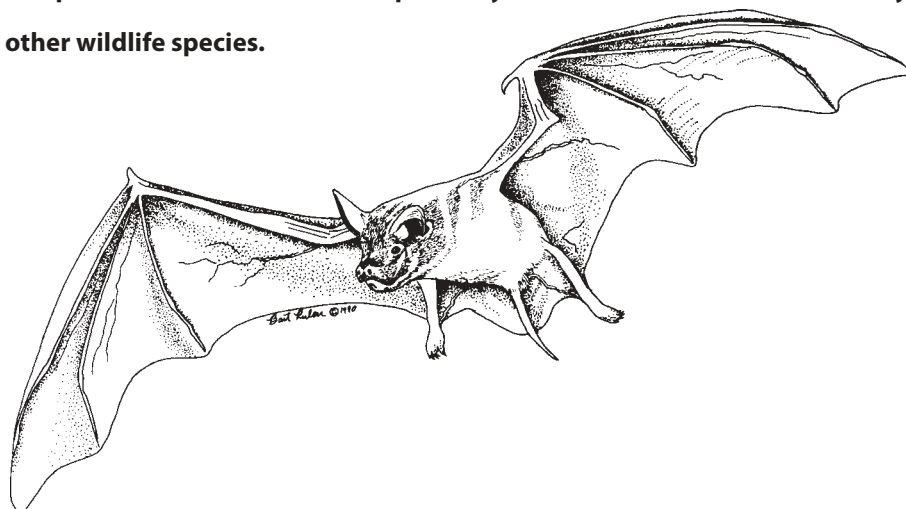


Bats ♦ Information for ♦ Kentucky Homeowners

Thomas G. Barnes

Few animals are as misunderstood as bats. They are the subject of myths, misunderstandings, and folklore that make them among the most feared animals in Kentucky. Bats are relentlessly persecuted wherever they are found. The presence of a bat in a house probably causes more alarm than does any other wildlife species.



This intense fear is probably more dangerous than the bats themselves. People have broken arms and legs in frenzied escapes, almost drowned falling off boat docks as bats swoop for mosquitoes, or become inadvertently poisoned or otherwise injured when fumigating a home.

These fears are unwarranted. Contrary to what you may have heard:

- Most bats are not rabid.
- Bat droppings in buildings are usually not a source of histoplasmosis.
- Bats are not filthy and will not infest homes with dangerous parasites.
- Bats are not aggressive and will not attack people or pets.
- Kentucky bats do not feed on blood. (The vampire bat, which does feed on blood, lives in Latin America, more than 1,000 miles from Kentucky.)

This publication seeks to dispel these myths and provide some answers for Kentucky homeowners on managing bat problems. Like all wildlife, bats have their place in the natural world and should not be indiscriminately killed because of unwarranted fears.

All wildlife species are protected by Kentucky law, and it is against the law to kill any bat in Kentucky unless it is determined the bats are damaging your property. Nonlethal control methods are recommended for managing bat problems in a house.

Bat Facts and Biology

Benefits of Bats

Bats are interesting and useful animals. People often fail to realize that bats benefit humans. One benefit is their ability to consume large amounts of insects. A single little brown bat (one of the most common house-dwelling bats) may eat 600 mosquitoes in an hour. Many landowners report a noticeable reduction in insects around their property when bats are present. All Kentucky bats eat insects and capture flying insects at night, using their tail and wing membranes. They are the only major predator of night-flying insects.

Another benefit provided by bats includes pollination and dispersal of seeds for many tropical plants. The local grocery store would not be the same without products that depend on bats for their survival. Wild stocks of bananas, avocados, dates, figs, peaches, mangoes, cloves, cashews, and agave are pollinated by bats. These wild plant ancestors are an important genetic source for developing new disease-resistant strains of commercial varieties, reinvigorating old commercial varieties, and producing new, highly productive varieties.

Bats have also contributed to medical research in birth control and artificial insemination techniques, navigational aids for the blind, vaccines and drugs, and new low-temperature surgical techniques. Without bats, we would suffer great economic losses, and our quality of life would be reduced.

Bat Biology

Bats are not rodents. They belong to their own special group of mammals called *Chiroptera*, which means “hand wing” (Figure 1). Bat wings are actually modified finger bones attached by a thin skin membrane. Bats are more closely related to primates (monkeys, apes, and humans) than to rodents. Like other mammals, bats are warm-blooded and furry, and they nurse their young.

Bats are the only mammals that exhibit true flight. Bats are not blind, and like dolphins, they navigate, avoid obstacles, and detect food using a very sophisticated system called echolocation. Echolocation works when bats emit high-frequency sounds that bounce off objects. The bat then hears the rebounding echo and reacts accordingly. This system is so precise and sophisticated that bats can detect obstacles as small as a gnat or a human hair in total darkness. With such sophistication they are unlikely to blunder into people.

