

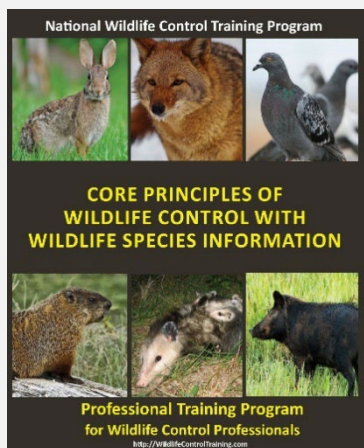


Wildlife Species Information

Bats

A Summary of Practical Methods
for Resolving Human - Wildlife conflicts

Acknowledgments



Information in this eBook is both original as well as updated and adapted from the *Prevention and Control of Wildlife Damage* (1994; edited by Scott Hygnstrom, Robert Timm, and Gary Larson, University of Nebraska–Lincoln).

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Research-based Wildlife Damage Management Information

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Bats

Species of interest:

- **Little brown bat** (*Myotis lucifigus*)
- **Big brown bat** (*Eptisicus fuscus*)

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

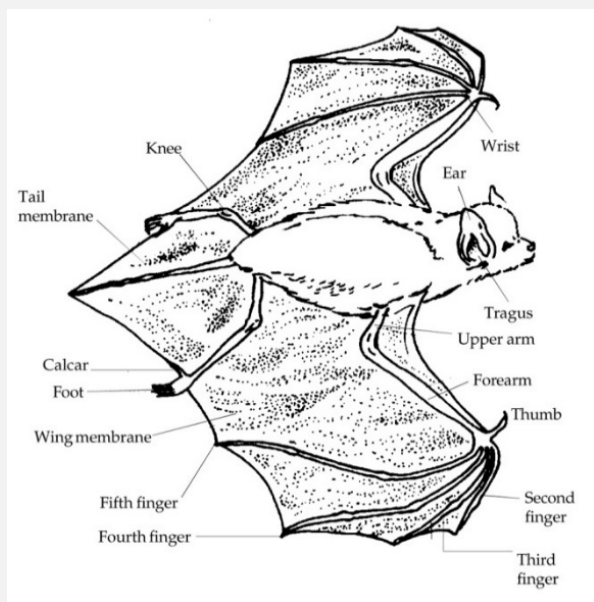


Figure 1. Anatomical diagram of a bat.

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:

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

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:

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:

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:

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:

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.

Birthing 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:

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?

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:

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

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 $\frac{1}{2}$ 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,[™]" 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[™] 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:

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:

- CO₂ chamber (a smaller chamber is better)

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

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.