traps.
2. Trap near roosting, loafing, and feeding sites. If they're roosting in a barn, you can trap them at night using nets.
3. In hot weather, trap near their water sources, such as a rooftop air-conditioning system.
4. Pre-bait the traps for 3 to 4 days by placing corn or milo around the outside of the trap.
5. Commercial pigeon trap. This is basically a box trap with a one-way door.

6. Cage trap designs include the funnel trap, lily-pad trap, and clover-leaf trap. The name describes the shape of the trap. These portable traps are made from screen and direct the birds inwards. They work best if you leave 4 to 5 pigeons inside as a decoy to attract other pigeons. Of course, leave food and water for the birds daily, and partially cover the trap to protect them from weather extremes.
7. If the birds become trap-shy, leave the traps open for 2 to 3 days, then reset for 4 to 5 days. If it's still not working, choose another site.
8. For construction details on these traps, see the "Pigeons" chapter in the book, *Prevention and Control of Wildlife Damage*.

## Lethal techniques

1. Shooting, with a .22-caliber rifle, shotgun, or air rifle, can be used to move a small flock.
2. Destroy nests and eggs. If you're persistent, this may be effective. Make a sweep of the area every two weeks and use this technique in conjunction with other management methods.

## Preferred killing methods

- CO<sub>2</sub> chamber
- Cervical dislocation
- Shooting, using an air rifle, a shotgun, or a .22-caliber rifle with bird shot

## Acceptable killing methods - Stunning and chest compression

## Control strategies that don't work well, or aren't legal in some states:

1. Ultrasonics don't work—the birds can't hear them.

2. Pigeons quickly become accustomed to noisemaking devices of many types. After all, they live happily under 8-lane-highway bridges. At best, expect only a short-term effect.
3. Lights, flags, balloons, rubber snakes, and owl decoys may amuse your neighbors, but they won't scare the pigeons for long.



# Rabbits

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## Species of interest: Cottontail rabbit

(*Sylvilagus floridanus*)



Cottontail rabbit. Photo by USDA

**Size:** 2 to 4 pounds. Body is 14 to 18 inches long.

## Legal status

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Protected. Game species with set season.

## Damage Prevention and Control Methods

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### Habitat Modification

- Remove brush piles, debris, dumps, and other cover
- Plant daffodils in place of tulips

### Exclusion

- 24-inch-high fences with bases secured to the ground to protect gardens and shrubs
- Cylinders made from hardware cloth to protect fruit trees and ornamental plants

## Frightening Devices

- None are reliable

## Repellents (vary in effectiveness)

- Thiram
- Capsaicin
- Putrescent eggs

## Toxicants

- None registered

## Shooting

- Sport hunting and shooting of problem individuals with .22-caliber rifles and shotguns

## Trapping

- Cage and box traps
- Some species are listed in northeastern states as threatened. Always check with state wildlife agencies before initiating control.

## Signs of their presence

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1. Visual sighting of animal.
2. Damaged garden crops: what won't they eat? Tomatoes—that's about it. But it's hard to tell whether a rabbit or woodchuck is responsible for damage to flowers or vegetables.
3. Damaged shrubs and trees. Usually, you can tell if this damage was caused by a rabbit, vole, or deer. Rabbits attack smooth bark and gnaw in patches. Their tooth marks are a little less than an inch wide, much wider, but less distinct, than the voles'. They often clip twigs, branches, and berry canes with a clean 45°-angle cut. Deer, on the other hand, lack upper incisors, so they leave ragged edges when they tear off branch tips.

4. Tracks: seen in groups of 4. The tracks of the back feet imprint ahead of the front feet because rabbits leap, pushing off from their front feet. The front track is almost round, about 1 inch wide; the hind track is about 3 to 4 inches long and oblong.
5. Scat: 1/3 inches in diameter, round, flying-saucer shaped, looks like compressed sawdust. One rabbit deposits 250 to 500 pellets a day. Like hares, voles, and beavers, they eat their feces to extract more nutrients from grasses and tree bark, which are difficult to digest.
6. Sounds: Usually quiet, other than a high scream of distress when attacked, the grunt of the mother when her nest is approached, or the high squeal of a female during mating.

## Diet

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Herbivore. In the winter, they often eat the bark, twigs, and buds of ornamental shrubs and fruit trees because everything else is covered by snow. In the spring and summer, they switch to vegetables, field crops, flowers, and other succulent green plants. It's probably easier to list what rabbits won't eat than what they will, because they'll eat many kinds of plants. They don't dig up carrots or flower bulbs and don't like tomatoes.

## Typical activity patterns

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**Social style:** Mostly solitary, although they may have an informal social network.

**Daily activity:** Nocturnal, and crepuscular. May feed during the day in summer, under or near thick cover.

**Hibernator?** No.

**Migrates?** No.

## Where found

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**Distribution** in New York and the Northeast: Common in suburban and rural areas. **Habitat:** Prefer brushy fence rows, field edges, overgrown pastures, sapling stands, and shrub or perennial borders in landscaped backyards. They don't need a water source because they can get what they need from snow or dew. Can reach densities of 3 to 5/acre; more if the habitat is favorable. They don't dig holes but will take refuge in a skunk or woodchuck burrow in bad weather—always staying right near the entry. Normally they rest in small depressions in the grass.

**Territory and home range:** Not territorial, but they are aggressive and establish a dominance ranking within each gender. Females are generally dominant over males, except during breeding. Rabbits have overlapping home ranges of 1 to 14 acres (average 5 acres) which may shift as food sources and cover change with the seasons. Males' home ranges are somewhat larger than females.

## Breeding habits

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- **Pair bonding style:** Rabbits are polygamous, with dominant males mating the most. Female raises the young alone.
- **Breeding dates:** Late February through September. Gestation is variable but averages 28 days. Females have up to 6 litters per year, giving birth to as many as 35 young. Females may breed again as soon as they've given birth.
- **Litter size:** 4 to 5. May see as few as 2 or as many as 8. Mothers only visit their young at night, to nurse them.
- **Weaning dates:** Between 4 to 5 weeks old.
- **Amount of time young remain with parents beyond weaning date:** Not long.

## Common conflicts

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**Time of year:** Any time of year.

## What are they doing?

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1. Eat flowers, vegetables, and agricultural crops.
2. Can girdle young trees and shrubs (ornamental and fruit).
3. Disease risks: tularemia.

## Management

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Rabbits are such prolific breeders and there are always so many nearby that are ready to move into a vacant territory that removal won't be effective for long. The best solution combines exclusion and habitat modification.

### Reduce their nesting sites:

1. Rabbits need dense cover close to their feeding areas to protect them from predators. Remove the cover and you make the area far less attractive to rabbits.
2. Remove brush piles.
3. Trim shrubs and fencerows.
4. Keep paths around gardens and fields closely mowed.
5. Clean up overgrown ditches or stream banks that are near crops.

### Protect vulnerable plants or areas:

1. For a small area, erect a 2-foot-high chicken wire fence with a 1-inch mesh that's either buried a few inches deep or very tight to the ground. Rabbits won't dig under the fence, but they will try to squeeze through loose spots. Support the fence every 6 to 8 feet with a strong post.
2. Put cylinders of ¼-inch-mesh hardware cloth around trees and shrubs until their bark roughens. Keep the mesh an inch or so

away from the plant. If you use 1/2-inch mesh, be sure it's far enough away from the plant to prevent the rabbits from nibbling through the mesh.

3. Commercial tree wrap can protect young trees. Remember, most tree damage happens during the winter. When there's deep snow, the rabbits can reach much higher.
4. A dome or cage of chicken wire over small garden beds will discourage rabbits.
5. A single-strand poly-tape electric fence will work well. To keep deer from damaging the fence accidentally, hang white cotton flagging on the fence every 6 feet to make it more obvious at night. You can spray the flagging with an odor-based deer repellent for extra security.
6. If there's an existing electric fence, add 3 additional wires at 5, 10, and 15 inches from the ground to keep the rabbits out, too. This also discourages woodchucks.
7. A 2-foot-high welded wire fence made of 1-inch mesh, installed in the rat wall "L" shape with a top wire that's electric also works well, but is more expensive.

## Pesticides:

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1. Many repellents registered for deer are also registered for use against rabbits. Egg-based repellents have proved effective; other possibilities include capsaicin (hot pepper), and thiram products.
2. No toxicants are registered for rabbits in most states.

## Trapping strategies

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Rabbits are such prolific breeders that trapping—or for that matter, shooting—won't solve the problem for long. More rabbits will gladly move in from other areas.

## Live traps

1. Rabbits are easy to capture in a box or cage trap (9 × 9 × 18 inches). Traps should be set just after sunset or just before sunrise, when the rabbits are most active. Winter is the easiest time to trap rabbits because there's less food around, so the bait is often more attractive.
2. Place traps close to the hole, feeding area, or trail. A trail of a few pieces of bait leading to the trap will help guide the rabbit into the trap.
3. Bait with apples or corn and add a few rabbit droppings to increase the bait's appeal.
4. Don't clean the trap between uses because the scent of a rabbit will attract other rabbits.
5. Place traps away from prevailing winds (winter) to keep snow and dry leaves from interfering with the trap door. And cover with dark canvas or other material to make the trap seem like a safe, secure place.
6. After a week, if the trap's not working, move to a new site.

## Lethal techniques

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1. Body-gripping traps, #110, or #120, set in the hole. Cover the trap or take other precautions to prevent the capture of non-target animals.
2. You can also suggest that customers invite hunters and beagle clubs to hunt on their properties during the legal season. An overall reduction in the local rabbit population may help reduce the chances of conflicts.

## Preferred killing methods:

1. CO<sub>2</sub> chamber
2. Cervical dislocation
3. Stunning and chest compression

4. Shooting using an air rifle, shotgun, or .22-caliber rifle (target the head if rabies testing isn't required, or the heart/lungs)

### Acceptable killing methods

1. Stunning and decapitation
2. Stunning and cervical dislocation
3. Stunning and shooting



# Skunks

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**Species of interest:** Striped skunk (*Mephitis mephitis*)



Striped skunk (*Mephitis mephitis*). (USDA Photo)

**Size:** 20 to 30 inches long, including 10 to 15-inch" tail. They weigh 6 to 12 pounds.

## Legal Status

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Striped skunks are classified as furbearers in most states. Spotted skunks are fully protected in some states. Legal status and licensing requirements vary. Check with state wildlife agency officials before removing skunks.

## Damage Prevention and Control Methods

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### Habitat Modification

- Remove garbage, debris, and lumber piles

### Exclusion

- Close cellar, outside basement, and crawl-space doors
- Seal and cover all openings
- Trench-screen decks and porches
- Install wire mesh fences around poultry yards
- Elevate beehives and install aluminum guards
- Secure the base of fences
- One-way doors under fenced decks and sheds

### Frightening Devices

- Limited value

### Repellents

- None are effective

### Shooting

- Effective, but usually emits odor

### Trapping

- No. 1 foothold
- No. 160 or 220 Conibear®-style or body-gripping traps
- 7- x 7- x 24-inch cage or box trap

### Other Control Methods

- Direct capture

## Signs of their presence

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1. Visual sighting of animal.
2. Sounds: Adults are generally quiet, although you'll hear them stamp their feet. Young skunks are more vocal, especially

when playing. You may hear teeth clicking, hissing, grunts, growls, purrs, squeals, and shrill screeches.

3. Odor is a nauseating, penetrating, acrid musk.
4. Tracks: Small relative to body size, 5 toes on all feet, smooth continuous palm pads, long front nails.
5. Scat: Scat includes mostly insect body parts, some fur, and seeds. (May be slightly curved.)
6. Evidence of their feeding: Funnel-shaped holes in lawns, 3 to 4 inches in diameter, where skunks dig for grubs. Eggs that have been crushed at one end, with shell fragments pushed inside. (Raccoons usually remove one end of the shell without crushing it. Foxes carry eggs away. Weasels and mink crush the entire egg.) Another sign that skunks have been raiding the chicken house is if only 1 or 2 birds have been killed, because most other predators will kill several birds.

## Diet

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**Opportunist.** Their diet changes seasonally. Skunks eat primarily insects (including ground bees and wasps), as well as earthworms, snakes, mice, moles, fruit, nuts, fish, amphibians, crustaceans, birds, eggs of birds and turtles, poultry, garbage, pet food, and carrion. They're particularly fond of grubs, and they occasionally raid vegetable gardens.

## Typical activity patterns

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**Social style:** Generally solitary, except for female with dependent young, and when denning in winter.

**Daily activity:** Nocturnal. During the summer, may see daytime activity, as females forage with their young. May bed down during summer in open sites away from the den.

**Hibernator?** Skunks sleep deeply for up to 3 1/2 months at a time but are not true hibernators. They'll emerge periodically during warm spells and during the mating season. Skunks den alone, or in a

group of 2 to 7 females and 1 male. They may lose up to 38% of their body weight during the winter.

**Migrates?** No.

**Where found:**

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**Distribution** in New York and the Northeast: Common. Can reach densities of 50 skunks/square mile in suburban areas. Less common on Long Island, but population may be increasing.

**Habitat:** Widespread, from coastal habitats to mature woodlands and small woodlots. Prefers open fields, lawns, and agricultural areas with areas of mixed shrubs and forest edges, near buildings, barns, or porches.

**Territory** and home range: Skunks rarely travel more than one mile from their den except during breeding season.

**Breeding habits**

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- **Pair bonding style:** Polygamous. Females raise young alone. (Male skunks will kill their young.)
- **Breeding dates:** Late February through March. Gestation takes about 62 to 75 days.
- **Birthing period:** May through early June.
- **Litter size:** 2 to 10, often 4 to 7.
- **Weaning dates:** At 2 months old.
- **Amount of time young remain with parents beyond weaning date:** Kits forage with their mother when they're 7 weeks old. They're independent at 3 months and disperse in the fall.

**Common conflicts**

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Time of year: Conflicts peak in February and March when they're mating. In May and June, problems are usually related to their

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grubbing in lawns. This picks up again in late July, continuing through mid–October. Also, during that period, you may get calls about "rabid" skunks that are active during the daytime.

### **What are they doing?**

1. Seeking a sheltered place to raise their young. They may den under porches, decks, foundations, garages, barns, or sheds.
2. Stinking up the place. Skunks can be very smelly, especially from the mating season through the whelping season, if the female fights off a male. If the smell seems to come and go, and is more noticeable at dawn or dusk, or with a shift in wind direction, or seems to be coming from an area with evergreen trees, it might be the odor of a great horned owl. These owls commonly eat skunks.
3. Defending themselves. Skunks are a mild-mannered, slow-moving, mind-your-own-business kind of animal. If provoked, they may spray people or pets. Their spray can reach up to 16 feet. Skunks can spray once they're 2 to 4 weeks old. They can spray up to 6 times in a row, then need a day to "recharge."
4. They'll fall into window wells while searching for insects and toads, and then become trapped.
5. Skunks dig in lawns for grubs. They'll sometimes scratch beehives in search of honey and insects, or raid poultry houses for eggs and chickens (but that's rare, and such damage is more likely the work of a raccoon).
6. Disease risks: Rabies (they are a rabies vector species in New York), distemper.

### **De-bunking myths about skunks**

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*A skunk that's active during the day is rabid.* Not necessarily. It may be a healthy female that's feeding more often than usual, because of the demands of her young.

*Skunks are trigger-happy with their sprays.* Adult skunks are not trigger-happy but "teenaged" skunks may be. Very young skunks squirt small amounts of fluid as they walk because they're not yet mature enough to have control of the "spray muscles." If you can "talk skunk," you can usually tell if an adult skunk intends to spray.

*Grubbing by skunks is always accompanied by an odor.* Grubbing by skunks is sometimes blamed on other animals because there's no skunk smell. Skunks spray in defense.

## Management

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When dealing with skunks, a new factor enters into the choice of capture, transport, and dispatch methods —how to keep the skunk from spraying. People who have handled skunks successfully for decades may advise those less experienced with handling skunks to relax. Move slowly and quietly, and don't wave your arms around. Be patient and gentle. Learn their habits and use those to your advantage.

For example, skunks like to see their targets. If they can't see, they're not likely to spray. So, if you use a plastic box trap, or cover the sides of a cage trap, you'll reduce the risk of being sprayed. For a more securely covered cage trap, attach 1/4-inch plywood to the sides and top. Leave room to reach the trigger release, and the carrying handle.

It's better to work with a covered trap than to cover the trap after you've caught the skunk. You may want to create a partially covered wire trap to use during hot weather, when the plastic traps could cause the skunk to overheat and die.

Here are some tips for capturing a skunk that's indoors. Set up a covered trap, and then slowly and quietly approach the skunk from behind. Guide the skunk toward the trap by gently pushing it with a broom or occasionally squirting it with water from a spray bottle. If you are nervous about working with a skunk don't do it!

## **Remove food sources and shelter**

1. Put trash out in morning instead of the evening, if possible, or keep it in a protected area.
2. Use a skunk-proof garbage can with a tight-fitting lid or secure it with straps.
3. Don't leave pet food or their food bowls out at night.
4. Enclose compost piles in a framed box using hardware cloth or welded wire; in a sturdy container, such as a 55-gallon drum; or in a commercial composter.
5. Treat lawns to reduce grub populations (biological controls are preferred. In the southern part of the New York, where it's been proven to work, try Milky Spore).
6. Keep mice out of buildings. Skunks eat them and will go inside buildings looking for them.
7. Remove brush piles and debris.

## **Protect vulnerable areas and crops.**

1. Close garage doors at night.
2. Cover window wells. There are readily available commercial window well covers that are inexpensive.
3. Close basement windows at night and keep them in good repair.
4. Fence beehives or poultry areas with 1-inch-mesh chicken wire, 1- × 1-inch or 1- × 2-inch vinyl coated or galvanized welded-wire mesh, or hardware cloth (1/4-inch or 1/2-inch mesh). If there's already an electric fence, add a wire at 5 inches off the ground. Or place the hives 3 feet above the ground.

