

Wildlife Damage Management Fact Sheet Series

Bats

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Ecological and Economic Benefits

Bats are beneficial mammals because they are efficient predators of insects. A colony of 100 little brown bats, the most abundant species in New York, may consume hundreds of thousands of mosquitoes and other small insects each summer. Big brown bats, which frequent agricultural areas, may consume crop pests and thus reduce insect damage to a variety of fruits and vegetables. Red, hoary, and silver-haired bats help maintain forest health by feeding on foliage pests such as tent caterpillar moths. Because of their role in controlling insect numbers, it is important to maintain wild bat populations so as to preserve ecosystem health and reduce crop damage.

General Biology

Although some mammals are able to glide, bats are the only mammals that truly fly, actually flapping their wings to propel them. They are the only member of the order Chiroptera, meaning “hand wing,” which refers to how a bat’s finger bones support its wings.

Bats live in a variety of habitats, including wetlands, fields, forests, cities, suburbs, and agricultural areas. They usually feed where insects swarm, such as over water and agricultural fields, in forest clearings and along forest edges, and around street lights.

All New York bats eat insects and take their prey on the wing. Bats may seize their prey in their mouths or use their wing and tail membranes like butterfly nets to capture insects. As a bat approaches



an insect or swarm of insects, it tilts its body slightly upward, curling its tail membrane into a “scoop” or “pocket.” Insects may be captured in either the wing membrane or tail “scoop,” from where they are picked up by the bat’s mouth and consumed in flight.

Although bats can see, they use echolocation—ultrasonic sounds and echoes—to navigate and catch prey in total darkness. Bats open their mouths in flight and emit a series of ultrasonic sound pulses that bounce off nearby objects—such as bushes, fences, branches, and insects—and return as echoes to the bat’s ears. Using the information gathered from these echoes, bats can maneuver to capture an insect or avoid flying into an object.

Because few flying insects are active during winter, bats that remain in New York year-round gather in caves, deep rock crevices, and abandoned mines to hibernate. (Some big brown bats may overwinter in buildings.) Hibernation is a state of prolonged torpor during which

bats’ normal metabolic activities are reduced. Body temperatures decrease by 50 percent and the heart rate slows to only about 20 beats per minute compared to 1,000 beats per minute during flight. Hibernating bats can survive on a very small amount of stored fat during the five- to six-month hibernation period. Over winter, they may lose from one-fourth to one-half of their prehibernation weight.

Not all species of bats in New York remain throughout the winter. Some species, such as silver-haired, red, and hoary bats, spend the breeding season in the North and migrate south for the winter. Once they arrive at their wintering grounds, these bats may remain active or hibernate.

Bats emerge from hibernation in March and usually arrive at their summer roosts in April. At this time, pregnant females seek out sheltered roosts in buildings, rock crevices, tree cavities, and tree foliage in which to rear their pups. Female red, hoary, and silver-haired bats

generally roost alone during the summer, whereas females of other species form large or small groups called maternity colonies. Male bats usually roost alone in fairly exposed locations. Each female (depending on species and geography) gives birth to one or two pups in late May and early June. The pups, which are born hairless, blind, and helpless, cling tightly to their mother in the maternity roost. On summer evenings, females leave the pups in the roost and hunt insects nearby, returning often to nurse their offspring. As the pups grow older, the females return less frequently during the night. The pups begin to fly and hunt on their own as early as July, when they are approximately five weeks old. The females continue to nurse their pups until they can feed themselves adequately.

Bats of the Northeast

Nine species of bats live at least part of the year in the Northeast (Table 1). Most of these species roost in secluded locations away from humans, but the little brown bat and big brown bat often roost in buildings. These bats once roosted in hollow trees but adapted to human structures after early settlers eliminated large expanses of forests. These “house bats” roost in hot attics, soffits, and other niches, which act as incubators for their growing pups.

Bats in Homes and Buildings

Humans and bats usually find themselves in conflict either when a lone bat flies into a building or when a maternity colony of bats roosts in a building. The proper techniques for dealing with these uninvited visitors are outlined in the following sections.