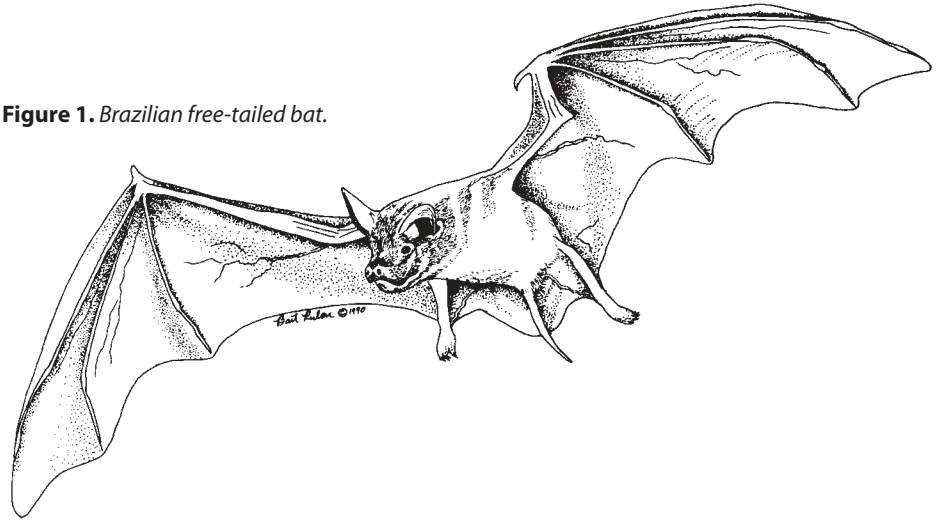
Kentucky bats mate in the fall and early winter. The females hold sperm in their reproductive tracts until spring when fertilization occurs. Pregnant females then move from their winter hibernating sites (called *hibernacula*) to maternity sites or nursery colonies.

Most bats produce a single offspring six to eight weeks after fertilization. This is an exceptionally low reproductive rate for a small mammal. Thus, their populations are quite vulnerable and require a long time to recover. Many bats do not breed until they are two years old and may survive for 30 years.

Young bats grow rapidly and are able to fly in five weeks. While females are attending to the young in nursery colonies, males congregate in separate groups called bachelor colonies. Groups of bats found in buildings throughout Kentucky are usually nursery colonies.

Cold winter temperatures force many Kentucky bats to migrate for the winter. Their migrations are usually less than 300 miles. Bats look for a cave or other hibernating site with an optimum tempera-

Figure 1. Brazilian free-tailed bat.



ture varying from 41 to 58°F. Big brown bats, commonly found in buildings, can survive subzero temperatures and may hibernate in walls, attics, cliff faces, and rock shelters.

Fall migrations usually begin in August, and the bats return in April and May. Bats have amazing homing abilities and return to the same summer or winter quarters every year, much like some birds.

Kentucky bats live in a variety of habitats. Some species like the red bat and the hoary bat spend their summers roosting among tree leaves and migrate south for the winter. Others, especially endangered bats like Indiana and gray bats, are cave dwelling animals in the winter.

Another endangered bat, the Virginia big-eared bat, hibernates in caves and spends the summer along sandstone cliff faces, crevices, and rock shelters. Several common bats, like the big brown and little brown bat, summer mostly in buildings but occasionally can be found in hollow trees or rock crevices.

Kentucky has 15 species of bats which can be found throughout most of the state. (For a description of each species, see the section on “Kentucky Bats” below.) Some species are common, and others have been placed on the state or federal endangered species list. Fifty-seven percent of Kentucky’s bat fauna is listed as rare, threatened, or endangered. Bat populations have been declining in the United States and Kentucky for the past 20 years.

Dealing with Unwanted House Guests

Most bat species found in Kentucky are not likely to become a nuisance. Many species, including rare, threatened, and endangered bats, are never encountered by most humans. Many of the more common species go unnoticed by everyone except avid bat enthusiasts. Only big brown and little brown bats, two of our most common bat species, are likely to take up residence in buildings.

Proper control measures must provide a long-term solution to the problem. Many short-term control measures are illegal and provide numerous hazards to both bats and humans.

There are no pesticides, not even Rozol tracking powder, registered for controlling bats in Kentucky. Insect bombs and commercial fumigation using methylbromide are against the law in Kentucky and pose significant health hazards to humans. Home remedies including moth balls, ultrasonic devices, bright lights, chemical repellents including aerosol dog and cat repellents, sulfur candies, strong wind currents, or glue boards are not completely successful or recommended.

The only permanent solution in dealing with problem bats is to build them out or “bat-proof” the building. Because bats cannot gnaw new holes or reopen old ones, once openings are closed they should remain that way. Bats can enter a hole as small as 3/8 inch in diameter. You

must find ALL openings larger than 3/8 inch and seal them because bats will continue to use the building as long as they have an entry point. Openings can be anywhere because bats do not need to fly through an opening to enter or escape (Figure 2).