## **Keep them from denning under buildings.**

If this is a preventive action, or there are no young present, you can:

1. First, ensure that the skunks have left the den. Close all the entrances to the den except the main hole. You can place a one-way door over that hole for 3 to 4 days to give the skunks time to leave or use the soft plug method. Sprinkle talc, or nontoxic tracking powder on the ground inside the den area near the hole, then cover the hole with hardware cloth. Return the next day to check for tracks. Once you're sure the skunks are gone, you can permanently seal the hole.
2. Screen areas under decks, porches, and houses (foundation skirt) with a "rat wall". Use 1- × 1-inch or 1- × 2-inch vinyl coated welded-wire mesh or hardware cloth (1/4-inch or 1/2-inch mesh). The fence must be buried 3 to 6 inches deep, with the bottom edge bent outward at 90° into an "L" shape that sticks out 6 to 12 inches to prevent the skunks from burrowing underneath it. If you can't bury the fence, the 90° bend extending along the ground can be effective. This design also works for a freestanding fence. If the top isn't attached to the deck or porch, the fence should be 3 feet high.
3. Skunks can squeeze through small openings in buildings. Seal any hole or crack that's 3 to 4 inches across with sheet metal, concrete, or hardware cloth.

**If young are present, remove or evict the entire family before blocking the entrance to their den.**

Trap and release strategies to reduce the risk of orphaning wildlife: The best way to prevent orphaning is to convince your clients to wait until the young are mobile before removing, repelling, or excluding the family from the site. If that's unacceptable, you can try to capture and remove both the female and all her young and hope that she will retrieve them and continue to care for them. Some people are trying to refine removal techniques to increase the chances that the female will retrieve her young. Here are their suggestions.

Capture the mother and young. Release them on-site, at dusk or in the evening.



Place the female and young in a release box. Many people use a simple cardboard box, others use a wooden nest box, such as a wood duck box, and some prefer plastic boxes. Match the size of the box and its entrance hole to the size of the species. (One person recommends a 2- × 2- × 1-foot box.)

Make sure the animal cannot immediately get out of the box by covering the hole. Then move them to a quiet place outdoors. Unless they're likely to be disturbed, keep the box at ground level. Remove the cover so the female can get out of the box. Another option is to build a box with a sliding door. Leave the door open about an inch, to keep the heat inside but make it easy for the female to slide it fully open so she can retrieve her young.

Some people prefer to use heated release boxes. Use heat only when appropriate, and make sure that the box doesn't get too hot. You may want to provide heat in just one area. Also, assume that if you put something in the box, they will chew on it. Don't give them access to anything that they shouldn't eat, such as wires. That means that if you choose to use a household heating pad as the heat source, make sure the animals can't reach the wires. To avoid that problem build the boxes with a double floor, placing the heating pad in the space between the floors. Other options for heat sources include microwaveable heating pads and warm soap-stones.

If you can't catch the female, put the young in the release box and locate it as close to the entry site as possible.

Check the next day to see if the young are still there. If so, they've probably been abandoned. There hasn't yet been enough research on this technique, so its effectiveness is unknown. Cover the hole to the den with a soft plug to make sure that no skunks are still using it before permanently sealing the hole.

If the young are older and mobile, install a one-way door over the entry hole. They'll leave but won't be able to re-enter. Wait 3 to 4 days before sealing the entry permanently.

## How to avoid being sprayed:

1. Skunks give a warning before they spray. They turn to face the aggressor, arch their backs, raise their tails, stamp the ground, and shuffle backwards. Then, just before spraying, they bend into a "U" shape, so both their head and tail face the target. Should you see any of these signals, back away slowly and quietly, and don't wave your arms around.
2. Take precautions before letting dogs out at night or keep them on leashes and maintain control.

## How to get rid of that lovely "eau de skunk".

1. First, ventilate the area.
2. A mix of equal parts of tomato juice and vinegar will clean a dog, but most people don't realize that you'd have to soak your pet for an hour—and then wash with soap. Here's an easier recipe, developed by chemist Dr. Paul Krebaum:
  - 1 quart of 3% hydrogen peroxide
  - 1/4 cup baking soda
  - 1 teaspoon liquid soap

Mix ingredients together and immediately wash your pet, or soak your clothing, while the solution is bubbling. Rinse. Don't try to bottle this mix because it generates a lot of oxygen and could explode.

3. To clean clothing or objects, two household products will work: ammonia or bleach (oxygen or chlorine bleach). You must choose one OR the other. Don't mix them because together, they form toxic fumes. So, either pour a little ammonia into water, or a little bleach into the water. Soak the clothes for several hours, then wash as usual. You may have to wash the clothes a few times, and there may be some discoloration. You could also try Dr. Krebaum's recipe, listed above.
4. There are many commercial deodorizers that can neutralize or mask the odor.

## Trapping strategies

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### Live traps:

1. Cage trap should be 9 × 9 × 24 inches for a single door model, longer for a double door model.
2. Bait with commercial fruit-based bait or peanut butter (sardines and cat food are effective but will also attract cats).
3. The skunk will be calmer if it enters a dark space. Use a plastic box trap, except during hot weather, or cover the sides of a cage trap with boards.
4. Foothold trap, #1 or 11/2 (double-jawed traps preferred, but can also use standard jaw or laminated traps), or the Lil Grizz Get'rz™, Duffer™, or EGG™ cylindrical foothold traps designed for raccoons.
5. How to get a skunk out of a window well. Skunks are poor climbers. Many people will suggest placing a board in the well to allow the skunk to climb out on its own, but this will only work if the window well is large enough so the board can be placed at a shallow angle of less than 45° (if you try this, give the skunk some traction by nailing a few boards or some cleats across the board). Unfortunately, most window wells are too small for this technique. Instead, try restraining the skunk with a Cat Grasper™ (akin to a catchpole) and then lifting it out, or place a small cage trap or small cardboard box in the well and guide the skunk into it using a long stick. Work calmly and you should be able to remove the skunk without being sprayed.

### Lethal traps

- Body-gripping trap, #120, #160, or #220 in a restricted opening set that reduces the risk to dogs and cats (vertical cubby, bucket with restricted opening, or a deep-notch box set). The skunk may spray.
- Modify the trigger to help ensure a top-to-bottom strike (which is more humane) and to prevent the skunk from

refusing to enter the trap. Skunks don't like to have anything brush against their eyes or whiskers, so separate the trigger and center it on the top or bottom of the trap. Proper positioning helps to ensure a cleaner, more humane catch.

## Preferred killing methods

1. The skunk will probably spray, so be prepared
2. CO<sub>2</sub> chamber (let the animal settle down before turning on the gas, and use a lower flow rate to avoid frightening the animal)
3. Lethal trap
4. Shooting, using a shotgun with #6 shot or a .22-caliber rifle (target the head, if no rabies testing is needed, or the heart/lungs). The skunk will almost certainly spray if you use the head shot.

## Acceptable killing methods

1. Stunning followed by chest compression. The skunk will probably spray, so be prepared.

## Control Methods that don't work well or may not be legal

1. No toxicants or fumigants are registered for skunks.
2. Moth balls aren't registered for this use and could be dangerous to people if used in the quantity that would be needed.
3. Other repellents haven't worked against skunks.

# Snakes - Venomous and Non-Venomous

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**Species of interest: Nonvenomous snakes, usually docile:**



Prairie rattlesnake (*Crotalus viridis*). Photo by Dan Fogell.

Common—

- **Common garter snake** (*Thamnophis sirtalis*) **Common near homes.**
- **Eastern milk snake** (*Lampropeltis triangulum*) **Common near homes.**
- **Northern brown snake** (*Storeria dekayi*)
- **Eastern ribbon snake** (*Thamnophis sauritus*)

Less common—

- **Black rat snake** (*Elaphe obsoleta*) **Found near homes.**
- **Eastern hognose snake** (*Heterodon platirhinos*)

## Legal Status

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Snakes are considered nongame wildlife and are protected by law in most states, unless they are about to cause damage to persons or property. Snakes should never be killed indiscriminately. Some species are listed on both federal and state threatened and endangered species lists.

# Damage Prevention and Control Methods

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## Habitat Modification

- Reduce sources of food including populations of rodents, fish, and invertebrates
- Keep vegetation closely mowed
- Remove bushes, shrubs, rocks, boards, firewood, and debris lying close to the ground
- Alter sites that provide habitat and protected basking locations

## Exclusion

- Seal all openings  $\frac{1}{4}$  inch and larger with mortar,  $\frac{1}{8}$ -inch hardware cloth, sheet metal, Copper Stuff-Fit or Xcluder™
- Snake-proof fence

## Frightening

- Not applicable

## Repellents

- Several repellents for snakes have been promoted but none have extensive research demonstrating effectiveness for real-world applications.

## Toxicants

- None registered

## Shooting

- Shotguns and small-caliber rifles when health and safety are at risk

## Trapping

- Funnel or pitfall traps with drift fences
- Glue board traps (not recommended)

## Other Control Methods

- Place piles of damp burlap bags or towels where snakes have been seen

### Nonvenomous, aggressive:

- **Northern water snake** (*Nerodia sipedon*) **Common around homes with nearby ponds.**

### Venomous, defensive:

- **Eastern massasauga** (*Sistrurus catenatus*)
- **Timber rattlesnake** (*Crotalus horridus*)
- **Copperhead** (*Agkistrodon contortrix*)

### How to tell a nonvenomous snake from a venomous one:

Nonvenomous snake:	Venomous snake:
Pupil: round	Pupil: like a cat's eye, vertical
No pit between the eye and nostril	Pit between the eye and nostril (the 3 venomous snakes in NY are all pit vipers)
Shape of head variable, often slender	Broad, triangular-shaped head
Scales underneath the tail, toward the tip, are divided	Scales underneath the tail, toward the tip, are undivided

### Size

**Garter snake:** 2 to 4 1/2 feet, usually smaller.

**Milk snake:** Up to 4 1/2 feet long. Sometimes confused for the copperhead.

**Black rat snake:** Up to 4 1/2 feet long.

**Water snake:** Up to 4 1/2 feet long.

## Signs of their presence

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1. Water snakes often sun themselves on boat docks.
2. Milk snakes and black rat snakes are frequently found in barns.
3. On cool days, you may find snakes (especially the black rat snake) resting on top of the heating ducts in buildings heated with forced hot air.
4. Sounds: Silent, except for the rattlesnake, which rattles, and the milk snake, which may also vibrate its tail if annoyed.
5. Scat: Elongated, whitish. The scat of a black rat snake may be large.
6. Shed skin (large, over 2-foot long): Probably from a black rat snake.
7. Evidence of their feeding: Hard to identify because they swallow their prey whole.
8. Garden and crop damage: None because they are strictly carnivores.
9. Building damage: None, because they use only existing holes and entryways, and don't create others.

## Diet

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Carnivores. Black rat snakes eat mostly small rodents and birds. Garter snakes eat mostly earthworms, but also slugs, amphibians, fish, crayfish, insects, small birds, other snakes, and carrion. Milk snakes eat rodents and other snakes. Water snakes eat mostly fish, also amphibians, insects, and crayfish. Other snakes add spiders, bird eggs, and rabbits to the menu.



## Typical activity patterns

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**Social style:** Solitary, but may hibernate with other snakes, even those of different species.

**Daily activity:** Mostly diurnal. Milk snakes are usually nocturnal.

**Hibernator?** Yes. Snakes will often hibernate (usually from October/November to March/April) in a large group that may include snakes of different species.

**Migrates?** No, but they do move to hibernating site.

## Where found

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**Distribution in the Northeast:** The common garter snake, milk snake, and water snake are common throughout New York. The black rat snake is only found in certain spots in upstate New York.

### Habitat:

**Black rat snake**—woods, fields, rocky hillsides, river bottoms. Often found in barns or other areas that are home to rodents.

**Garter snake**—wide variety of moist areas, from woodlands to marshes to fields.

**Milk snake**—usually seeks brushy or woody cover in many of same habitats favored by black rat snake. Also often found in barns or other areas that are home to rodents and other snakes.

**Water snake**—rivers, brooks, wet meadows, ponds, and swamps, preferably still or slow-moving water, in areas with overhanging branches and rocks (for cover and basking). Common near dams and bridges. Often suns on boat docks.

**Black rat, garter, and milk snakes** will follow their prey into barns and houses, usually in basements but sometimes attics. That's especially true for the black rat snake because it's an excellent climber. Most snakes prefer sunny areas where rock or wood piles and other debris provide cool, shaded hiding places. They move from sunny to shady areas to regulate their body temperatures.

**Territory and home range:** Not generally territorial, but snakes are faithful to den sites ("hibernacula") in their home range. They'll reuse these sites from year to year and are sometimes found in large numbers. This makes them vulnerable to habitat destruction and persecution.

## Breeding habits

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**Pair bonding style:** Polygamous.

**Mating dates:** Black rat: May to June. Garter: first few warm days after emerging from hibernation, usually mid-March to May, then mates again in the fall before entering hibernation. Milk snake: June. Water snake mates in April to May and again in the early fall.

**Egg-layers:** Black rat and milk snakes lay eggs in loose soil, decaying wood, or sawdust or manure piles. Black rat snakes lay their eggs from May through early July. Milk snakes lay in mid-June to July.

**Live young:** Garter and northern water snakes.

**Birthing/eggs hatch dates:** Garter snakes give birth July to early September. Northern water snakes give birth in August to early October. The eggs of the black rat snake hatch between July and September, those of the milk snake from late August to October.

**Clutch size:** Black rat snake: average 14 (6 to 24). Garter: average 14 to 40 (3 to 85). Milk snake: average 13 (6 to 24). Northern water snake: average 20 to 40 (10 to 76).

**Weaning dates:** Young are able to fend for themselves at birth or upon hatching.

## Common conflicts

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**Time of year:** Spring through fall.

Snakes don't damage buildings or eat crops. They only enter buildings through existing holes, cracks, or openings (such as an

open window). Some people are afraid of snakes. Others welcome them, because some snakes eat mice and rats and help to control those pest populations. Remember, however, that if a snake can get into a home, so can other creatures.

### **What are they doing?**

1. These snakes sometimes hibernate in buildings, especially the basements of old houses with stone foundations. They usually enter houses through torn screens, open basement windows, cracks in the foundation, or through gaps next to pipe and cable entrances.
2. They follow prey (mice, insects) into cellars, crawl spaces, attics, barns, sheds, garages. They may also be found in wood piles and debris, in heavily mulched gardens, and under shrubs, tarps or planks. They seek cool, damp, dark places.
3. Their presence may frighten or annoy people. Several species, including the garter snake, may emit a foul and musky smell when handled.
4. Disease risks: salmonellosis (food poisoning).
5. Injury risks: nonvenomous snakes have tiny teeth. They leave a faint, U-shaped bite mark. Their bites rarely hurt much or cause problems, exception for the northern water snake, which is known for its nasty bite. A bite from a venomous snake (copperhead, massasauga, timber rattlesnake) will swell, hurt, and turn black and blue. Children and the elderly are at greatest risk for a severe reaction. If bitten, remain calm and get medical help. Do not use a commercial snake bite kit; they tend to do more harm than good.

### **De-bunking myths about snakes**

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1. *If bitten by a venomous snake, suck out the poison.* Do NOT try to suck out the poison. Do not slice the wound. Get medical help.

2. *Snakes dig holes.* Snakes don't dig. They can't make holes.
3. The milk snake and northern water snake (both non-venomous) are often confused for the copperhead or the water moccasin (both venomous).

## Management

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### Remove their food sources:

1. Grains, pet food, and bird seed will attract mice, insects, and other species, which then attract snakes. Keep these foods in mouse- or insect-proof containers. Exclude insects and mice from your buildings.
2. Reduce the amount of mulch in your garden, around trees and shrubs (again, this will discourage mice and other potential snake food).

### Reduce their shelter

1. Mow closely around buildings.
2. Remove wood piles, junk, and piles of rocks.
3. Don't plant right next to the foundation because that provides cover for snakes and many pests.

### Prevent them from entering buildings

1. Seal all openings that are larger than 1/4-inch with mortar, expanding foam, cooper mesh (Stuf-Fit®), 1/4-inch hardware cloth, or sheet metal.
2. Fences may keep them out. Use 1/4-inch-mesh hardware cloth. The fence should be 3 feet high, buried 1 foot deep, with the bottom edge bent outward into an "L"-shaped shelf that sticks out at a 90° angle to prevent the snakes from slipping under the fence. Fences are more likely to work well around a small area. Otherwise, high maintenance needs may make this impractical, because some snakes would be able to travel through chipmunk tunnels that pass under a fence.

3. Although snakes cannot create holes, they will use holes that were made by rodents and other animals. To prevent the problem from happening again, you may need to identify the maker of the holes and exclude them, too.

## Trapping strategies

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### **Direct capture methods and live traps for non-venomous snakes:**

1. Pick them up, wearing heavy leather gloves for protection. Support the snake's entire body to keep it calm. Hold snakes behind the head, to keep them from biting you.
2. With care, snakes can also be captured with a "snake stick," which is a catchpole modified for snakes. A forked stick can also be used (carefully!) to pin down a snake.
3. They can be scooped into a garbage can using a scoop or shovel.
4. To live trap water snakes, add a brick-sized piece of Styrofoam to a minnow trap (so the trap will float, allowing the snake to surface for air). Bait with about a half-dozen minnows. Attach a rope to the trap for easy retrieval, then float it near the shoreline.
5. If the snakes can't be found, you can lure them to a spot where they can be easily captured. Place piles of damp towels or burlap sacks on the floor, near the walls. Cover the pile with a dry burlap bag to keep it moist. In a few days, return to the pile during the middle of the day, when the snakes are most likely to be there. Scoop up the pile with a large shovel, put it into a large garbage can, and carry it outside.
6. Create a reptile tube trap, based on a technique suggested by HSUS animal capture consultant, Dave Pauli. Inside this trap, the temperature should be just right for the snake—more appealing than the surrounding area. The trap is a piece of thin-walled PVC tubing that's 2 to 3 feet long. Drill a few 1/8-

inch air holes along the length of the tube. Cap one end. In cold weather, place a disposable hand warmer, battery-operated electric sock or heating pad in the far end of the tube, along with some soft cotton rags. If you have fresh rodent droppings, you may want to toss a few in there, too. (In hot weather, substitute an ice pack or cold, wet rag for the heat source.) Then drill a 1-inch hole into a cap and use it to cover the other end of the tube. Although the snakes can leave the trap, they usually stay inside because it's more comfortable for them. You can install a one-way valve by affixing a 1 1/2-inch stiff plastic circle over the inside of the cap. The snake can push its way in but can't leave easily. (This trap also works with other reptiles, such as lizards.)