A Single Bat in the House

Individual bats occasionally enter houses, most often during evenings in July and August. These wayward bats are often the year's young that are just beginning to fly. Fortunately, these incidents can be resolved quite easily. A bat flying in the house will usually circle a room several times in search of an exit and may find its own way out. Chasing or swatting at the bat will cause it to panic and fly erratically around the room, which needlessly prolongs the incident.

If you encounter a bat flying in a room and you have determined that no person or pet had contact with the bat, and if the bat was not found in a room with a sleeping person, a previously unattended child, or a mentally disabled or intoxicated person (see “Rabies Precautions” section), follow this procedure:

FLYING BAT

1. Shut all doors leading into other rooms to confine the bat to as small an area as possible. Remove pets from the room.
2. Open all windows and doors leading outside to give the bat a chance to escape (Don't worry about other bats flying in from outside.)
3. Leave the lights on, stand quietly against a wall or door, and watch the bat until it leaves. Make sure that someone stays in the room with the bat at all times to ensure that it actually leaves.
4. Do not try to herd the bat toward a window. Allow it to get its bearings calmly, and don't worry about it swooping at you. When indoors, a bat makes steep, banking turns, so it flies upward as it approaches a wall and swoops lower near the center of the room.
5. Within 10 to 15 minutes the bat should settle down, locate the open door or window, and fly out of the room.

RESTING BAT

If the bat tires and comes to rest on a curtain or wall, you can remove it easily without directly touching it.

1. Put on a pair of leather gardening or work gloves. (Never handle a bat, or

Table 1. Bats of New York

Common name	Scientific name	Summer Roosts	Winter Roosts	Notes
Little brown bat	<i>Myotis lucifigus</i>	Buildings	Caves, mines	Most common species
Big brown bat	<i>Eptesicus fuscus</i>	Buildings	Caves, mines, occasionally buildings	Sometimes active during winter
Eastern pipistrelle	<i>Pipistrellus subflavus</i>	Trees	Caves, mines	Smallest bat in region
Eastern long-eared bat*	<i>Myotis septentrionalis</i>	Trees, building exteriors	Caves, mines	Rarely seen by people
Indiana bat	<i>Myotis sodalis</i>	Hollow trees, beneath bark	Caves, mines	Federally endangered
Small-footed myotis	<i>Myotis leibii</i>	Beneath tree bark	Caves, mines, rock piles	Species of special concern
Silver-haired bat	<i>Lasiurus noctivagans</i>	Tree crevices	Migrates south	Forest-dwelling bat
Red bat	<i>Lasiurus borealis</i>	Tree foliage	Migrates south	Forest-dwelling bat
Hoary bat	<i>Lasiurus cinereus</i>	Tree foliage	Migrates south	Forest-dwelling bat

*or northern myotis (formerly Keen's bat)

any other wild animal, with your bare hands.)

2. Place a container, such as a large plastic bowl or coffee can, over the bat as it rests on the wall. The bat will probably be exhausted and disoriented and should not fly as you approach it. (If it does take flight, follow the procedure for flying bats.)
3. Slide a piece of rigid cardboard (if unavailable, use a magazine or lid from a coffee can or bowl) between the container and the wall to trap the bat. Hold the cardboard firmly against the container and carry it outside.
4. If the bat is in a hard-to-reach place, such as the corner of a room, you may capture it with a fine-meshed insect net with a long pole. Forceps (9–12 inches long, rat-toothed) can also be used to capture the bat and transfer it into a container.
5. Once you have captured the bat and are sure no people or pets have come into contact with it, place the container on its side (facing away from you) on a secure place above the ground—such as on a ledge or against a tree—and slide away the cardboard. Releasing the bat above the ground will keep it safe

from predators until it has its bearings. Unlike birds, most bats must drop from a perch and catch air under their wings before they can fly.

If there is any question about possible contact with a bat, do not release it. Capture the bat following the instructions above and contact your local health department as soon as possible. If bats continue to enter your home, inspect it, including the attic, to determine if you are housing a bat maternity colony.

Brown Bat Maternity Colonies

Because brown bats have only one or two pups per year, the destruction of just one maternity colony can have a long-term impact on local populations of bats and insects. Homeowners may believe that extermination or destruction of a maternity colony is their only solution, but there is a safe, humane, and effective alternative, called bat-proofing.