7. Glue boards designed for mice will also catch smaller snakes. You may be able to release the snake unharmed by pouring a little bit of cooking oil onto it. Some biologists believe the oil harms the snakes. This method is not recommended.

## **Venomous snakes**

Only experienced snake-handlers should capture venomous snakes. They're often handled using a catchpole and then transferred into a sturdy container.

### **Using a one-way door to exclude snakes from a building.**

This technique was developed by wildlife consultant William Bridgeland. Roll aluminum insect screening into a tube, then attach it over the entry hole, which is usually found in the foundation. Angle the tube up slightly and flatten its outer end a bit. Leave the tube in place for at least two weeks while snakes are active (summer). Don't substitute another material for the insect screening. Snakes may use scent to find their entry holes. Insect screening scatters odors, which would make it harder for the snakes to locate the entry hole, but other materials might retain their scent and direct the snakes back to the opening. If they find the opening, they may be able to get back inside.

## Pesticides:

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There's a repellent, Snake-A-Way, registered for use against rattlesnakes in some states. Its effectiveness varies greatly depending on the species.

## Preferred killing methods

First, discuss the situation with your client. Is it necessary to kill the snake? (And remember, is it legal?) Would removal and exclusion be sufficient? If not: Shooting, using bird shot (target the head) or use Stunning and decapitation.

# Starlings

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**Species of interest:** European starling (*Sturnus vulgaris*)



European starling (*Sturnus vulgaris*). Photo by unknown.

**Size:** This exotic species is about 3 ounces. Body is 11 inches long.

## Legal status

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Unprotected. The European starling is an exotic species; an exemption to the Migratory Bird Treaty Act allows for its control without a federal permit. Local ordinances may prohibit certain control measures.

## Signs of their presence

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1. The bird itself is the most obvious sign. It's hunchbacked, short-tailed, and robin-sized with swift, direct flight, not rising and falling like many blackbirds. Starlings are often seen in large, noisy flocks.
2. Sounds: Cries and songs range from a raucous to nearly melodic chatter, made up of dozens of variable (and loud) wavy, whiney, wheezy sounds mixed with high whistles and imitations of other bird calls.



3. Droppings: Buildup of droppings on rafters, building ledges, public areas.
4. Nests: Coarse-looking nests of sticks and stems in any hole or cavity. They'll nest in such places as trees, birdhouses, cracks in buildings, within eaves, on cliff faces or building ledges, on roof beams inside barns and warehouses, and on shopping center signs.

## Diet

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Omnivore. Seeds and fruits (native and cultivated), and insects—especially grubs, which are essential during breeding season. Insects and other invertebrates make up about half of their diet. Starlings will gladly feast on every orchard and berry crop. They eat livestock rations, picking out the high-protein supplements mixed into the feed. Starlings often contaminate more than they eat. They'll eat garbage, too.

### Typical activity patterns:

**Social style:** Sociable outside the breeding season. Fall flocks are smaller (up to several thousand birds) and spread over a large area. In winter, starlings gather in much larger flocks (sometimes over a million birds) that are concentrated in smaller areas (few acres). They may use the same winter roost year after year.

**Daily activity:** Diurnal.

**Hibernator?** No.

**Migrates?** Some do, some don't. Yearlings are more likely to migrate. The starlings who do migrate may travel up to several hundred miles.

## Where found

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**Distribution:** Common in cities and around farms.

**Habitat:** Urban, suburban, and rural areas that offer nest sites (holes in trees, buildings), and foraging areas (parks, lawns, fields, pastures, livestock facilities, dumps).

**Territory and home range:** Starlings are territorial during the nesting season.

## Breeding habits

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**Pair bonding style:** Monogamous. Both parents build the nest, incubate the eggs, and feed the young.

**Breeding dates:** Early to mid-spring.

**Clutch size:** 4 to 7 eggs. Young hatch in 11 to 13 days. Females may lay a second clutch, but it's apt to be less productive.

**Fledging dates:** Young leave the nest after about 3 weeks.

**Amount of time young remain with parents beyond fledging date:** They don't.

## Common conflicts

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**Time of year:** Any time of year.

## What are they doing?

1. Nesting in attics, under the eaves, and in soffits and other openings in buildings.
2. Where enormous flocks (up to a million starlings) gather, they can be intensely noisy. Their droppings smell bad and are corrosive and slippery to walk on. Under certain conditions, the droppings can promote the growth of the fungus that causes histoplasmosis, an airborne disease that affects people.

3. These "feathered bullets" can cause plane crashes. Starlings travel in large flocks that can collide with a plane or get sucked into the engine.
4. Eat (and contaminate) livestock feed, grains, fruits (grapes, peaches, blueberries, strawberries, figs, apples, cherries), and garbage.
5. Take over nesting sites of native cavity-nesting songbirds (purple martins, flickers and other woodpeckers, bluebirds) and wood ducks. If nest sites are limited, starlings may severely hurt the populations of these native birds.
6. May transfer disease (transmissible gastroenteritis) from one livestock facility to another.
7. Disease risks: histoplasmosis to people, transmissible gastroenteritis to livestock, especially pigs.

## Management

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### **Remove artificial food and water sources (bird seed, grains, pools):**

1. If anyone's feeding the starlings, persuade them to stop.
2. Clean up spilled grain.
3. Store grain and bird seed in bird-proof containers or structures.
4. Use bird-proof livestock feeders: flip-top pig feeders (constant banging keeps starlings uneasy); lick wheels for liquid supplements; auto-release feeders for high-protein rations.
5. Livestock feed that's compressed into cubes or blocks larger than ½- inch across are too big for starlings to swallow. Avoid 3/16-inch pellets because starlings eat them 6 times more quickly than granular meal. And don't feed your

livestock on the ground—that's like setting a place for the starlings.

6. Starlings really like those high-protein supplements, so mix the supplements into the feed thoroughly to make it harder for the birds to pick it out.
7. Delay feeding livestock until late afternoon or nighttime, if possible.
8. Feed livestock in a covered area, such as a shed, which is less attractive to the birds.
9. Starlings are attracted to water. You have 2 choices with pools, troughs, and other containers that catch water: either drain them or keep the water level out of the starlings' reach. Do that by keeping it low enough so they can't dip in easily while perching on the edge, and deep enough so they can't stand in the bottom.

### **Make outdoor roosts less appealing**

1. In a dense grove, thin trees. If a tree is a preferred roost site, trim out about a third of its branches, concentrating on the inside center of the crown. This will reduce the number of available perches and increase the birds' exposure to weather. With less, and poorer shelter, fewer starlings will congregate.
2. A combination of frightening techniques (noises and visual deterrents) may convince the starlings to leave a roost. As always, your chance of success increases if the techniques are used together and in an unpredictable fashion. Try noisemakers such as tape-recorded distress and alarm calls, shell crackers, propane cannons, shotguns, and beating on tin sheets or barrels. Eye-spot balloons, hawk kites, lights, and mylar reflectors, and dousing the birds with water from hoses or sprinklers that are mounted nearby, may also work.

Starlings that are used to people and city noises may not respond.

3. Use bird boxes with openings that are too small for starlings. Modify wood duck boxes to make them less attractive by placing them horizontally instead of vertically. Build them out of a 2-foot-long piece of stove pipe that's 1 foot in diameter.

### **Keep them out of, and off buildings**

1. Remove the nest by hand, if possible. Then seal the entry hole.
2. Seal all openings that are bigger than 1 inch in diameter. Many materials work; metal, wood, glass, masonry, galvanized ¼-inch hardware cloth, and plastic or nylon netting.
3. Cap chimneys. (A cover that slips inside the tile liner is adequate).
4. To keep them off ledges:
  - fasten wood, stone, sheet metal, styrofoam, or plexiglass "plates" to the ledge at a 45° angle so they can't comfortably perch there.
  - attach a sharply pointed steel device to the ledge. There are a few variations, including porcupine wire (prongs point out in many angles), ECOPIC™ (vertical rods), and a steel coil that looks like a slinky. Birds don't like to land on these objects because they hurt, but some will foil these devices by layering nesting materials over them. If that happens, remove the nest. (If the prongs are too widely spaced apart, the starlings will find it easier to perch on them.)
  - install electric shock devices on the ledge (Avi-Away™, Flyaway™, and Vertebrate Repellent System™). When the bird lands, it receives a nasty shock but is not killed.
5. To keep them out of farm buildings and warehouses, hang 10-inch-wide vinyl or rubber strips over open doorways (with no

more than a 2-inch gap between strips). You and your equipment will pass through, but the birds won't.

6. To keep them from nesting and roosting in sheds, barns, garages, hangars, and warehouses, staple ¼- to 1-inch polypropylene netting to the underside of the roof beams.

## **Pesticides:**

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1. Repellent spray: Certain grape-like flavorings (methyl anthranilate), when sprayed on fruit, repel starlings but don't harm the fruit or people (Rejex-it®, BirdShield). This may be impractical because of cost.
2. Repellent gels: Polybutenes are sticky, and starlings don't like to land on ledges, signs or other surfaces that have been treated with them. Polybutenes can affect other species, and they can be messy and hard to remove. For these reasons, consider restricting your use of this tool to indoor applications.

## **Protect valuable crops**

1. Cover berries, cherries, and grapes with netting.
2. Methyl anthranilate (repellent spray described above) may help protect fruit.

## **Trapping strategies**

The European starling is an exotic species, so please do not release any into the wild. If a starling has fallen into someone's chimney and your client prefers nonlethal techniques, rest assured that releasing one bird is not going to make a significant difference in the starling population. Unfortunately, they are both abundant and well-established.

## **Direct capture techniques and live traps**

1. If the starlings are roosting on a low perch, you may be able to capture them at night, using spotlights and dip nets.

2. Nest-box trap, only useful during nesting season. A bird box that's modified to close the opening once the starling hits the trigger panel on the bottom of the box. A mouse snap-back trap can be used to create the triggering mechanism for this starling trap.
3. Decoy trap, for use during the fall and winter when starlings are flocking. This trap may capture as many as 100 starlings a day. This trap is big: 6x8x6 feet, or even bigger. It can be mounted onto a farm wagon for easy movement to the starlings' preferred roosts. Leave a few starlings (with lots of water and food) in the trap as decoys. The trap can be used with bait instead of decoys, but be more patient, because that method is less effective.

For construction details on both traps, see the "European starling" chapter in *Prevention and Control of Wildlife Damage*.

### **Preferred killing methods**

1. CO<sub>2</sub> chamber
2. Cervical dislocation
3. Shooting, using an air rifle, a .22-caliber rifle with bird shot, or a shotgun
4. Stunning and chest compression

### **Control strategies that don't work well or aren't legal in most states.**

1. Netting over a doorway isn't as wise a choice as plastic strips because the netting will probably tear.
2. Ultrasonic devices don't work—the birds can't hear them.
3. ReJex-It® (methyl anthranilate) can be used in different ways but only one use is registered in New York for starlings; you can use this grape-like flavoring to repel them from cherries, blueberries, and grapes.

# Tree Squirrels

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Eastern gray squirrel (*Sciurus carolinensis*).

## Species of interest:

- **Gray squirrel** (*Sciurus carolinensis*)
- **Red squirrel** (*Tamiasciurus hudsonicus*)
- **Fox squirrel** (*Sciurus niger*)
- **Northern flying squirrel** (*Glaucomys sabrinus*)
- **Southern flying squirrel** (*Glaucomys volans*)

## Size:

**Gray:** 18 to 20 inches" long; tail half that length; 1 to 1 ½ pounds.

**Red:** 12 inches long, same with the tail; about 5 1/2 ounces.

**Fox squirrel:** 21 inches long, includes 9 1/2-inch tail; nearly 2 pounds.



**Northern flying:** 10 to 11 inches includes 4 1/2-inch tail; 3 to 4 ounces.

**Southern flying:** 9 to 10 inches includes 3 1/2-inch tail; 1 1/2 to 2 1/2 ounces.

## Damage Prevention and Control Methods

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### Habitat Modification

- Remove bird feeders
- Cut down or trim trees back at least 6 feet from buildings

### Exclusion

- Install sheet metal bands on isolated trees to prevent damage to developing nuts
- Install chimney caps
- Close external openings to buildings; do not seal animals inside the home
- Plastic tubes on non-electrical service wires may prevent access to buildings

### Repellents

- Capsaicin
- Polybutenes

### Toxicants

- None registered

### Shooting

- .177-caliber pellet guns
- .22-caliber rifles
- Shotguns with No. 6 shot

### Trapping

- 5- x 5- x 18-inch (minimum) cage or box traps
- Rat traps, tunnel traps, choker traps, or body-gripping-style traps depending on species

## Other Control Methods

- One-way doors
- Squirrels may be captured by hand using leather gloves, nets, and snake tongs

## Legal Status

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Fox and gray squirrels are classified as game animals. Red squirrels are unprotected in New York. Check with local or state authorities to determine the legal status of squirrels in your area.

## Signs of their presence

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1. The animals themselves. (Don't be surprised if people report seeing black or white squirrels. They're gray squirrels—just a color variation.)
2. **Sounds:** Red squirrels are loudest, with their sometimes birdlike, sometimes scolding, but seemingly endless chatter. Gray and fox squirrels also chatter, and during the mating season, they'll make a chucking bark as they chase each other. May hear chewing, pattering, scampering, scratching sounds in attic, eaves, and walls from early morning throughout the day—except for flying squirrels, which are nocturnal.
3. **Scat:** Oval, smooth, roughly ¼-inch long. The scat of flying squirrels is often found in distinctive piles.
4. **Nests:** Gray, fox, and flying squirrels make leaf nests, usually placed in a tree crotch, that are used summer and fall. The flying squirrel's nest is about 8 inches in diameter; those of the gray and fox squirrel are larger.
5. **Evidence of their feeding:** Nipped twigs of spruce, hemlock, and pine trees; piles of gnawed hickory nuts and walnuts, or strips of acorn shell, between attic joists or in wall cavities (gray, fox, red, or flying); piles of pinecones, acorns, hickory nuts (red).
6. **Garden and crop damage:** They eat flower bulbs and seeds, raid birdfeeders, damage the equipment used for maple syrup

collection, eat cherry blossoms and ripe pears, and chew on the bark of fruit trees. They may also strip bark, which they use in their nests.

7. **Building damage:** Holes in vents, eaves, soffits, and fascia. Claw marks on siding. Tunnels in insulation. Chewed wires. Damage to stored household goods, either from their chewing, urine, or feces.

## Diet

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Opportunists, primarily herbivores. The flying squirrels are the most carnivorous of the lot, although all tree squirrels will eat bird eggs and nestlings. All these tree squirrels store food for the winter. Red squirrels create one large cache, while gray and fox squirrels bury nuts singly, all over the place.

**Gray and fox squirrels** prefer the same foods: fall through winter, they eat fruits and nuts (especially acorns, hickory nuts, and walnuts) and bird seed, if available. In early spring, they switch to tree buds, then in summer, to fruits, berries, and succulent plants. They also eat insects; bird eggs; mushrooms; corn; garden, orchard, and field crops; and when very hungry, will chew tree bark and lick the sap.

Both **flying squirrels** tend to eat the same foods as the gray and fox squirrel, but they're more likely to eat bird eggs, nestlings, insects, and carrion.

**Red squirrels** prefer pine seeds and buds but will eat many of the foods listed above. They're more carnivorous than gray and fox squirrels, but not as likely to eat meat as flying squirrels.

## Typical activity patterns

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**Social style:** Gray and fox squirrels are somewhat sociable. Red squirrels are solitary, except for female with young. Flying squirrels are social, with as many as 15 or more nesting together.

**Daily activity:** All are diurnal except for the flying squirrels, which are nocturnal.

**Hibernator?** No.

**Migrates?** Not typical, but when food supplies crash, they may migrate in large numbers.

## Where found

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**Distribution in the Northeast and eastern Atlantic:** Everywhere. The fox squirrel has the most limited distribution of the group found only in pockets in some states. The gray squirrel is the most common and adaptable, but they're all comfortable in cities and suburbs.

**Habitat:** Wooded areas. Gray and fox squirrels prefer hardwood forests (fox squirrels like the forest edge); red squirrels prefer softwood forests or mixed hardwoods and conifers; flying squirrels also prefer softwood or mixed forests but aren't as picky as red squirrels. Squirrels den in tree cavities, rock crevices, burrows, brush piles, deserted buildings, chimney flues, attics, barns. Gray, fox, and flying squirrels also make leaf nests for use in the summer and fall. Red and flying squirrels prefer old woodpecker nest holes and hollow tree limbs.

**Territory and home range:** The red squirrel is strongly territorial, defending both food sources and den trees. Gray and fox squirrels are not but may fight to establish dominance in common feeding grounds, such as around a bird feeder. Their home ranges are broadly overlapping and variable, generally about an acre. Flying squirrels are often found in large groups and are most likely not territorial.

## Breeding habits

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- **Pair bonding style:** Polygamous. Females raise young alone.
- **Breeding dates:** Gray squirrels: mid-December through January. Fox squirrels mate in January. Red and northern flying squirrels: late winter. Southern flying: early spring. Gestation takes 40 to 45 days. Five to ten percent of older female gray squirrels may breed again in June.
- **Birthing period:** Gray and fox squirrels: February to March. Gray squirrels may have a "second" litter in June to July. Red and northern flying squirrels: April to May (red squirrels may continue into June). Southern flying squirrels: May to June.

- **Litter size:** Gray squirrel: 2 to 4 young; fox squirrel: 2 to 4; red squirrel: 3 to 6; flying squirrels: 2 to 7 young.
- **Weaning dates:** Gray squirrels begin leaving the nest at 10 to 12 weeks.
- **Amount of time young remain with parents beyond weaning date:** Not long. Young female gray squirrels may stay with their mother for several months, although they won't necessarily remain near the den site.

## Common conflicts

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**Time of year:** Any time of year.

Clients calling from fall through winter (September through February) often complain about denning activity. Typically, an attic den could be home to 8 to 10 squirrels (red or gray squirrels) or dozens of flying squirrels (perhaps up to 50).

From March through May, most calls relate to their breeding, as females seek places to raise their young. That's when you typically find one female and her young in the attic or wall.

### What are they doing?

1. They den in attics, walls, sheds, barns, and chimneys, annoying people with their noise and odors. Squirrels usually gain access via overhanging branches, power lines, or by climbing up the siding. They may fall into chimney and furnace flues, thus gaining entrance to the basement or interior of the house.
2. Their nest materials might block a vent, causing a fire hazard.
3. They chew and scratch wires (another fire hazard), also damage attic vents, eaves, screens, bird feeders, siding, insulation, household goods, and the tubing used for maple syrup production.
4. They run along power lines and sometimes short out transformers.
5. Squirrels also eat garden, field, and orchard crops; bird seed; and newly planted vegetable seeds.

6. They'll strip the bark from trees, especially fruit trees and cedar.
7. Disease risks: mange, cat scratch disease, typhus, rabies (rarely).

## Management

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### **Remove artificial food sources (bird seed, pet food):**

1. If anyone is feeding the squirrels, persuade them to stop.
2. There are metal bird feeders that close once the squirrel jumps onto them, which are effective. Other feeder designs can be modified to make them more squirrel-proof. Place a stovepipe baffle (min. length 2 1/2 feet) on the pole, at least 4 feet off the ground. Or hang the feeder on a rope between 2 pulleys.
3. Keep the area underneath the feeder clean.
4. Enclose compost piles in a framed box using hardware cloth or welded wire; in a sturdy container, such as a 55-gallon drum; or in a commercial composter.
5. Feed pets indoors.
6. There are brands of sunflower seed and suet that are treated with a repellent. The active ingredient is capsaicin, the chemical that makes hot peppers taste hot.

### **Protect vulnerable crops.**

1. Plant bulbs within a cylinder of 1-inch poultry wire. Lay the wire in a trench then plant the bulbs in it. Add some dirt, finish wrapping the wire around the bulbs, then cover with soil.
2. Another option for bulbs is to plant them, and then lay a piece of 1/2-inch hardware cloth over the soil surface to reduce the squirrels' ability to dig up the bulbs. The hardware cloth should extend at least a foot around the plantings and be covered with soil. Its mesh must be large enough for the stems to grow through, so you may need to experiment with different sizes for different plants.

3. Establish a barrier around gardens and fields with fences (wire mesh, electric, or combination wire/electric fence). Use 1/2-inch hardware cloth or welded wire. The fence must be 30 inches high, buried 6 to 12 inches deep, with a foot-wide "L"-shaped shelf that sticks out to prevent the squirrels from burrowing underneath it. Or use a 2-wire electric fence (if allowed by local ordinances) with one wire placed at 2 inches above ground, and the other at a height of 6 inches. A combination fence should have a wire at 2 inches off the ground, and along the top of the fence.
4. Wrap 2-foot-wide bands of sheet metal around fruit trees at 6 to 8 feet, to prevent squirrels from climbing the tree. This will only work if the squirrels can't leap from another tree or other object onto this tree. Attach the band loosely, so the tree has room to grow. Don't staple the band onto the tree because that can prove dangerous if someone needs to cut down the tree.
5. There are repellents for use on maple sap collection equipment, lawns, gardens, outdoor furniture, and buildings.

### **Prevent entry into building.**

First step: Remove any current residents. Exclude them with a one-way door when the young are old enough to be mobile.

If this is a preventive action, or there are no young present, you can:

1. Replace plastic attic vents with metal designs that are securely attached to the building, or screen them with 1/2-inch hardware cloth. Attic vents are a common entry point for squirrels.
2. Seal openings at the joints of siding, overhanging eaves, and where pipes and utility lines enter buildings. Plug gaps around water, gas, and heating pipes with latex caulk. For large holes around pipes, use galvanized metal pipe chase covers, sheet metal plates, mortar, plaster of Paris, or cement.
3. Cover chimney flues with commercial caps and seal any gaps in the chimney's flashing.

4. Wrap 2-foot-wide bands of sheet metal around trees that are within jumping distance (10 feet) of the building.
5. Trim overhanging tree branches 10 feet away from the house.
6. Screen gutter pipes, downspouts, and foundation drainpipes with 1/4-inch hardware cloth.

**If young are present, remove the entire family before blocking the entrance to their den:**

If the young are older and mobile, install a one-way door over the entry hole. They'll leave but won't be able to re-enter. Make a squirrel excluder of 4-inch diameter plastic pipe, 18 inches long, mounted over the opening, pointing down at a 45° degree angle.

If the squirrels are caught in a chimney, give them a way to climb out. Place a small weight on a rope that's 1 inch in diameter. Drop the rope down the chimney. The weight helps you drop the rope all the way down, and then keeps the rope taut so the squirrels can climb it. Once the squirrels have left, cap the chimney so they won't enter it again.

First, a special caution about relocating squirrels. All these squirrels rely on a cache of food to survive the winter, so if you move them too far away during that time, they'll probably starve to death. Not possibly—probably. Limit relocation to times when food is readily available. **It is illegal for landowners to capture nuisance wildlife alive and move it off their property in New York.**

Trap and release strategies to reduce the risk of orphaning wildlife: The best way to prevent orphaning is to convince your clients to wait until the young are mobile before removing, repelling, or excluding the family from the site. If that's unacceptable, you can try to capture and remove both the female and all her young and hope that she will retrieve them and continue to care for them. Some people are trying to refine removal techniques to increase the



chances that the female will retrieve her young. Here are their suggestions.

Release red, gray, and fox squirrels on-site, during the day. Flying squirrels should be released at dusk or in the evening because they are nocturnal.

Locate the young by following trails made in attic insulation. Flying squirrels don't show signs of nursing, so assume young are present during the breeding season.

Place the female and young in a release box. Many people use a simple cardboard box, others use a wooden nest box, such as a wood duck box, and some prefer plastic boxes. Match the size of the box and its entrance hole to the size of the species.

Make sure the animal cannot immediately get out of the box by covering the hole. Then move them to a quiet place outdoors. Unless they're likely to be disturbed, keep the box at ground level. Remove the cover so the female can get out of the box. Another option is to build a box with a sliding door. Leave the door open about an inch, to keep the heat inside but make it easy for the female to slide it fully open so she can retrieve her young.

Some people prefer to use heated release boxes. Make sure that the box doesn't get too hot. You may want to provide heat in just one area. Also, assume that if you put something in the box, they will chew on it. Don't give them access to anything that they shouldn't eat, such as wires. That means that if you choose to use a household heating pad as the heat source, make sure the animals can't reach the wires. To avoid that problem, build boxes with a double floor, placing the heating pad in the space between the floors. Other options for heat sources include microwaveable heating pads and warm soap-stones.

If you can't catch the female, put the young in the heated box and locate it as close to the entry site as possible, or put them in a nearby tree.

The female may continue to care for her young, or she may abandon them because of the trauma of capture. Check the next day to see if the young are still there. If so, they've probably been abandoned. There hasn't yet been enough research on this technique, so its effectiveness is unknown. It's likely to be more effective with older, more experienced females; younger females might abandon their young more readily.

## Trapping strategies

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1. Set traps over the entry hole or as close as you can.

### Live traps

1. Install one-way doors, especially with the smaller squirrels, such as flying squirrels.
2. Cage trap should be 6 × 6 × 24 inches. Set and bait the trap, then prop it open for 2 to 3 days, so the squirrels will grow accustomed to feeding in it.
3. Bait with apples, nuts, peanut butter, or sunflower seeds.
4. Multiple-capture cage traps are available for use with flying squirrels. Place food in the trap; this may reduce their level of stress and the risk that they'll fight.

### Lethal traps

1. Body-gripping trap: many new varieties have been released recently, so scan the markets. Options include: #110 (and a newer, slightly smaller version based on the #110, the #50; #120 (and its smaller cousin, the #60-2); #55; the 5 × 5 Buckeye; 3 × 3 Eradicator; and smaller Koros traps.
2. Tunnel trap (cylinder with body-gripping trap inside). Less obvious to viewers. You can place a standard body-gripping

trap in a wooden box or other container for an equally discreet effect.

3. Modify the trigger to help ensure a top-to-bottom strike (which is more humane) and to prevent the squirrel from refusing to enter the trap. Squirrels don't like to have anything brush against their eyes or whiskers, so separate the trigger and center it on the top or bottom of the trap. Another option is to bend the trigger into a circle; you can add a piece of thin wire or monofilament line to complete the circle, if necessary. Proper positioning helps to ensure a cleaner, more humane catch.
4. Rat-sized snap-back traps for the smaller squirrels (flying and red squirrels). Look for models that have "covers" over the bait.

### Preferred killing methods

- CO<sub>2</sub> chamber
- Lethal trap
- Shooting, using an air rifle, a shotgun, or a .22-caliber rifle

### Acceptable killing methods

- Stunning and cervical dislocation
- Stunning and chest compression

# Turkeys

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**Species of interest:** Wild turkey (*Meleagris gallopavo*)



Wild turkey. Photo by Gary M Stolz, USFWS

**Size:** Males (toms) weigh 11 to 25 lbs.; females (hens) weigh 8–12 lbs. Young are called “poults.”

## Legal status

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Protected. Game species with set seasons. A special permit is needed to kill nuisance wild turkeys.

## Damage Prevention and Control Methods

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### Habitat Modification

- Habitat modification generally is not a feasible means of reducing conflicts with turkeys. Removal of isolated roost trees, however, may cause turkeys to roost elsewhere.

### Exclusion

- Nets (2-inch weave) provide the best way to prevent access to sensitive areas by wild turkeys.

- Use bird spikes or other ledge exclusion products to prevent turkeys from roosting in unwanted locations.

## Frightening Devices

- Short-term results may be obtained by the use of frightening devices. Hang strips of Mylar® tape in locations where turkeys are not wanted. Motion-sensing sprinklers, propane cannons, radios, and scarecrows also have shown some effectiveness.

## Repellents

- Products made with methyl anthranilate are available to protect blueberries, cherries, and grapes from bird damage.

## Toxicants

- None are available.

## Shooting

- Shooting is an effective way to manage turkeys. Shotguns (12-gauge) with No. 6 or heavier shot is effective for taking turkeys within 30 yards. Follow all safety and legal requirements before shooting.

## Signs of their presence

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**Sightings of the bird.** Flocks are often seen feeding in fields, especially on freshly spread manure when there is deep snow.

**Feathers and droppings:** Turkey primaries are large (12 plus inches) and marked with black and white bands.

**Scratching marks:** In the spring and fall, you can see scratching marks on the ground under nut and fruit trees. When searching for food in the woods, turkeys usually scratch, kicking the leaves back and to the side as they feed. Then they switch feet. This leaves an inverted “V” mark.

**Tracks:** Good bet it's a turkey if the distance from the tip of the middle toe to the back of the heel is greater than 4". Near water, you might confuse their tracks for those of the great blue heron.

**Nest:** A simple depression, usually 8–10" in diameter, made when the hen rubs her breast into the leaves. The nest is usually found in brushy areas, such as near raspberry bushes, fallen branches, along the edge of a weedy field, and in a brushy field that's changing back to forest.

**Sounds:** Males gobble, usually as part of their courtship display (but may gobble while roosting, too). Hens cluck, purr, and cackle in response. Gobbling is most commonly heard in the early morning. During the breeding season, the toms may gobble at any time of day. The sound may be heard up to a mile away. Both toms and hens make a variety of other noises, including yelps, purrs, and cackles.

## Diet

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Omnivores. Turkeys will eat insects, salamanders, small frogs, and plants. Their diet changes seasonally. Spring: They'll eat nearly any available plant, such as grass shoots; sedges; buds, flowers, and leaves of shrubs and trees; the roots, tubers, and bulbs of perennials; dried fruits; and nuts. Spring and summer: High-protein foods, such as insects, spiders, centipedes, millipedes, snails, and slugs are critical to their poults (young bird). Adults eat those foods, as well as grasses, seeds, salamanders, and frogs. Late summer: Grasshoppers, beetles, crickets, and the fruits and seeds of nearly any plant. Fall: just about any nut or fruit crop, including acorns, beechnuts, hazelnuts, wild cherries, and grapes; waste grain; insects; salamanders, and frogs. Winter: Nuts and seeds; grains, including corn; insects; and snails. They'll often feed where deer have pawed through deep snow and in corn fields, especially if manure was spread on the field, and in spring seeps.

## Typical activity patterns

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**Social style:** Gregarious. Several hens and their broods may flock together during mid-summer into fall. From the end of the breeding season through the summer, bachelor flocks are common, and usually stay together through late winter. But in late fall, a few of the toms may join the flocks of hens and poults. During the winter, several flocks may congregate in areas with good food supplies.

**Daily activity:** Diurnal. Turkeys are active throughout the day, depending on the weather. While feeding in a part of their range, they tend to roost in the same area each night. During periods of deep snow, they may stay on the roost for several days.

**Hibernator?** No.

**Migrates?** No.

## Where found

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**Distribution in the Northeast:** Stable throughout the region; more common outside of the Adirondacks.

**Habitat:** Turkeys are highly adaptable but do best in areas that offer mature woods, clearings, and fields. They roost in large trees and feed under the hardwoods, in openings, and in agricultural fields. In the winter, they seek south-facing slopes with hardwoods (for nuts) and springs and seeps (for insects and salamanders). Turkeys are also found near corn fields, orchards, dairy farms (especially those with available silage and fields spread with manure), pastures, and in suburban areas next to those habitats.

**Territory and home range:** Turkeys move around a lot, seeking nesting sites in the early spring, brood areas in the summer, and woodland cover in the fall. In the early winter, they often move from forested or hilly country to agricultural areas, where they may depend heavily upon grain left in the fields after harvest and seeds they can pick out of manure. These seasonal movements can be

significant in some regions—a flock may range over many square miles. In the winter and during nesting, their home range is often limited to 100 to 200 acres.

## Breeding habits

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- **Pair bonding style:** Polygamous.
- **Breeding dates:** Late March–June.
- **Egg-laying dates:** April–July. They lay one egg each day, for about 13 days (but may skip a day). Hens lay one clutch but will nest again if their eggs are destroyed. *Clutch size:* 8 to 15, usually 13. *Eggs hatch:* About 28 days after the female begins incubating the eggs. The poults leave the nest right after hatching, to forage for insects with the hen, usually in a clearing or field. They can fly when they're about 10 days old. Poults chill easily until they're about 5 weeks old, so the female will brood them when it's damp or cool.
- **Amount of time young remain with hen:** Until the flock breaks up the next spring. At that time, the young seek their own home ranges. Young males may disperse earlier than young female turkeys.

## Common conflicts

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**Time of year:** Any time of year.

Turkeys are often blamed for crop damage that was caused by another species. These large birds are easily seen in the fields during the day, but they may be eating insect pests—not the crop! Remember to investigate carefully, looking for tracks, tooth marks, and other animal signs that will help you find the real culprit.

## What are they doing?

- Eat crops, such as grapes, berries, corn, and small grains. They'll eat mature corn in the field, harvested corn from



outside storage cribs, and may damage newly planted seeds and seedlings.

- They eat dairy silage and may occasionally peck holes in the covers protecting the silage, which can cause it to spoil.
- Tear up turf on golf courses (the greens) and newly established lawns. Although uncommon, other nuisance behaviors include:
- Digging up flower beds and home gardens. (They've been reported nesting in a flower bed next to a home.)
- They may peck and scratch at cars and other reflective surfaces, such as windows.
- Their droppings may foul cars, decks, and porches, and other areas.
- They'll sometimes stop traffic as they pause while crossing roads. They can pose a hazard to planes on runways (not often in the air, as do other birds).
- Turkeys may act aggressively toward people or pets, usually during their mating season in the spring.

## Management

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### **Reduce food sources and roost sites:**

- If anyone is feeding the turkeys, persuade them to stop.
- Keep the area underneath bird feeders clean.
- Rake up and remove nuts and fruits, if possible.
- Plant a taller variety of corn to keep the ears out of the turkeys' reach, or one with a tighter husk, so the kernels are better protected.
- Replace flowering bulbs and other vulnerable plants with varieties they find less tasty.
- Trim branches or remove trees from favored roosts.
- Removing brushy cover from nearby nesting sites may help reduce local populations in the future.

## **Protect people and vulnerable objects.**

- If a turkey is behaving aggressively, try to scare it away. Establish yourself as the “top turkey.” Wave your arms, make noise, threaten the bird with a broom, spray it with water from a hose—just don’t harm it—that’s illegal, in this situation.
- Park the car in a garage, or as far away from the wooded side of the parking lot as practical, or keep it covered. Cover the rear-view mirror with a paper bag to reduce its reflectivity. (For those who don’t like to wash their cars, this can be an excuse. A dirty car won’t be as reflective, either.)
- Cover windows or any reflective surface that the birds are pecking or scratching with tarps or opaque plastic sheets.