BAT-PROOFING

First, enter the attic and look for roosting bats. During the day, bats will likely be roosting in narrow crevices in the attic walls, between or on the rafters, or in the space between the rafters and roofing material. When you enter the attic, the

bats will quickly retreat out of sight (rather than taking flight). If you can't see them, listen for squeaking or scurrying sounds.

If you are uncomfortable entering the attic when bats may be present, you can inspect it at night for bat droppings. The dry, black droppings are about the size of a grain of rice, and they accumulate in piles below roosting areas. (Mouse droppings look similar but are smaller and would be scattered in small amounts throughout the attic.) If you find bats in your attic during the day, or if you find large accumulations of bat droppings, a maternity colony is probably living in your house.

Do not use toxicants to eliminate a bat colony. No chemicals or pesticides are registered for this purpose, and unnecessary killing of bats is not an environmentally sound, humane, or permanent solution. There is no research evidence that electromagnetic or ultrasonic sound devices will repel bats from a structure. Unless entrances to the structure are sealed, the bats will return.

To bat-proof your home (1) stage a "bat watch" to identify entrances, (2) seal the holes to prevent bats from entering, (3) (optional) provide an alternative roost,

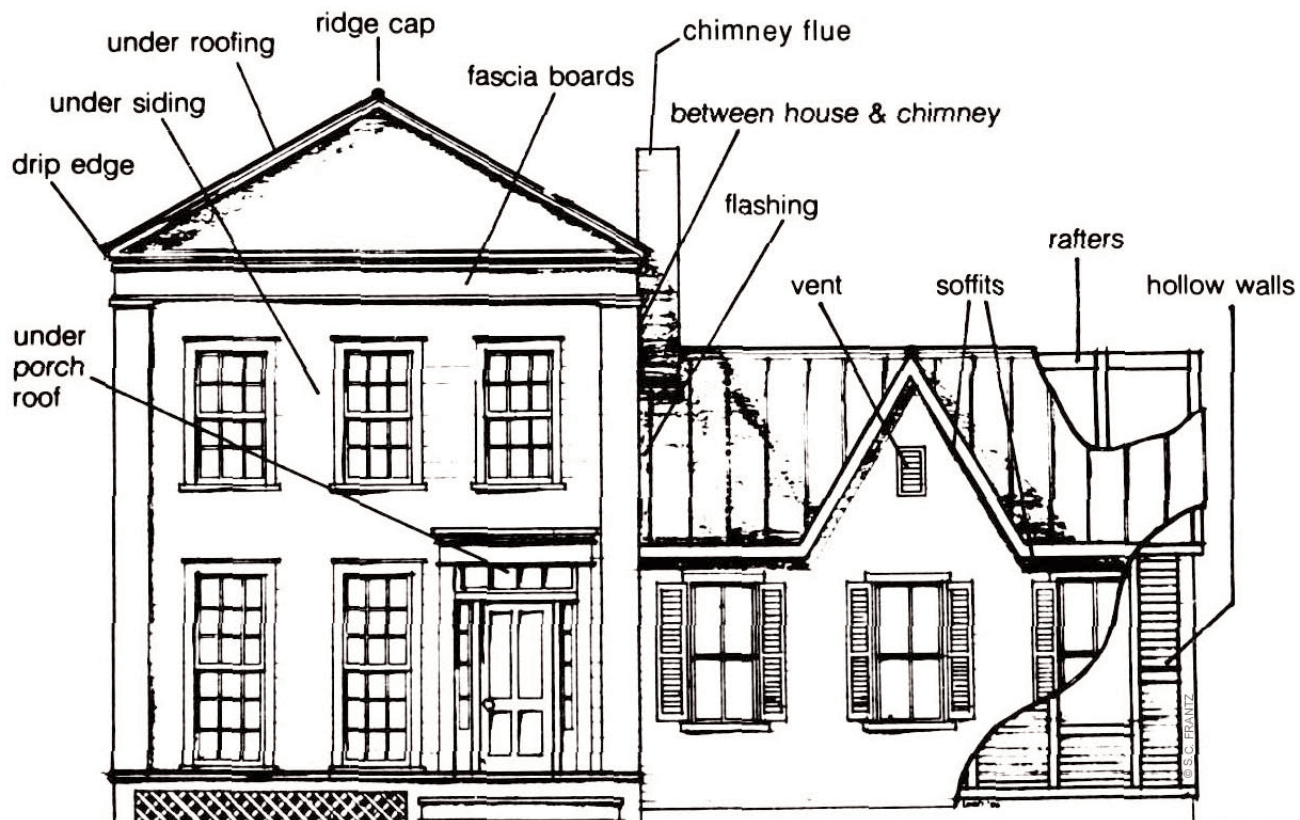


Figure 1. Common points of entry

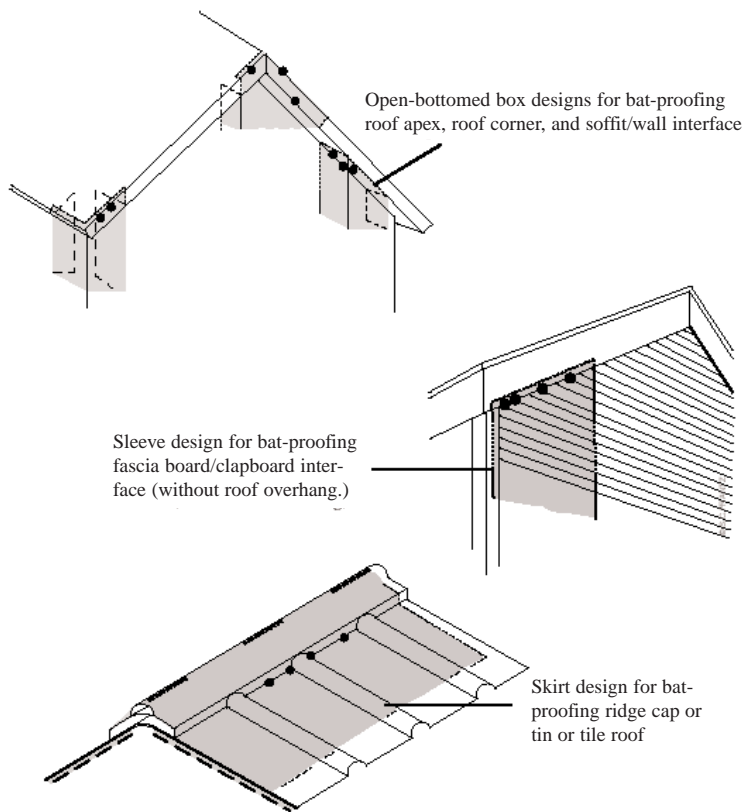


Figure 2. Three examples of one-way doors

or bat box, for the colony to occupy. Bat-proofing is usually a simple procedure, but some situations may require a professional.

Step 1: Identify Entrances. Locate the holes bats use to enter and exit the structure. Bats commonly enter where joined materials have warped, shrunk, or pulled away from one another. Examples include louvered vents with loose screening, the roof peak, and where flashing has pulled away from the roof or siding (Figure 1).

To determine which of these areas are providing access, look for bat droppings on the side of the house below a suspicious crack or crevice. In addition, entrances that have been used for a long time may have a slight brown discoloration at the edges. Inside the attic, bat droppings often accumulate below bat entrances and exits. During the day, turn off the lights and look for openings where outside light is passing through.

Staging a “bat watch” can also help you locate the bats’ entrances. At dusk, station a person on each side of the building and watch as the bats exit. When the first bats leave, focus on that area of the building and watch for others until you have pinpointed their exits. Dawn is another good time because the returning bats will

swarm around their entrances a few times before actually entering the building.

Step 2: Seal Entrances. Use window screening or hardware cloth to cover louvered vents or large gaps and cracks in the building. To fill in smaller cracks, use knitted wire mesh or caulking compound. Trim or paint caulked repairs after they harden. Most bat-proofing materials can be obtained in local hardware or building supply stores. Unlike mice, bats will not gnaw new holes in the building, so sealing the existing holes will keep them out.