## **Protect vulnerable sites**

- Fencing may keep them away from a small area that the turkeys aren’t using much, such as a deck, porch, or flower garden. A 2-foot-high fence should be adequate, because turkeys usually try to walk around fences rather than fly over them.
- If it’s possible, totally enclose the area with the barrier, perhaps adding netting as a cover for the fence (they can fly).
- Frightening noises from propane cannons or bangers may work in rural areas.
- Movement-activated sprinklers, windmills, mylar balloons, scarecrows, and predator models may also scare off the turkeys.
- Patrol dogs (larger breeds that run and chase, such as border collies or terriers) may be able to chase turkeys out of vineyards, orchards, and other enclosed areas. Dogs must be trained to chase but not capture the birds. Some growers place

platforms in the enclosure, to give the dogs a better view of the area.

- You can suggest that your customers allow hunting on their land. This may help to reduce local populations and alleviate some of the pressure on the site.

## Trapping strategies

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It's unlikely that turkeys will be trapped to solve a nuisance problem, because of several practical issues. You need a special permit, specialized equipment, and it tends to take a lot of time and effort. No lethal traps are approved or even available for turkeys. The nonlethal methods described above are a much more practical approach to dealing with the problem, especially in urban areas.

## Preferred killing methods

- Shooting, using a shotgun with # 4, 5, or 6 shot
- CO<sub>2</sub> chamber
- Stunning and decapitation

## Acceptable killing methods

- Stunning and cervical dislocation

## Control strategies that don't work particularly well, or aren't legal in some states:

- There are no pesticides (including repellents) registered in most states for use against turkeys.
- Repellents that are based on odor or taste wouldn't be worth the effort, anyway, because turkeys have a poor sense of smell and taste.
- Night-time efforts are usually impractical because turkeys roost in trees at night.

- Conventional fencing is unlikely to work in large areas, or areas that are used heavily, because the turkeys will probably just fly over the fence. If the attractant is strong—such as a crop—the fence isn't as likely to work. It may be impractical, impossible, or too costly to add a netting top to the fence.

# Voles

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Meadow vole (*Microtus pennsylvanicus*). Photo by Stephen M. Vantassel.

## Species of interest:

- **Meadow vole** (*Microtis pennsylvanicus*)
- **Pine vole** (*Microtus pinetorum*)

**Size:** 4 to 7 1/2 inches long; 1/2 to 2 1/2 ounces. Meadow vole is larger than the pine vole. The meadow vole's tail is longer than its hind foot; the pine vole's tail is shorter than its hind foot.

## Legal Status

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Voles are non-game mammals and can be controlled whenever they are causing damage. Contact your local state wildlife agency for details regarding questions about laws and regulations.

## Damage Prevention and Control Methods

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### Habitat Modification

- Remove or modify bird feeders to reduce spillage
- Eliminate ground cover
- Cultivate soil to destroy burrows and reduce cover

## Exclusion

- Use wire cages to protect trees, ornamental plants, and small areas

## Frightening

- None effective

## Repellents

- Capsaicin
- Thiram

## Toxicants

- Zinc phosphide
- Anticoagulants (e.g., warfarin, chlorophacinone)

## Shooting

- Not practical or effective

## Trapping

- Mouse snap-back traps
- Box traps (Sherman-type)
- Multiple-catch traps

## Other Control Methods

- Perches for raptors

## Signs of their presence

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1. High vegetation, when mowed, reveals a network of small, crisscrossing tunnels, 1 to 2 inches wide, "roofed over" by vegetation, at the soil surface.
2. If the lawn is mowed, you will see pathways, not tunnels. Similar tunnels through mulched garden beds and tree and shrub borders. They also tunnel under plastic and paper mulch. Tunnels are particularly well displayed during winter thaws.

3. Scat piles at tunnel crossroads and scattered along tunnels, 1/4-inch long, cylindrical (mouse scat fits same description).
4. Plant cuttings, 1/4 to 1/2 inches long, scattered through tunnels.
5. For the pine vole, a subterranean burrower, small holes mark the entryway to their burrows. Burrows are 3 to 4 inches below ground, or occasionally just below the soil surface. In this case they resemble small mole tunnels. Pine voles may take over the abandoned burrows of moles or short-tailed shrews and even make surface tunnels at times.
6. Girdled trees and shrubs, especially seedlings and saplings up to about 15 years old. Ornamental and orchard plantings are equally at risk. Tooth marks (1/8 inch wide, 3/8 inch long) make a crosshatch pattern near the ground or snow line. (Rabbit gnaw marks are larger and not as distinct; they clip right through branches with a clean, oblique cut.)

## Diet

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Green plants, roots, tubers, bark, mushrooms, and occasionally snails, insects, carrion, and each other's young. They store food for the winter (grains, tubers, bulbs, and rootstock). Pine voles generally eat roots and tubers. Like rabbits, hares, and beavers, they eat their feces to extract more nutrients from grasses and tree bark, which are difficult to digest.

## Typical activity patterns

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**Social style:** Generally solitary, except female with young.

**Daily activity:** All day and night, with alternating periods of rest and feeding.

**Hibernator?** No. In fact, voles may even breed and bear young through the winter if snow cover is deep enough to provide sufficient insulation for their nests.

**Migrates?** No.

## Where found

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**Distribution in the Northeast:** Abundant and widespread in rural and suburban areas. The pine vole is mostly found in the Hudson Valley, Long Island, and further south. Population densities vary wildly, often in 4-year cycles.

**Habitat:** Fields and moist, meadow bottomlands, but adapt well to suburban woodlots, gardens, and ornamental plantings as well as orchards. Pine voles prefer deciduous forests, brushy areas, and orchards with dense vegetation. They are excellent swimmers and decent climbers though the pine vole is a bit clumsy.

**Territory and home range:** Females are scrappy fighters and territorial toward other females; males are not territorial. Females' home ranges cover roughly 75 square yards, and males' are about 200 square yards. The home ranges of the males may overlap those of several females and other males as well.

## Breeding habits

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**Pair bonding style:** Polygamous.

**Breeding dates:** Year-round as the weather permits. Gestation takes about 20 to 23 days.

**Birthing period:** Year-round as the weather permits.

**Litter size:** 3 to 5, average 4. May see as few as 1 pup or as many as 9.

**Weaning dates:** Between 2 to 3 weeks of age. Females may breed within days of being weaned. Males are sexually mature at 45 days old.

**Amount of time young remain with parents beyond weaning date:**  
Not long!

## Common conflicts

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**Time of year:** Any time of year. The type of damage changes seasonally:



1. Early spring (mid-April through end of May): can ruin lawns, golf courses, some perennial bulbs (especially tulips and crocuses), newly planted vegetables (peas, beans), and some ornamental shrubs.
2. Spring and summer: they damage hay, leafy vegetables, and legumes (beans and peas).
3. Summer and fall: voles eat root crops (carrots, beets, potatoes, as well as kohlrabi).
4. Fall (Sept. through Nov.): they damage lawns, golf courses, fruit trees, and some perennial bulbs.
5. Fall and winter: they will girdle trees and shrubs, (especially fruit trees and some ornamental shrubs).
6. Look for the damage up to the level of the deepest snow cover.

### **What are they doing?**

1. Burrow through and damage lawns and golf course turf.
2. Girdle some fruit trees and ornamental shrubs during winter.
3. Eat flower bulbs, especially tulips and irises.
4. Eat some vegetables in gardens and farms, especially legumes (peas, beans) and root crops (carrots, beets, potatoes).
5. Forage on hay crops. A population of 100 voles/acre may reduce the crop by a half-ton over the course of a season.
6. Disease risks: minimal because of their infrequent contact with people, but voles can carry tularemia.

# De-bunking myths about voles

*Voles are often confused for moles. Here's how to tell them apart:*

VOLES have:	Moles have:
small eyes	very small eyes
small, but noticeable ears	no external ears
furry noses	a naked, pointy snout
small, mouse-like feet	large front feet that are turned sideways, and big claws. (Excellent shovels).

## Management

If your strategy includes lethal control, plan to reduce vole populations before the first winter snow.

### Protect ornamental plantings and lawns:

1. Mow closely under and around ornamental trees and shrubs; remove vegetation and pruned branches.
2. Pull mulch away from the bases of trees.
3. Make vole guards for trees. The guards must be large enough to allow 5 years' growth. Circle the tree with 1/4-inch hardware cloth that's buried 3 to 6 inches deep. The tree guards should be taller than the anticipated snow depth by about 3 to 4 inches.
4. Mow lawns regularly.

## **Protect garden crops**

1. Remove vegetation, ground covers, and brush piles or other plant litter near crops.
2. Tilling before planting annual crops destroys tunnels and removes cover.
3. Small areas may be fenced with 1/4-inch mesh hardware cloth that's buried 3 to 6 inches deep.

## **Protect orchard crops**

1. Follow recommendations for ornamental plantings.
2. Consider the relative economic and environmental value of tilling or close mowing between rows and applying herbicide in rows to reduce cover. Rotary mowers cut closer than sickle bar mowers do.
3. Mow adjacent strips and drainage ditches; work to reduce vole populations in older orchard blocks (where trees are too big to be vulnerable) that border younger blocks. Clean up windfall apples.
4. Trap intensively over a 5-day period. Trapping can reduce vole populations by 90 percent or more.
5. Encourage predators. Voles may provide 85% of a hawk's or owl's diet. All the other carnivores—foxes, skunks, weasels, coyotes—rely on them, too. However, voles are so good at reproducing that predators alone won't give ultimate control.

## **Pesticides:**

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1. Repellents may give short-term protection against meadow voles (they don't do much against pine voles). There are thiram-based and capsaicin-based repellents.
2. Poisons (zinc phosphide) will work and may make economic sense in some situations. Carefully follow all label instructions. Bait stations can reduce nontarget animal access to toxicants.

## Trapping strategies

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To increase your success, trap intensively for several days. More is better. Voles can be caught in any style mouse trap. Providing overhead cover improves trapping success.

### Live traps

1. Set cage traps in their runways. Bait with apple chunks.
2. Place larger multiple-capture traps (Ketch-All®) in the runways with the door facing the runway. For meadow voles, use a larger multiple capture trap such as the Ketch-All® or a 3- × 3- × 8-inch Sherman trap.

### Lethal traps

1. The familiar mouse trap is called a "snap-back trap." Look for ones with expanded "triggers" (properly, it would be called the "pan" but you're more likely to hear it referred to as a "trigger") or a clothespin design, because they're easier to set.
2. For pine voles, use the mouse-sized snap-back trap, preferably, a design such as the Victor Quick Kill trap, which has a lid over the bait cover. Only animals that are motivated to seek the bait will lift the lid. This means that an animal can accidentally step on the lid without triggering the trap. The trap will not fire if it's picked up. In addition to being more selective than the traditional mouse trap, this design is also more effective, because the location of the bait cup positions the mole in the perfect strike position.
3. For the larger meadow vole, you may want to switch to a larger trap.
4. Place traps in the runways, spaced every 15 to 20 feet. Cover the trap with a bent-shingle "roof."
5. Set snap traps in pairs. This is much more effective. Two sets work well:

- Side-by-side, perpendicular to the runway, with the trigger snapping into the runway
  - "Back-to-back" in the runway (set them parallel, or in the same direction, as the runway) with the triggers snapping to the outside of the trap so it can catch a vole from either direction.
6. Bait with apple chunks.
  7. To protect young children, place traps in a cage trap with 1-inch mesh, a bait station, a coffee can with both ends cut out, or in PVC pipe (remember to test that the trap will spring within its container).
  8. Wildlife rehabilitators may appreciate donations of voles, which are used to feed some snakes, birds of prey, and other animals. Be sure that no poisons have been used during previous control efforts. You can double-bag the voles and freeze them.

## Preferred killing methods

1. Lethal trap
2. CO<sub>2</sub> chamber
3. Cervical dislocation

## Acceptable killing methods

1. Pesticides

## Control strategies that don't work particularly well or aren't legal in some states.

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1. Rubber snakes, owl silhouettes, ultrasonic devices, and moving streamers don't do much over the long haul.
2. Repellents don't work well against pine voles because they forage mostly below ground level.

# Woodchucks

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**Species of interest:** **Woodchuck** (*Marmota monax*), also known as groundhog and whistle pig.



Woodchuck (*Marmota monax*). Photo by S. M. Vantassel.

**Size:** 20 to 27 inches long, excluding tail; 5 to 12 pounds.

## Legal Status

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Woodchucks are considered either game or unprotected animals in most states. Check your local state regulations.

## Damage Prevention and Control Methods

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### Habitat Modification

- Not recommended

### Exclusion

- Three-foot high fence with an 18-inch skirt buried at least 2 inches with a 9- to 12-inch overhang
- Electric fences where legal

## Frightening Devices

- Dogs

## Repellents

- None are effective

## Toxicants

- Charcoal-based gas cartridges

## Shooting

- .22- or .177-caliber rifle
- Shotgun with No. 4 shot

## Trapping

- Cage or box trap
- 10 x 12 x 32-inch, single-door
- 9 x 9 x 32-inch, 2-door
- Conibear-style- Nos. 160 and 220
- Footholds- Nos. 1 or 1.5

## Other Control Methods

- Flood woodchucks out of dens and into nets

## Signs of their presence

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1. Adults often seen basking in the sun, in a grassy area, on a fence post, stone wall, large rock, or fallen log—always near its burrow.
2. Sounds: Occasional sharp whistles and low churrs, given at times of danger.
3. Odor is distinctive. Will often see flies around an active burrow.

4. Scat: Rarely seen (woodchucks excavate a latrine off their main burrow).
5. Evidence of their feeding: Chewed wood. Chewing on fresh plants similar to that of rabbits; difficult to pin on woodchucks without supporting evidence.
6. Dens: Will see a large mound of dirt and stones by the main entrance to their burrow. The secondary entrances, which were dug from the inside, generally don't have a dirt mound by their opening. Well-worn trail from entrance to entrance, or to the garden.

## Diet

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Herbivore. Woodchucks eat succulent grasses, weeds, clover, fruits (apples, cherries, pears), berries, field and garden crops (cabbage, lettuce, beans, peas, carrots, alfalfa, soybeans), and ornamental plants (they love phlox). They'll climb trees to take fruits such as cherries, apples, and pears.

## Typical activity patterns

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**Social style:** Generally solitary.

**Daily activity:** Diurnal, most active in the early morning and evening. They rely on dew as their water source. Woodchucks have good eyesight and are good swimmers. They'll climb trees up to a height of about 20 feet, although more usually, they keep to 8 to 12 feet.

**Hibernator?** Yes. Hibernates deeply from the time of the first heavy frost through early spring. Occasionally hibernates in small groups.

**Migrates?** No.

## Where found

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**Distribution in the Northeast:** Everywhere.



**Habitat:** Meadows, woodlots, hay fields, pastures, hedgerows, idle fields, parks, suburbs. Dens usually found in open fields; near fence rows or woodland edges; under barns, sheds, porches, decks, stone walls, and wood piles.

**Territory and home range:** Territorial. Woodchucks may skirmish to establish dominance. Subordinate woodchucks avoid dominant ones. Home ranges overlap and are usually small. Woodchucks rarely travel more than 50 yards from their den, even to feed. Their burrows can be 2 to 5 feet deep and as much as 60 feet long. There are usually 2 or 3 (but perhaps as many as 5) entrances, possibly including a well-hidden, straight-down "plunge hole".

## Breeding habits

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- **Pair bonding style:** Polygamous. Females raise young alone.
- **Breeding dates:** Late February through March.
- **Birthing period:** Late March to early May. Gestation takes about 31 days.
- **Litter size:** 3 to 4.
- **Weaning dates:** at 5 to 6 weeks.
- **Amount of time young remain with parents beyond weaning date:** Young stray from burrow alone at 6 to 7 weeks, mid-June to early July. Mother drives young from her burrow by July.

## Common conflicts

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**Time of year:** Calls peak in July and August, although their damage may begin in spring and last into the fall.

## What are they doing?

1. Feeding, or just filing down their front teeth, which never stop growing. Woodchucks raid gardens, fields, lawns, orchards, nurseries, and may gnaw or claw on shrubs and fruit trees.

Occasionally chew on outdoor furniture, decks, and siding while scent-marking or filing their teeth.

2. **Marking their territories:** They may strip off the bark at the base of a tree that's near their burrow entrance.
3. **Burrowing.** Look for burrow entrances among shrubs near vegetable and ornamental gardens; under woodpiles, brush piles, and stone walls; under sheds, porches, decks, and crawl spaces. Burrows in fields may damage agricultural equipment, while those in pastures may trip livestock, resulting in injuries.
4. **Disease risks:** Low. Mange, rabies (rarely), raccoon roundworm.

## Management

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Just when you thought it was all over, year-old woodchucks will occupy abandoned burrows. You can try filling in the burrows, but they may re-open the holes.

### **Remove artificial food sources and shelter:**

1. Remove brush piles and debris and keep areas well-trimmed.

### **Protect vulnerable crops:**

1. Erect a "rat wall" fence around gardens and fields. Make sure the woodchucks can't climb over or dig under this barrier. Use 1- to 1 1/2-inch chicken wire. The fence must be 4 feet high and buried 1 foot deep; if you prefer, you can bury it only 1 to 2 inches down, if you bend the edge outward into an "L" shape that sticks out at a 90° angle to prevent the woodchucks from burrowing underneath it. Also bend the top 15 inches of the fence out at a 45° angle to keep them from climbing over it, or add an electric wire strung 4 to 5 inches above ground level, and 4 to 5 inches from the outside of the fence.

2. Another modification of the rat wall design. Use 2- x 4-inch welded wire that's 2 feet high, bottom buried in the L-shaped shelf as described above. String an electric wire across the top of the fence. (Durable and effective but more expensive.)

### **Keep them from denning under buildings:**

First step: Remove any current residents. Exclude them with a one-way door when young are old enough to be mobile.

If this is a preventive action, or there are no young present, you can:

Screen areas under decks, porches, and houses with the rat wall fence, as described above. Attach the top of the fence to the structure.

If young are present, remove the entire family before blocking the entrance to their den.

If the young are older and mobile, install a one-way door over the entry hole. They'll leave but won't be able to re-enter.

Trap and release strategies to reduce the risk of orphaning wildlife: The best way to prevent orphaning is to convince your clients to wait until the young are mobile before removing, repelling, or excluding the family from the site. If that's unacceptable, you can try to capture and remove both the female and all her young and hope that she will retrieve them and continue to care for them.

Capture the mother and young. Cover cages during transport to minimize stress. Release them on-site, preferably in the morning.

Place the female and young in a release box. Many people use a simple cardboard box, others use a wooden nest box, such as a wood duck box, and some prefer plastic boxes. Use a larger box with a 7-inch hole.

Make sure the animal cannot immediately get out of the box by covering the hole. Then move them to a quiet place outdoors.

Remove the cover so the female can get out of the box. Another option is to build a box with a sliding door. Leave the door open about an inch, to keep the heat inside but make it easy for the female to slide it fully open so she can retrieve her young.

If you can't catch the female, put the young in the release box and locate it as close to the entry site as possible.

Cover the hole to the burrow with a soft plug to make sure that no woodchucks are still using it. Check the next day to see if the young are still there. If so, they've probably been abandoned. There hasn't yet been enough research on this technique, so its effectiveness is unknown. It's likely to be more effective with older, more experienced females; younger females might abandon their young more readily.

## Trapping strategies

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### Live traps:

1. Cage trap should be at least 10 x 10 x 24 inches. Double door traps should be at least 10 x 10 x 30 inches.
2. Conceal the trap, using grass, sticks, or canvas.
3. Choose the size of trap based on the size of the burrow's hole but realize that woodchucks can wreck a smaller trap.
4. Foothold traps, #1 or 1 1/2.
5. Bait with apples, cantaloupe, cabbage, carrots with their green tops, fresh peas, or lettuce. Woodchucks may ignore the bait if food is plentiful. Or use a trap that's already housed a woodchuck, because the scent will attract other woodchucks, especially males.
6. Check traps twice daily and provide shade and protection from weather. Woodchucks overheat easily.

7. Clean brush away from the opening of the trap, or it may interfere with the door.
8. Can also set trap without bait, placing it directly in front of the hole. Dig down a bit and use fencing to guide the woodchuck into the trap.

## Lethal traps

1. Spring is the best time for control, when the adults are active but before the young are born. It's also easier to see the burrows then, and other animals are less likely to be inside. Woodchuck burrows provide shelter to several species.
2. Body-gripping trap, #160, #220, #120, or a 5 × 5 Buckeye, placed at the entrance to the burrow. To reduce the risk of catching pets or unintended wildlife, cover the hole and the trap with a weighted box or hardware cloth. Another option is to add a one-way trigger to the trap, so it only fires when the woodchuck is leaving its burrow.
3. Modify the trigger to help ensure a top-to-bottom strike (which is more humane) and to prevent the woodchuck from refusing to enter the trap. Woodchucks don't like to have anything brush against their eyes or whiskers, so separate the trigger and center it on the bottom of the trap. Proper positioning helps to ensure a cleaner, more humane catch.

## Other lethal techniques:

1. Carbon monoxide gas cartridges, a registered product, may be used to kill woodchucks in their burrows. These gas cartridges do pose a fire hazard so don't use them near buildings, under sheds, or near stumps. They could ignite grass, buildings, gasoline, and other flammable objects.

## Preferred killing methods:

1. CO<sub>2</sub> chamber

2. Lethal trap
3. Shooting, using a shotgun, a .22-caliber rifle, or a centerfire rifle where safe (target the head, if no rabies testing is needed, or the heart/lungs).

### **Acceptable killing methods:**

1. Stunning and chest compression
2. Pesticides (carbon monoxide fumigants).

### **Methods that don't work well, or aren't legal in some states:**

1. There aren't any registered repellents for woodchucks.
2. Commercial deer and rabbit repellents, as well as some pesticides thought to repel woodchucks, weren't effective at keeping them away from crops.

# Woodpeckers

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Red-headed woodpecker. Photo by Ron Case.

## Species of interest:

1. **Downy woodpecker** (*Picoides pubescens*)
2. **Hairy woodpecker** (*Picoides villosus*)
3. **Yellow-bellied sapsucker** (*Sphyrapicus varius*)
4. **Red-bellied woodpecker** (*Melanerpes carolinus*)
5. **Northern (a.k.a. "common") flicker** (*Colaptes auratus*)
6. **Pileated woodpecker** (*Dryocopus pileatus*)

**Size:** The downy woodpecker is the smallest, at 6 ½ inches. The sapsucker and the hairy woodpecker are both 8 to 9 ½ inches (hairy looks like a larger version of the downy). The red-bellied woodpecker is 9 to 10 ½ inches, and the flicker is 12 to 14 inches. The pileated is the largest, about the size of a crow, at 16 to 19 ½ inches.

## Legal status

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Federally protected migratory birds (under the Migratory Bird Treaty Act).

## Damage Prevention and Control Methods

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### Habitat Modification

- Removal of dead trees
- Woodpecker-resistant materials for siding
- Use suet as alternative food
- Nest boxes as alternative cavities
- Insecticides for indirect control

### Exclusion

- Netting
- Repair damage quickly
- Metal barriers

### Frightening

- Sound - loud noises, propane exploders, distress calls of woodpeckers
- Visual - Irri-Tape®, Mylar® tape, mirrors, models of predators

### Repellents

- Polybutene

### Toxicants

- None are registered

### Shooting

- .177- and .22-caliber rifles
- Shotgun with No. 7½ shot

### Trapping

- Rat snap trap



## Signs of their presence

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1. The bird itself is the most obvious sign.
2. Sounds: drumming, drilling, and calls. The sound of the cartoon character, Woody Woodpecker, was based on the call of the pileated woodpecker.
3. Holes in trees, utility poles, and buildings.

## Diet

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Mostly wood-boring insects, but they'll also eat berries, beech nuts, acorns, seeds, fruits, and suet. Sapsuckers also feed on tree sap (surprise) and the inner bark of trees. Poison ivy berries are a winter staple for them. Woodpeckers eat insect pests, such as carpenter ants (a winter staple for the pileated), wood-boring ants and beetles, bark lice, wasps, and carpenter bees. Flickers feed on ants on the ground. The other woodpeckers feed on trees. Red-bellied woodpeckers cache food.

## Typical activity patterns

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**Social style:** Pairs may interact for about half the year.

**Daily activity:** Diurnal, with peaks at dawn and dusk.

**Hibernator?** No.

**Migrates?** Downy, hairy, red-bellied, and pileated woodpeckers remain in New York all year. Flickers in northern New York migrate, but those in the southern regions remain. The sapsucker migrates.

## Where found

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**Distribution in the Northeast:** Widespread in the Northeast, but abundance varies by species.

**Habitat:** Open mixed woods with dead trees (some prefer bottomlands), woodland edges, orchards, rural, suburban, urban

areas with trees (especially if there's a good supply of suet), and parks. Some woodpeckers use wooded swamps, fields, and meadows, and some need large trees. The pileated likes a larger area that combines second-growth and mature trees, often near a river or wooded swamp. Red-bellied woodpeckers prefer to nest in dead limbs in living trees, competing with starlings for these cavities. Sapsuckers prefer to nest in aspens, and in trees with rotten heartwood. Some woodpeckers create new cavities each year (downy and hairy) while others reuse their holes (flicker).

**Territory and home range:** Most are territorial just in a small area around their nests.

## Breeding habits

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**Pair bonding style:** Monogamous.

**Breeding dates:** April to June.

**Egg-laying dates:** April to June. May have 2 to 3 broods/yr.

**Clutch size:** 3 to 7, usually 4 to 5.

**Incubation lasts:** 11 to 18 days.

**Fledging dates:** 20 to 30 days after the eggs are laid.

**Amount of time young remain with parents beyond fledging date:**

Downy woodpeckers stay with their parents for 3 weeks after fledging. Hairy woodpeckers feed their young for a few days after they fledge. The young leave as soon as they can feed themselves.

## Common conflicts

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**Time of year:** Most damage occurs from March through June. In the early spring, they drum to proclaim their territories and attract mates. Then they'll create nest cavities. From summer through fall, they seek insects and roosting sites. They may forage, nest, or roost in buildings.

Buildings that are near wooded areas with high woodpecker populations are more vulnerable.

They prefer cedar and redwood siding but will damage pine, fir, and other woods.

They don't often damage composite wood or Masonite.

Untreated or stained wood is preferred over painted wood.

Wood painted in earth tones (dark brown, red, or green) is more attractive to them than white, pastel, or brightly colored wood.

Try to distinguish between the signs of woodpecker drumming and feeding. Why? Drumming will stop on its own and generally causes little damage. Foraging can cause more damage, and it means that the building is infested with insects, usually carpenter bees, leaf-cutter bees, or grass bagworms. Ask customers about the noise. A rapid-fire, loud, and continuous drill—or any banging on metal—is the sign of drumming, which usually happens in the spring. They don't excavate any wood while drumming. When woodpeckers search for insects, the sound is often a bit more sporadic and may be quieter.

### **What are they doing?**

1. **Drumming.** In the spring, woodpeckers will peck on a variety of resonant objects, such as a hollow or dry tree; aluminum siding; metal roofs, gutters, drainpipes, chimneys, chimney caps, vents, stove and pipes; cars; canoes; mailboxes; garbage cans; the trim and fascia boards of a wood, brick, or stucco building; and even metal road signs. Drumming may leave small, shallow dents in wood, usually no more than 1" across. Look for the dents clustered along the corners of buildings, or on the trim or fascia boards. Some people may find the noise annoying.

2. Chiseling foraging holes in wooden buildings (siding, eaves, trim boards, even window frames) or utility poles. Certain building materials are more prone to insect invasion, such as grooved plywood siding (a.k.a. "T-111," a mimic of board-and-batten siding), so they're more vulnerable to woodpecker damage, too. Woodpeckers also prefer anything made of cedar.
3. In T-111, look for this sign of woodpecker feeding damage: horizontal rows of small holes across the siding or the fascia.
4. Cedar clapboards, resawn shakes, tongue-and-groove, or board-and-batten siding: very small holes clustered on the fascia boards (could also be caused by drumming).
5. Drilling larger holes into wooden buildings to create roosts and nests. These holes are usually only slightly wider than the bird, and are either round, rectangular, or gourd shaped. They seem to prefer a hard outer shell and soft inner cavity, which they usually find in a dead tree—or cedar building. They will drill into the insulation, in which they'll hollow out their nest or roost. Woodpeckers often create several holes before settling down to business. Nesting holes are excavated late April–May. Roosts are usually created in the late summer through fall, as the birds prepare for winter. Woodpeckers are more likely to excavate roosts and nests in buildings with board-and-batten, clapboard, or tongue-and-groove siding than those with shingles or shakes.
6. In cedar clapboards: nest and roost holes are usually drilled on the seam between two clapboards and may be found throughout the siding.
7. In board-and-batten: these holes are usually seen on the batten between two boards, throughout the siding (some preference for corners).
8. In tongue-and-groove: corner holes are more typical, but you may see them at the seam of two boards.

9. In resawn shakes and shingles: generally, corner holes, usually between two shingles, where the top and bottom meet.
10. Woodpeckers will sometimes feed on fruits and nuts from orchards and backyard trees, but this isn't much of a problem in the northeast.

## Management

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If your client plans on building in a forested suburb or rural area, or in an area that's suffered previous woodpecker damage, tell them to use brick, aluminum, vinyl, stone, or steel siding when possible.

For better results, begin your control program as soon as damage starts.

### **To stop drumming:**

- First, talk to your clients. The simplest solution is to live with the noise. Padding placed behind the area where the birds drum will soften the noise. The drumming may stop.
- Hang strips of aluminum foil or mylar tape (3 to 4 inches wide, 4 feet long) mirrors, aluminum pie tins, or a handheld windmill (kid's toy) in the area that's been damaged. The strips need to hang freely so they can blow in the wind. Brightly colored windsocks can be hung at the corners of the building.
- Hawk or owl models and scare-eye balloons can be mounted over the site. Models that move in the wind are generally more effective. This method has shown mixed or poor results in some trials.
- Attach lightweight nylon or plastic bird netting or 1/4" hardware cloth to the outer edge of the eaves, and then angle it down and attach it to the wood siding. The netting needs to hang out at least 3" from the building, or the woodpeckers will be able to reach through it.
- To seal a hole in siding and stop more damage: cover with flashing (aluminum sheets) soon after damage has begun.

## To stop foraging:

- You must get rid of the insects and prevent them from re-infesting the building. First, remove any insects. Then seal the gaps that let them in. Paint the siding for even more protection—better to use white, pastels, or bright colors—avoid those dark brown, red, and green earth tones. Use an oil-based paint or polyurethane to seal gaps and create a hard finish that deters carpenter bees.
- Board-and-batten: run a wire through the gaps to remove any insects. Then seal the gaps with wood putty or caulk.
- Cedar siding: remove loose knots, then fill holes with wood putty.
- T-111: scrape along the vertical grooves to remove any bugs, then caulk along the grooves. Painting the siding helps a lot.
- Shakes/shingles: a tough situation! It's hard to prevent insect infestations in a shingled building, and to remove the bugs. The house can be sprayed with pesticides by someone with a commercial pesticide applicator license. Replace damaged shingles. Frightening techniques may keep woodpeckers away.
- Holes and tunnels made by carpenter bees can be sealed with cork, wooden dowels, or wood putty.
- To seal a hole in siding and stop more damage: cover with flashing (aluminum sheets) soon after damage has begun.
- Attach lightweight nylon or plastic bird netting or ¼-inch hardware cloth to the outer edge of the eaves, and then angle it down and attach it to the wood siding. The netting needs to hang out at least 3 inches from the building, or the woodpeckers will be able to reach through it.
- Drape bird netting over the canopy and trunk of a small tree that's suffering from sapsucker damage. For larger trees, loosely wrap ¼-inch hardware cloth or burlap around the trunk or limbs. If the damage is caused by one of the other species, remember that they are after insects, not sap. Downy, hairy,

red-bellied and pileated woodpeckers, and the northern flicker, don't generally create holes in healthy trees.

### **To stop nesting and roosting:**

- Frighten the woodpeckers away from the building as soon as you hear them begin to drill the hole. Follow the tips in the section on drumming.
- If they're not nesting yet, seal all the holes (of course, make sure the birds aren't inside before you start).
- If they're already nesting, wait until the young fledge (usually, mid-summer), then seal the holes.

### **Preferred killing methods:**

Any lethal strategy requires a federal depredation permit from the U.S. Fish & Wildlife Service, and a state permit from your state wildlife agency. Follow the conditions on your federal permit. Preferred techniques include: CO<sub>2</sub> chamber; shooting; and stunning followed by cervical dislocation, chest compression, or decapitation.

Control strategies that don't work particularly well or aren't legal in many states.

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- Ultrasonic devices don't work. Birds can't hear them.
- No pesticides (including repellents) are registered for use against woodpeckers on buildings or trees.

# Is it a Pet or a Pest?

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## **An overview of the issues related to the control of feral cats and dogs**

Both the house cat (*Felis catus*) and the domestic dog (*Canis familiaris*) are regulated by most states' Department of Agriculture (and Markets). This section will give you a sense of the issues surrounding feral cat control. Be sure to check your local and state laws concerning domestic animal control.



Feral cat (*Felis catus*). Image by Stavrolo.

### **House cats (*Felis catus*)**

There are many cat situations that are quite straightforward. An elderly mother passes away and the daughter wants the frightened cat captured so she can take it to her home. This type of situation holds the same type of risks as any normal wildlife call. That's not



true once you're confronted with a stray cat, a feral cat (a "house" cat that lives outdoors and acts like a wild animal), or a cat of mysterious origins.

There are several reasons why some people are tempted to handle feral cats. Many state laws require each town to have an animal control officer, but cat control isn't mandated. Some shelters have a "no-kill" policy, which limits their ability to accept more animals. You may sympathize with people who are experiencing problems and you may have the appropriate skills and tools to capture and handle nuisance cats in a safe and compassionate manner, while the average person probably doesn't.

The problems are real. Farmers and restaurant owners may find themselves overrun with cats, because the cats have been abandoned there or they're attracted by a food source, such as a dumpster. The noise, especially during the breeding season, can be extremely annoying. Feral and free-roaming cats may carry as many as a half-dozen diseases. People are more likely to approach and pet a cat, especially a kitten, than a wild animal, so their risk of being exposed is higher. Cats are predators and kill birds and other wildlife. Some people who feed birds want to protect them from cats, which they consider unnatural predators. Others feel guilty or sad when they see a malnourished cat outdoors and feel motivated to address its suffering.

## Legal risks

Cats are not wildlife, even if they were born in the wild and act like completely wild animals. The domestic cat, *Felis catus*, is an exotic species. It's not covered by the Environmental Conservation Law in New York, for example. And when it comes to cats, the wildlife regulations that cover the activities of WDM, do not give you any authority or right to handle cats. Cats fall under different laws and regulations in most states.

From a legal standpoint, cats are property. So, property laws apply, too. Private landowners have no legal authority to dispose of "found

property” (and “finding” a stray cat without a collar is like finding a wallet without ID on the street). That means that if someone disputes your activity, you could be charged with both a criminal lawsuit (under the animal cruelty law) and a civil lawsuit (under the property laws). If that doesn’t make you queasy, here’s the kicker: the laws describing cat control are vague.

Here’s an example of how that could affect someone who’s handling feral cats. In many states, there’s no law requiring the licensing of cats. How do you decide if a particular cat is a free-roaming and beloved pet, a stray, or a feral cat, if it’s “owned” or “unowned”? Do you canvas the entire neighborhood before you set a trap? What if someone lies to you? Imagine someone wants you to capture and kill a colony of feral cats living in their barn. You do everything right, but then someone sues you, claiming that you killed their pet. How do you defend yourself? Without tags or licenses, there’s no way to prove whether or not a cat is a pet. Even cats that appear to be wild or feral may be owned (such cats are often ear-tipped, but not always).