The best time for bat-proofing is spring, before bats enter the roost, or fall, after they have left. Because pups remain confined in the roost until they are old enough to fly, bat-proofing should never be done between late May and mid-August. Otherwise the young, flightless bats will be trapped, resulting in potential health risks and obvious odor problems as the bats die and decay inside the building. In addition, the pups may enter human living areas in search of a way out, and females may frantically attempt to reenter the building to rejoin their young, even during daylight hours. If bat-proofing must be done while bats are inhabiting the building, install a one-way door (Figure 2) after the pups are able to fly.

One-Way Doors

One-way doors are pieces of mesh or screening placed over a bat entrance to form a long sleeve or tent. These doors allow bats to exit at night but prevent their re-entry at dawn. One-way doors work because bats depend largely on their sense of smell, rather than their vision, to locate their entrances. The bats will exit at the bottom, but when they return they will land on the mesh near their entrance hole. They will smell their entrance through the mesh and will crawl around in its vicinity, trying to find a way inside. The smell of the entrance focuses the bats’ attention on that portion of the mesh and they will not try to enter at the bottom of the door. An easy-to-install one-way door is described in Appendix 1.

One-way doors are designed to allow bats to leave a building but not reenter.

Big brown bats occasionally hibernate in an attic or basement. If this is the case, install a one-way door in the fall before the bats begin hibernating or in the spring before the pups are born.

Step 3: (Optional) Provide an Alternative Roost. Bat-proofing has two potential drawbacks. First, exclusion can be very stressful for a maternity colony. When prevented from using their traditional roost, the bats may move into a nearby building, where they may be expelled again or even illegally exterminated. In addition, research has shown that displaced colonies will not relocate into buildings that already house other maternity colonies.

Second, homeowners may find it difficult to bat-proof their home completely. Bats can crawl through a crack as small as 1/4 by 1 1/2 inches, so persistent ones may find a way to reenter their traditional roost.

Installing a bat box may solve both of these problems because it provides an

alternative roosting site for maternity colonies. When constructed properly, bat boxes can serve as suitable and safe places for females to raise their pups. Information on placement and care of bat boxes can be found in *A Homeowner's Guide to Northeastern Bats and Bat Problems* (see References).

Health Concerns

Rabies

All mammals are vulnerable to this potentially fatal disease, which is caused by a virus that attacks the central nervous system. Rabid animals go through either a "furious" stage, in which they attack anything in their path, or a "dumb" stage, in which they become progressively paralyzed before death. Rabid bats can experience either of these stages, although the majority of infected bats display "dumb stage" behavior. Once the symptoms of rabies appear, bats usually become immobilized within two days and die within four days.

The incidence of rabies in wild bat populations is very low, and outbreaks of rabies in individual colonies appear to be rare. Scientific surveys of wild bats in the United States and Canada indicate that the incidence of rabies in clinically normal bats is less than 0.5 percent. However, of the bats encountered by humans or domestic animals and submitted to the New York Department of Health for testing, approximately 4 percent (mostly big brown bats) test positive for rabies. Bats that can be caught, particularly grounded bats or those found in unusual places, are more likely to be sick than others. Thus it is important to take precautions when handling bats found lying on the ground. (Not all grounded bats are rabid; young pups often become grounded when learning to fly.)

Rabies Precautions

Although bats will bite in self-defense, they almost never attack humans. If you must handle a bat, however, take precautions to avoid being bitten. By wearing leather gloves and scooping a grounded bat into a coffee can or some other container, you make it virtually impossible for the bat to bite you. Warn children never to approach or pick up grounded bats. Cats and dogs, including indoor ones, which come into contact with bats

and other wild animals far more often than their owners, should be immunized regularly for rabies. If you suspect that your cat or dog has come into contact with an animal that may have rabies, ask your veterinarian to administer a booster shot. In addition, avoid contact with all stray cats or dogs.