It’s much easier to make a mistake with cats than with wildlife. A truly feral cat usually avoids human contact but distinguishing between a free-roaming pet and a stray can be hard. It may not be easy to tell from their behavior or their appearance. What if a free-roaming cat wandered into an area at the wrong time, and was trapped along with the feral cats?

If you become known as the neighborhood “cat guy,” new problems might arise. You wake up one morning and discover a box of kittens on your doorstep. They’re so young they’d require hand feeding, and they’re sick. You don’t have the facilities or time to raise them and seek adoptive homes. You make your usual phone calls, but no luck. So, you decide that the merciful and practical thing to do is euthanize them. The “owner” hears about this later and is spitting mad. The public may be more upset with you for euthanizing them than with the owner for abandoning them. Now are you nervous?

## Financial risks

With all this legal liability, people who handle cats must make a lot of money, right? Guess again. Many people don't want to pay for these services. Some may think that the government takes care of it, which is true for dogs, but not always for cats. Some people may appreciate your skills but they're just tired of having to deal with—and pay for—someone else's mistake.

Don't think that all you are offering is a bit of your time and expertise, and that once you've caught the cats you can drop them off at an animal shelter. Private shelters need to keep their euthanasia rates low because that's what appeals to donors. They survive on donations. Even if they agree that euthanasia is the right choice, they might be unwilling or unable to do it. You may do better with a municipal shelter because public safety is part of their mission, so they're concerned about reducing the disease risks associated with feral cats.

Veterinarians sometimes provide discounts, most commonly to nonprofits or if they have a well-established professional relationship with the client. One person with a great deal of cat experience warns that if you become involved in arranging for the neutering of the cats or the adoption of kittens, the venture will not be profitable. It will turn into a community service rather than a business.

## Risks to your personal reputation

Imagine that someone wrote a nasty letter to the newspaper. Maybe they cover the story, run your picture, and mention your name. That's not the kind of advertising you probably want.

Some cat activists are against trapping. They may not trust you, yet they're an important source of information and support.

## Ethical questions

If someone intends to maintain and feed a feral cat colony, and hires you to provide services that will help them do that, are you violating

an ethical code? You know that by feeding the cats, they'll also be feeding wildlife, such as raccoons. This could create problems for the neighbors. Feeding cats also attracts other cats to the site, so the size of the colony might increase. Would you be helping to create or worsen a nuisance animal situation? And what effects might this feral cat colony have on local wildlife populations and nearby natural areas?

And yet, some people form an even stronger bond with cats than they do with wildlife. Some people go to a great deal of trouble to help take care of feral cat colonies. They may receive strong psychological benefits from the companionship of the cats, from the chance to do something they consider meaningful, and from getting outside. It may reduce their isolation and prevent depression and may be a source of joy. Some wildlife biologists believe that in certain areas, feral cat colonies don't pose much of a threat to wildlife. How do you balance the potential harm and good caused by a particular colony?

Let's face it, most of us feel a little differently about cats than we do about voles. The thought of a cat being killed may be a little harder to stomach. People who have problems with nuisance wildlife can seek professional help, but that may not be true with cats. Some desperate people may try to do it on their own, with horrifying results. You could provide badly needed expertise. How would you feel if you do (or if you don't) offer your skills?

## Ecological questions

What effects do free-roaming cats have on wildlife? You will hear many strong opinions, especially from birders, wildlife biologists, and cat fanciers. It's a hard question to answer scientifically. There are usually several factors that cause a population to decline. How much is due to habitat destruction and how much to predation? That can be hard to determine. Then you'd need to isolate the effects of cats from other predators, which is also not an easy task.

So far, we can say that free-roaming cats can hurt wildlife populations on “islands.” From a conservationist’s point of view, the term “island” refers to 3 scenarios: a piece of land surrounded by water; an urban park, in which a habitat is surrounded by development; and a pocket of habitat used by endangered or threatened species. In these islands, predation by cats may be a serious problem. For example, on some islands, prey have not been exposed to predators, so the introduction of *any* predator can be devastating. If the prey is an endangered species, losing even a few of them to a predator—any predator—could matter a great deal. In such fragile situations any additional stress could tip things the wrong way. Yet on other islands, cats may help some vulnerable species by killing other more dangerous predators, such as rats. Another complication to this island scenario is that when cats are fed, so are other predators such as raccoons, skunks, foxes, and opossums, further increasing predation pressure.

Most free-roaming cats don’t live on islands or near endangered species. Unfortunately, some people have established feral cat colonies near natural areas that do support threatened wildlife, sometimes on public land.

### **There is a lot of information for and against feral cats and it can be hard to determine the facts around management objectives.**

If you’re interested in this subject and want to learn more, evaluate your information sources carefully. It’s hard to find unbiased information about feral cats. Is the source of the information from studies that were peer-reviewed, meaning other scientists reviewed them? Is the information based on a large population or sample size, or just one or two, and then estimates drawn?

### **So, what should you tell people who call with cat problems?**

It’s best to avoid any situation involving cats of unknown origin. Suggest the callers contact a local shelter or their municipality. In some areas, there may be no written guidance in law for regions with no shelters, or for regions where shelters are full.

## Domestic dogs (*Canis familiaris*)

Many states require towns and cities to have a dog control officer. In most cases, you can refer people to their local dog control officer or the local police, who'll deal with the problem.



Some cities have large populations of stray dogs.

In some areas, if you witness a dog attacking a person who is “peaceably conducting himself in any place where he may lawfully be,” you may intervene either during the attack, or if the dog pursues the person. The person being attacked, and anyone witnessing the attack, is authorized by some laws to kill the dog, “and no liability in damages or otherwise shall be incurred on account of such destruction.” Check your local laws and ordinances.

There may be times when a dangerous situation develops with a nearby dog. If it's not a life-threatening emergency, call the dog control officer and the police, then let them take over. If you have the equipment and the skills, capture and restrain the dog, then call the dog control officer and the police.

If you're interested in becoming a dog control officer, contact your local municipality, such as the police or sheriff's department, for more information or who to reach.

**Buy the book – <http://store.nwctp.com>**

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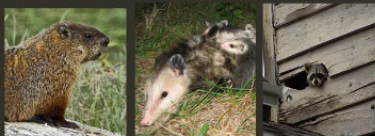


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## CORE PRINCIPLES OF WILDLIFE CONTROL WITH WILDLIFE SPECIES INFORMATION



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## Core Principles of Wildlife Control with Wildlife Species Information

## Questions with Answers for Wildlife Control Methods

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### **What is Integrated Wildlife Damage Management?**

Integrated wildlife damage management involves the timely use of a variety of cost-effective, environmentally safe, and socially acceptable methods to reduce human-wildlife conflicts to a tolerable level.

### **What are 2 ways to prevent orphaning wildlife?**

The best way to prevent orphaning is to convince your clients to wait until the young are mobile before removing, repelling, or excluding the family from the site. If that's unacceptable, you can try to capture and remove the female and all her young and hope that she will retrieve them and continue to care for them.

### **What are the 8 broad categories of WDM methods?**

1. Habitat Modification
2. Exclusion
3. Frightening Devices
4. Repellents
5. Toxicants
6. Shooting
7. Trapping
8. Other Methods

### **Habitat modification affects 3 necessities must animals have to survive. What are they?**

All animals need water, food, and shelter.

### **What are the downsides to habitat management?**

Changes to habitat to reduce the carrying capacity for one species may encourage population growth in another species. Unfortunately, some habitat modifications can be expensive, so expect some client resistance.



## **What are some examples of exclusion?**

- Nets can exclude birds from important crops and buildings and have become an important solution to complex bird problems.
- Screens and barricades prevent wildlife from entering crawl spaces and buildings.
- Fences prevent ground-dwelling animals from gaining access to landscapes like fields, gardens, airports, and structures such as decks, porches, buildings.
- Covers, caps, and screens prevent wildlife from entering specific structures such as chimneys.
- Crevice sealers include materials such as caulk, foam, mortar, and fabric to fill cracks, crevices, and openings to prevent animals from entering structures.
- Cone guards keep pests away from birdfeeders and nest boxes on poles.
- Rollers are long, cylindrical wheels with supports on each end, mounted on peaks of roofs, signs, ledges, and other narrow locations where birds loaf. Birds land on the rollers and fall off.

## **What are frightening devices? List 4 types.**

These harassment tools scare wildlife from a location through non-chemical means. Frightening devices fall into 4 categories: visual, audio, audio-visual, and biological.

## **True or False. Birds can be hazed in their nesting area during the nesting season.**

False. Most birds cannot be hazed in their nesting areas during the nesting season because of the Migratory Bird Treaty Act.

## **How do visual frightening devices work? Give examples.**

Visual devices use sight to frighten wildlife.

Visual frightening devices include scarecrows, effigies (e.g., plastic owls), scary-eye balloons, and Mylar® tape.

## **What type of visual frightening device is least effective?**

Stationary visual frightening devices are the least effective, as birds tend to habituate to them in a few days.

## **Geese and crows can be dispersed from a night-time roost by using what visual frightening device?**

Geese and crows can be dispersed from a night-time roost by pointing a spotlight, laser pointer, or high-intensity laser at them.

## **What are some examples of audio frightening devices?**

Audio devices include propane cannons and distress calls.

## **What extra steps should be taken when using audio frightening devices?**

Check local ordinances and consider the effects on the neighbors before using any noisemakers.

## **What are audio-visual frightening devices?**

Audio-visual devices use sight and sound to frighten wildlife, and include pyrotechnics (bangers, screamers, shell crackers, and propane canons with spinners).

## **What is an example of a biological control using fright?**

Guard animals such as dogs and llamas sometimes are used to protect livestock, especially sheep, from predators.

## **What are repellents?**

A repellent is a chemical that deters an animal pest from a specific location or from damaging activity.

## **Chemical repellents come in what 3 forms?**

1. Oral: A chemical that tastes unpleasant (spicy hot).
2. Tactile: A chemical that feels unpleasant (gooey or sticky).
3. Olfactory: A chemical that smells unpleasant or promotes fear of a natural predator (ammonia or rotten-egg odor).

## **How do oral and olfactory repellents work?**

Oral repellents deter pests by their bad taste when applied to vegetation, seeds, or fruit. Olfactory repellents drive mammals away through odors such as egg odors, human hair, and predator urine.

## **How does one type of oral repellent teach geese to avoid certain grassy areas?**

Anthraquinone, a registered repellent for geese, changes the ultraviolet reflection of the grass where it is applied. When geese eat the treated vegetation, they feel ill. The geese may then learn to avoid treated areas when they see the reflection of the grass.

## **Under what conditions are chemical repellents most effective?**

Chemical repellents are most effective when alternative food and shelter are available to the pest and pest populations are low. Otherwise, pest animals will be more likely to eat high-value foods to survive.

## **Why is it critical to use the right amount of tactile chemical repellent?**

Improper or excessive application of tactile repellents may foul the feathers of non-target birds. It can also entrap birds on ledges or other sites. Dead birds that stick to ledges will decay and are difficult to remove. This not only violates label laws; it can create a sanitation problem as well.

## **What are 3 reasons that repellents may need to be reapplied?**

Repellents may have to be reapplied after rainfall, to protect new plant growth, or because they lose effectiveness over time.

## **What are toxicants, and what are some examples?**

Toxicants are chemical compounds used to kill problem animals. These chemicals include rodenticides, avicides, and lethal frightening

agents. This also includes toxic baits used to control pest birds such as starlings (an avicide).

### **How can the effectiveness of a toxicant be increased?**

Toxicants should be used with other control methods, such as habitat modification and exclusion, to increase their effectiveness.

### **What are some non-target animals that could be harmed by toxicants?**

Considerable care must be used to minimize risks to non-target animals, including predatory wildlife, songbirds, livestock, pets, and people.

### **What equipment commonly is used when shooting is selected as the damage control method?**

Firearms include pistols, shotguns, rifles, and air rifles (high-end pellet guns).

### **On what species of animals is shooting appropriate?**

Shooting is appropriate for use with medium to large mammals (squirrel-sized and larger), birds, and reptiles.

### **What are extra considerations when using shooting to control wildlife damage?**

Shooting requires training and skill. Safety concerns and legal restrictions must be considered before shooting. For proper training in the use of firearms, attend a hunter education course or a training course sponsored by the National Rifle Association (NRA).

### **What is a benefit of using trapping to manage wildlife damage?**

Traps are devices that can capture wildlife without a person being present.

## **What are 6 types of live traps?**

Live traps include cage traps, box traps, multiple-capture traps, foothold traps, capture nets, cable-restraints, and a variety of bird traps.

## **What are some advantages of using live traps?**

You can see what you have captured and demonstrate success to the client. It prevents animals from dying in inaccessible locations, which is a hazard of using toxicants. With live trapping, you avoid the foul odor caused by decay that could attract other pests and is a nuisance itself. In most cases, if you are using a live trap, you can release nontarget animals that are caught accidentally.

## **What are some disadvantages to using live traps?**

It usually is labor intensive and you may capture the wrong animal. If a live trap is used improperly, an animal may die in it from lack of food or water; from weather extremes ranging from heat in summer to cold in winter; or from attacks by wildlife, pets, or people.

## **What is the difference between a cage trap and a box trap?**

Cage traps often are made of wire while box traps are made of solid material, usually plastic or aluminum.

## **What are foothold traps?**

Foothold traps are live traps and, as the name suggests, are designed to capture an animal by the foot.

## **What animals are foothold traps most efficient to trap?**

Footholds can be used in land sets, water sets (in streams, lakes), and under ice. They are the most efficient tools for catching coyotes and foxes and often are important for trapping raccoons, beavers, muskrats, and nutria during wildlife control activities.

## **True or False. Mouse and rat snap traps are examples of body-gripping traps.**

True. The familiar mouse trap is a form of body-gripping trap.

## **What modifications have been made to the traditional snap trap to make them more effective?**

Snap traps with expanded triggers and the clamshell design are much easier to set than the traditional mouse trap. The Quick Kill Mouse Trap® made by Victor® has a lid over the bait cup. Only animals that seek the bait will lift the lid, which is what triggers the trap.

## **What is the benefit to using a multiple-capture trap?**

Multiple-capture traps can catch more than one animal without having to be reset.

## **How often should one check a live trap?**

Check live traps often enough, usually daily, so that animals are not stressed or exposed to extreme temperatures.

## **What is the key to successful mole trapping?**

The key to successful trapping of moles is to identify active tunnels. Look for ridges, molehills, dead grass, and soft spots in the lawn. Prepare the site and set the trap according to the instructions given for the trap. If there is no activity after a few days, move the trap.

## **Why are snap traps preferred over glue boards in many cases?**

Snap traps often are more effective than glue boards and are more humane, although setting them does take more effort.

## **How can you increase your success in trapping birds?**

To increase your chance of success, habituate birds to the trap. First, put out some bird seed (shelled corn for pigeons) or other appropriate bait to habituate birds to feeding in the area.

## **What baits are attractive to raccoons, but not cats?**

Marshmallows and sardines attract raccoons, but marshmallows will not entice cats, so marshmallows are safer if you must trap where

cats are free roaming. Cats are attracted to protein-based baits, so choose sweet baits to avoid catching cats.

### **What is the purpose of a lure?**

Lures can help bring the target animal to your trap.

### **What are 3 categories of lures? Give examples of each.**

Lures tend to be liquid and fall into 3 categories: food-based, gland-based, and curiosity. Lures are concentrated odors and may be detected by wildlife from great distances. Food-based lures trigger hunger and are scents that appeal to the animal's appetite. Gland-based lures trigger sexual or territorial behavior. Urine is a gland-based lure. Curiosity lures are odors that likely are unfamiliar to the animal, yet attractive enough to cause the animal to investigate.

### **What equipment is useful for direct capture?**

Gloves, however, we do not recommend grabbing wildlife using only gloves, except when dealing with juveniles.

A catch pole is a versatile tool for the capture and restraint of animals. It is a long stick with a noose on one end. Other hand-operated devices, often called cat graspers, incorporate a vice-grip closure on the end of a pole. They can be useful if you are trying to capture small animals or if you are not able to get a loop around an animal.

Snake tongs are useful for grabbing snakes and a snake hook can be used to pin the head of a snake to the ground.

Capture nets, to be distinguished from nets used in exclusion, are available in varying designs such as throw nets, hoop nets, and mist nets.

### **What is chemical immobilization?**

Chemical agents can be used to immobilize animals, so they are unable to escape a human that approaches. Products such as alpha-chloralose, ketamine, and telazol typically are available only to state

wildlife agency, USDA-APHIS-Wildlife Services (WS), veterinary, and academic personnel. Purchase and use of the drugs requires federal and state licenses.

### **What is fertility (reproductive) control? What is one example?**

It is essentially birth control for wildlife. Eggs can be oiled, punctured, or shaken so that they cannot hatch. Egg control often is used to manage resident Canada geese in troublesome nesting areas. Federal permits are required.

## **Questions and Answers for the Control of Birds**

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### **Which species of blackbirds are most common?**

Brown-headed cowbird, common grackle, and red-winged blackbird.

### **How do blackbirds typically damage crops?**

They feed on agricultural grain and seed, especially sorghum, sunflower, millet, corn, and oats.

### **Which species of blackbird eats livestock feed and lays its eggs in the nests of other birds?**

Brown-headed cowbird.

### **Describe how crows may damage agricultural crops.**

Crows feed on emerging plants (e.g., corn, peanuts, and soybeans) in the spring, and ears of corn in the milk stage. When crows feed on ears of corn, they often eat only a few kernels. Their feeding, however, may contaminate the entire ear with bacteria and mold. Crows also peck and eat fruits such as tomatoes, melons, Asian pears, and cantaloupes. The birds can be a problem in nut orchards, especially pecans.



## **Why are large crow and gull populations sometimes blamed for a decline in shorebirds and colonial water bird species?**

Crows and gulls prey on the eggs and young of shorebirds and colonial water birds. Populations of many of these desirable bird species have dropped sharply over the last 25 years.