If you are bitten or scratched by a bat, immediately wash the bite or scratched area with soap and water and see a physician. If the bat is captured, keep it contained in a cool place and contact your county health department for instructions. The bat will have to be euthanized without destroying the head in order to be tested for rabies. If there is a reasonable probability that you have been exposed and the bat is not available for testing or tests positive for rabies, the physician will recommend rabies shots. Today, most people receive rabies treatment in a series of five relatively painless vaccine shots in the arm and one or more antibody injections administered during a one-month period.

Bat bites cause little trauma and may not always be recognized. For that reason, the federal Centers for Disease Control recommends considering postexposure treatment for rabies, even in the absence of a demonstrable bite or scratch, in situations where it is reasonably probable that contact (a bite, scratch, or exposure to a mucous membrane) might have occurred. Such instances include when a sleeping person awakes to find a bat in the room or an adult witnesses a bat in the room with a previously unattended child, mentally disabled person, or intoxicated person.

If you have a wildlife-related rabies question contact your county department of health or regional wildlife office. The wildlife agency can also put you in contact with a nuisance wildlife control operator, who can conduct bat-proofing for a fee. To report possible exposure to rabies or suspected cases of rabies in animals, call your county health authority. In New York, if you are unable to contact your county health authority, call the Bureau of Communicable Disease Control at 518-474-3186. For questions regarding preventing and managing bat problems, call the NYS Laboratory of Zoonotic Disease and Epidemiology at 518-869-4520.

Appendix 1. One-Way Door or "Frantz Check-Valve"*

1. Use 1/4- to 1/2-inch wire screening or heavy plastic mesh to cover the bats' points of entry. Cut the screening so that it covers the width of the hole and extends approximately 3 feet below the hole. The screening should project 3 to 5 inches from the hole so that the bats can crawl between the screen and the building and exit at the bottom.
2. Secure the mesh at the top and sides with duct tape or staples and leave the bottom open.
3. Leave the one-way door in place for at least three to five days or until you are sure that all bats have left the building, then remove the door and permanently seal the opening.
4. Never use a one-way door between May and mid-August, or young bats may be trapped inside and die.

*designed by Dr. Stephen Frantz, New York State Department of Health

Appendix 2. Bat-Proofing Materials and Supplies

"Flashband": self-adhesive, aluminum-faced sealant that permanently adheres to almost any surface. Useful for sealing roof junctions, loose flashing, eaves, and gaps between chimneys and walls. Easily applied, requires no special tools, and resists water, rust, mold, and mildew. Available from Andek Corporation, 850 Glen Avenue, P.O. Box 392, Moorestown, NJ 08057-0392, tel. 609-866-7600.

"Stuf-Fit": knitted copper mesh product made of flattened, knitted copper wire that is sold in rolls of various lengths. Useful for plugging holes that are too big to caulk and too small to warrant carpentry repair (such as long narrow cracks and crevices or larger openings around eaves). Will not rust, stain, or break down. Not available in stores; must be mail-ordered. Available from Allen Special Products, Inc., P.O. Box 605, Montgomeryville, PA 18936, tel. 800-848-6805 (Note: Stuf-Fit is the raw material from which formed, copper cleaning mesh products such as "Chore Boy" are fabricated. If a limited number of small holes is to be closed, these products can be purchased in grocery stores.)

Chimney Caps: Available from Chim-a-lator Co., 8824 Wentworth Ave. S., Boomington, MN 55420, tel. 612-884-6805.

One-Way Doors (Metal hardware cloth/window screening/plastic structural-grade bird-netting): Available from most garden supply stores. Any material used for one-way doors should have a mesh size no larger than 1/4 to 1/2 inches. Mesh with larger-size openings will allow bats to crawl through and reenter the building. Available from InterNet, Inc., 7300 49th Ave. N., Minneapolis, MN 55428, tel. 800-328-8456. (Note: This company manufactures and sells structural-grade bird-netting and fastener clips in small sections or very large rolls.)

“Bat Check Valve” Kit: includes a 100-square-foot (7 x 14 foot) section of structural grade bird netting, including mounting clips and installation instructions. The company also sells rolls of netting for making one-way doors of any size. Available from Wildlife Management Supplies, 9435 E. Cherry Bend Rd., Traverse City, MI 49684, tel. 800-451-6544.

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