## **How can flocks of crows affect human health and safety?**

Crows may cause disease threats associated with roost sites, and by threats to aviation safety. Crow roosts increase the risk of histoplasmosis. In addition, flocks of crows may collide with planes during morning and evening movements to and from the roost.

## **Briefly describe how crows may damage property.**

Roosting crows may leave fecal deposits on cars, buildings, or walkways. Frequent cleaning is necessary to protect property from the acidic droppings. Sometimes, noxious odors from the roost drive landowners off their property. Occasionally, crows pull windshield wipers from parked cars. Crows may also pick at and ruin the latex caulking or rubber gaskets holding windows within the frame. Many crows peck into plastic trash bags and scatter the trash.

## **Describe the appearance of a European starling.**

European starlings are robin-sized birds weighing about 3 ounces and measuring 7 to 8 inches in length. In summer, adults are black with an iridescent green-purple sheen. In winter, their plumage has white flecks. The bill of both sexes is yellow during the reproductive cycle (January to June) and dark at other times. Starlings are chunky and hump-backed, with a shape similar to a meadowlark.

## **Starlings fly great distances between roosting and feeding sites each day. Describe their "commuting" behavior.**

Starlings may fly up to 30 miles from roosting to feeding sites. When they return in the evening, starlings often "stage" on trees, power

lines, bridges, and towers. After sunset, they fly to their roosts for the night.

### **What types of damage do starlings cause?**

Starlings cause agricultural damage by eating animal feed and contaminating water with their droppings. They destroy fruit and sprouting grain and compete with native birds for nesting sites. Starlings may also transfer disease from one livestock facility to another. Their droppings encourage the development of histoplasmosis.

### **What species of feral ducks are sometimes pests in your state?**

Muscovy, Pekin, barnyard mallard, and runner ducks.

### **Briefly describe how feral ducks cause damage.**

Feral ducks damage property, impair water quality, cause erosion of the shoreline, and threaten human health when their droppings accumulate. Accumulated droppings may foul recreational areas, beaches, shopping centers, and picnic grounds. When the number of feral ducks is large, the associated filth and nuisance may drive many people away from recreational areas.

### **What 4 species of gulls are most common in the northeast?**

Herring gulls, great black-backed gulls, ring-billed gulls, and laughing gulls.

### **How do gulls harm the mariculture industry? What effect do gulls have on shorebirds and other colonial water birds?**

Gulls, especially herring gulls, feed on cultured clams, oysters, mussels, and soft-shell crabs in holding trays. Herring gulls and great black-backed gulls kill many terns, skimmers, and oystercatchers. Ring-billed and laughing gulls also prey on eggs and chicks of other colonial water birds and shorebirds.

## **Describe how gulls may threaten human health and safety.**

Gulls are a hazard around airfields when they collide with aircraft. At landfills, flocks of gulls may obscure the view of drivers moving heavy equipment, which can result in collisions. Gulls often contaminate drinking water resources at reservoirs through bacteria spread by their feces. They also congregate at shopping centers. Air-handling units at shopping centers often pick up gull droppings and feathers. These may contaminate the air inside the shopping center.

## **In an urban area, what might a house sparrow eat?**

Garbage, breadcrumbs, spilled birdseed, and refuse from restaurants.

## **What kind of habitat do most feral ducks prefer?**

Urban and suburban settings and college campuses, where people often feed them.

## **House sparrows and rock pigeons cause many sanitation problems. Give several examples of these for each bird.**

**House sparrows:** contaminate livestock feed; droppings and feathers contaminate stored grain and bulk feed; and sparrows transmit diseases and parasites that can harm humans.

**Rock pigeons:** droppings may carry and spread diseases to people; pigeons carry harmful mites, fleas, and ticks; insects that inhabit pigeon nests in buildings are fabric and pantry pests as well as external parasites of people; and around grain-handling facilities, pigeons may contaminate food destined for humans or livestock.

## **Why are house sparrows so successful in urban areas?**

They are very tolerant of human activity. House sparrows seem to prefer man-made habitats in cities and around farm buildings and houses. Their diet is adaptable to food sources found in cities.

## **Other than sanitation issues, how do pigeons threaten human safety?**

Pigeons can be a safety hazard around airports when they collide with jet aircraft.

## **How does human behavior contribute to pigeons' food supply?**

Pigeons thrive on spilled or improperly stored grain, garbage, and other food materials provided for them by the untidy habits of people. In many urban areas, feeding pigeons is a form of recreation.

## **Which species of vulture is the greater threat to farm animals: black vultures or turkey vultures?**

Black vultures.

## **Briefly describe the damage often done by black vultures.**

Black vultures kill vulnerable animals such as young calves, lambs, and kid goats on the range; pet dogs, cats, ducks, and chickens confined to small pens or short runs; and slow-moving wild animals such as deer fawns, groundhogs, skunks, and opossums. Vultures may also damage boats, tractors, vehicles, houses, hay bales, and other objects. Much of this damage results from ripping, tearing, and poking holes.

## **How do vultures threaten human health and safety?**

Vultures are a safety hazard around airports. Vulture-aircraft collisions, or strikes, have caused severe fuselage and engine damage. Vulture vomit and feces may contain harmful bacteria and viruses. In addition, vultures can mechanically transmit bacteria and viruses on their feet and feathers.

## **At what time of year are vulture roosts largest?**

Roosts are largest during the winter. Vultures roost together because it helps them find food.

**Name the 2 types of Canada geese found in the northeast and describe how they differ. Which group tends to cause the most problems?**

The northeast has 2 populations of Canada geese: those that migrate for nesting, and those that nest locally (resident). Migratory Canada geese are native. They winter in the southeast and migrate north during warmer months. Resident (local breeding) Canada geese live in the northeast throughout most of the year. Migratory and resident Canada geese behave differently. Migratory geese tend to avoid people, whereas resident geese freely associate with humans. Resident geese cause most of the problems.

**Describe the type of damage caused by Canada geese.**

Canada geese damage crops, golf courses, industrial parks, municipal parks, public beaches, and waterfront residences by overgrazing the turf, fouling areas with droppings, or trampling fields. Their droppings also can contribute to algal blooms, which may lead to fish kills.

**Why are resident Canada geese more of a nuisance than non-resident geese?**

First, resident Canada geese do not migrate but remain in the northeast during most of the year. This increases their opportunities to become a pest. Resident geese live around metropolitan areas, which exposes them to more people. They also congregate around sensitive areas such as reservoirs, lakes, golf courses, and some industrial parks. Finally, resident geese do not avoid people, as do migratory geese.

**How do mute swans and tundra swans differ?**

Mute swans weigh 21 to 25 pounds and measure between 55 and 60 inches. They are usually silent. Adults are snow white with a large orange bill. Mute swans are not social birds and do not usually travel

in flocks. Many of them do not migrate. Mute swans are exotic to North America.

Tundra swans are smaller, weigh between 12 and 18 pounds, and grow from 48 to 57 inches long. Adults are snow white with a black bill and a yellow spot in front of the eye. They make a goose-like honking sound. Tundra swans are social birds and form large flocks. These swans are migratory, and tundra swans are native to North America.

**How do the feeding habits of mute swans harm wetland plants and animals?**

By feeding on aquatic plants, mute swans deplete food supplies for native ducks and geese. Their feeding also kicks up silt and organic material in the water. Water clouded with silt can inhibit the growth of underwater plants.

**Name the common types of woodpeckers found in the northeast. What types of damage do woodpeckers do?**

Common woodpeckers include pileated woodpeckers, downy woodpeckers, hairy woodpeckers, northern flickers, red-bellied woodpeckers, redheaded woodpeckers, and yellow-bellied sapsuckers.

In the northeast, woodpeckers are mostly a threat to wood siding on homes. Woodpeckers may do considerable harm to cedar siding by trying to make nest holes in it. If they drill or peck into other types of wood, it is mostly to get at carpenter ants or other insects that have already infested the wood. Some woodpeckers also attack fruit trees, nut trees, and beehives.

**Name 4 reasons that woodpeckers damage structures.**

1. To search for food.
2. To create roosting sites.

3. To create nesting sites.
4. To attract a mate or mark a territory through drumming sequences.

### **Are woodpeckers migratory or do they live year-round?**

Some species, such as the northern flicker and redheaded woodpecker, are migratory. However, most are resident, living year-round in the same area.

### **Animals become pests when their populations increase in human environments. Why do Canada geese, house sparrows, rock pigeons, and European starlings thrive around people?**

These pest birds can tolerate people and their activities. They successfully exploit new habitats, particularly those influenced by humans. Through recreational feeding, people also encourage the existence and abundance of these birds in cities.

### **What feature of birds reduces the effectiveness of control methods?**

Unlike mammals, few birds can smell very well. Therefore, olfactory repellents will not control bird pests.

### **Why is it important to observe pest birds before beginning a treatment program?**

Observing pest birds at different times of day will tell you how many birds are present, what species there are, and what the birds are doing. This will help you decide whether the birds are a nuisance and what treatment options will work best.

### **Your client has a blackbird roost near his crop fields. Which crops would be best to plant within 5 miles of the roost? Why?**

Soybeans, wheat, or other crops that do not appeal to blackbirds. Most severe crop damage occurs within 5 miles of a roost. Plant more attractive crops, such as corn or sunflowers, farther away.

**What type of trap may help reduce large populations of blackbirds in targeted areas?**

Decoy traps. These traps can catch 10 to 50 blackbirds and starlings per day.

**What cultural techniques may help disperse crow roosts? Describe.**

Thinning or trimming roost trees. "Thinning" means removing one-third to one-half of the trees. This procedure allows more air, wind, and rain to enter the roost site and will often disperse the roost. Trimming branches on large trees is another possibility.

**What type of frightening device is usually most successful in dispersing crow roosts? Give examples.**

Noise harassment devices. These include pyrotechnics, propane exploders, distress calls, and sirens. Shooting to scare birds is also effective. However, the Bureau of Alcohol, Tobacco, and Firearms (ATF) now regulates the use of pyrotechnics and explosive devices.

**Name at least 6 practices that may limit the availability of food to starlings and make livestock areas less attractive to these birds.**

1. Cleaning up spilled grain.
2. Storing grain in bird-proof facilities.
3. Using bird-proof feeders.
4. Feeding livestock in covered areas such as open sheds.
5. Using feed that starlings cannot swallow.
6. Adjusting feeding schedules to minimize feed exposure to birds.
7. Mixing protein supplements thoroughly with other rations or using non-protein nitrogen (NPN) sources.



8. Draining or filling in unneeded water pools around livestock operations.

**What are gulls' main food sources? List at least 5.**

1. Improperly buried waste at landfills.
2. Agricultural practices that make worms easily available.
3. Composted chicken spread on fields as fertilizer.
4. Improper disposal of dead poultry.
5. Increased cultivation of shellfish.
6. Paved landscapes that expose worms after rainfall.
7. Availability of human food waste at shopping centers and restaurants.

**Of the following species, which are protected by the Federal Migratory Bird Treaty Act: starlings, pigeons, woodpeckers, Canada geese, laughing gulls, and tundra swans?**

Woodpeckers, migratory Canada geese, laughing gulls, and tundra swans.

**Your client has a persistent problem with nuisance gulls. Past attempts to limit gull damage using nonlethal methods have failed. What is the next step?**

You or your client must document the type of damage that has occurred. Include proof that reasonable and practical nonlethal control methods have failed. These documents may qualify the property owner or manager for a federal migratory bird depredation permit, issued by the US Fish and Wildlife Service. This permit will allow you to take (kill or trap) nuisance gulls despite their status as protected migratory birds.

**What types of traps will capture gulls? Why is a federal permit required to trap gulls?**

Nest traps, rocket nets, and cannon nets. A federal permit is required to capture or kill a migratory bird. Gulls, being migratory birds, are protected by federal law.

**If you plan to shoot gulls around wetlands, what type of ammunition must you use? Why?**

Nontoxic shot (nonleaded shot made of materials such as steel or tungsten). The Fish and Wildlife Service prohibits the use of lead shot for hunting waterfowl because the shot will cause sickness and death when ingested by nontarget migratory birds.

**Describe 2 ways to destroy sparrow nests.**

1. Pull down nests and destroy the eggs to discourage sparrows from using an area. Repeat every week through the breeding season.
2. Where nests are high, spray corn or vegetable oil on eggs in nests. This treatment will kill (suffocate) the eggs.

**Why do house sparrows often take over purple martin apartments? How can you prevent this?**

Martins and sparrows are about the same size. The openings to martin apartments invite both martins and sparrows. To prevent sparrows from nesting in martin houses, block entrances until martin scouts return from their winter grounds.

**Why are house sparrows hard to control with traps?**

Sparrows are suspicious and intelligent birds. This makes it difficult for traps alone to remove a sparrow population completely.

**Describe several ways to exclude house sparrows from buildings.**

Close or block all openings over  $\frac{3}{4}$  inches wide. Replace broken windows in upper stories or cover them with a solid material like plywood or wire mesh. Block large openings like bell towers with poultry mesh no bigger than  $\frac{3}{4}$  inches. Screen poultry houses and

feeders, and block warehouse doorways. Hang floor-length PVC strips in front of doorways. Install mesh behind ventilators to keep birds out, and electric wires to repel the sparrows from ledges.

### **Why are cracked grains often useful as sparrow bait?**

Cracked grains are a more digestible and attractive size. House sparrows often like cracked corn ( $1/16$  to  $3/16$  inch).

### **What simple cultural practice can greatly reduce pigeon populations in an area?**

Keeping areas clean. This will eliminate the food supply and likely get rid of pigeons as well. Pigeons are attracted to untidy areas where bits of food and grain are readily available. Clean up around grain elevators, feed mills, railcar cleanout locations, and other places where grain often spills.

### **List at least 3 tips for trapping pigeons.**

1. Place the traps near major loafing areas or watering sites.
2. Pre-bait the area(s) for several days before trapping begins.
3. Visit traps at least every day. Replenish food and water for any decoy birds.
4. If the traps fail to catch many birds, choose another site.

### **How do tactile repellents help discourage pigeons from roosting on buildings?**

These repellents are uncomfortable to land on and force pigeons to loaf or roost elsewhere. Tactile repellents are effective for up to one year.

### **Name several cultural control methods that will limit vultures' food supply.**

1. Bury or incinerate dead livestock.
2. Put out only enough food for pets to eat in about 15 minutes.

3. At landfills, bury trash regularly throughout the day, and cover all trash with dirt at the end of the day.
4. Bury or remove livestock carcasses immediately.

### **What types of frightening devices may help disperse vulture roosts?**

Devices include 15-mm pyrotechnics, propane exploders, sirens, lasers, and effigies of dead vultures.

### **What types of traps will capture vultures? How should you dispose of trapped vultures?**

Two types of traps are effective: large, baited walk-in traps, and padded-jaw foothold traps set around a carcass. The walk-in traps usually measure 30 feet long, by 10 feet wide, by 6 feet tall and have a funnel entrance. The foothold traps are set to capture vultures that are damaging rubber or latex gaskets on buildings. Euthanize captured birds.

Remember that a migratory bird depredation permit is required to trap vultures. Only state and federal wildlife agency staff may routinely trap and euthanize vultures.

### **List several ways landowners can discourage Canada geese and other waterfowl from using a pond.**

1. Discourage people from feeding ducks and geese.
2. Remove domestic ducks and geese from bodies of water to avoid attracting more geese.
3. Construct a grid of suspended wires (wire grid) over the pond to deny bird access to the water.
4. Erect a 2-strand temporary fence around the pond during the molt from mid-June to mid-July.
5. Mow to the edge of ponds to reduce nesting cover.
6. Shut off pond aerators in winter and allow the pond to freeze.
7. Vertically straighten pond banks.
8. Place boulder rip-rap around levees and banks.

9. Use mylar tape to construct goose-resistant fencing around gardens and crop areas.
10. Cover certain areas (such as clam beds) with nylon netting.

### **How should you carry out a waterfowl-scaring or harassment program?**

First, be prepared. Know where birds will go once they leave a location. Discourage birds from landing in unharvested fields. They often trample as much or more than they eat. Watch fields closely. This is especially important during morning and evening hours when waterfowl usually feed. Scare equipment should be ready before the damage begins. Finally, move or change scare tools for best results.

### **What permit must you have to legally trap a troublesome Canada goose or tundra swan? Why?**

A migratory bird depredation permit, issued by the USFWS. Canada geese and tundra swans are protected migratory waterfowl..

### **How can egg treatments help control non-migratory Canada geese and mute swans?**

Puncturing eggs, or coating eggs with corn oil will prevent them from hatching. After treating the eggs, return them to the nest and allow the birds to incubate for at least 3 weeks. Then, remove all nest materials and eggs. This will discourage further nesting.

### **What types of siding may prevent woodpecker damage?**

Aluminum or vinyl siding in bright colors. Not all wood siding is equally vulnerable. Woodpeckers do not initially damage some of the harder compressed-wood or wood-fiber siding. Their hardness and/ or smooth surface serve as deterrents. However, over time, the hard wood surface often becomes soft due to water damage. It is then more vulnerable to woodpecker attack.

## Woodpeckers have damaged a client's cedar siding. How could you prevent further damage?

1. Install nylon or plastic netting beneath the eaves of the home, stretched tight.
2. Place metal sheathing over the pecked areas on wood siding for permanent damage protection.
3. Use visual frightening devices such as eyespot balloons, brightly colored tassels or strips, and plastic twirlers.
4. Create loud noises such as hand clapping, a toy cap pistol, and banging on a garbage can lid. Such harassment, if repeated as needed, may cause the birds to leave for good.
5. Do not injure or kill the birds.

## What animal can safely repel geese and swans from certain areas?

A well-trained dog. Border collies are most frequently used to repel geese from parks and golf courses.

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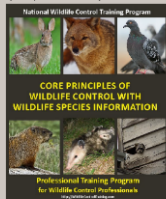
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