Time spent locating and sealing all entrances the first time will save additional time and frustration in the future because bats return each year to their nursery colony. Thus, they will be back next year if you don't take the time to find and seal their points of entry.

The first step in building out bats is to locate entrance points. There are several methods you can use to locate bat entry points. Inspect the ground at the base of the house for bat droppings which accumulate below entrances. Also look on the side of the building for spattered droppings.

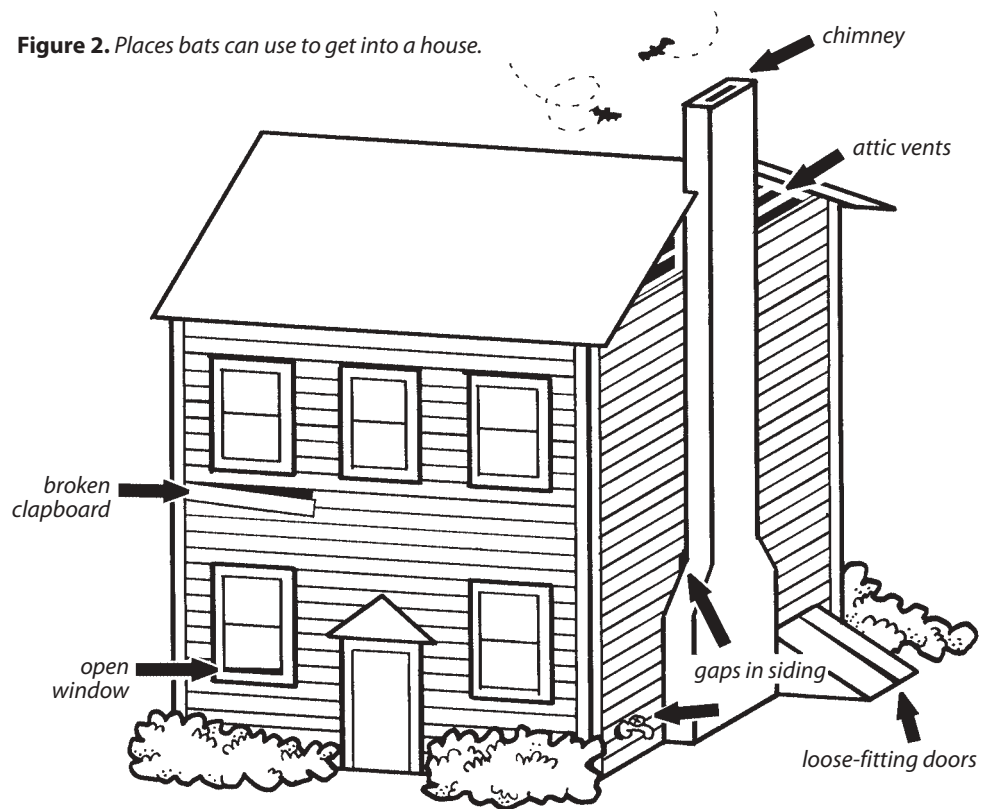
On bright sunny days climb into the attic and observe where light from the outside is coming. Or, after dark, place a bright light such as a lantern inside the attic and observe places where light is shining through.

Another method is to position several people around the outside of the building before dusk and watch for bats emerging. However, this method may not locate all entrances for two reasons: bats may use other nonpreferred entrances, and people often have difficulty seeing bats emerge, recognizing them only when they are actively flying.

The best time of day to seal bat openings is several hours after sundown when bats are feeding. Because most bats migrate, the best time of year to bat-proof the building is during late November through early March. Never seal openings from mid-May through July because flightless young may be present. Sealing bats inside a building causes the bats to quickly starve, creating an unsanitary and smelly problem.

The best method to use in sealing openings is to seal all but two or three major entry points at your convenience. Once the bats have adjusted to using these openings, seal these openings after dark or during late fall and winter. You can seal them with a variety of materials depending on each individual situation. Because bats do not chew like rodents, you can use insulating material as a stop-gap measure until a permanent material is found.

Figure 2. Places bats can use to get into a house.



Cracks near the roofline or areas where pipes or wires enter a building can be sealed with latex, acrylic or silicone caulk. Metal flashing can be used to seal joints in the house, and mortar can be used to seal cracks in the foundation.

Weatherstripping can be used to seal cracks around door and windowsills. Open vents and belfry louvers should be sealed with 1/4-inch hardware cloth which will allow proper ventilation. Rust-resistant spark arrestors or bird screens should be installed on chimneys to prevent bats from entering.

One alternative to closing the remaining holes after dark is to install a valve-like bat-proofing device in the remaining holes. This allows bats to depart during the evening but prevents their reentry. Eventually, these holes will need to be sealed permanently to prevent reentry. Bat excluder devices are available from *3E Corporation, 401 Kennedy Blvd., P.O. Box 177, Somerdale, NJ 08083* or *Bay Area Bat Protection, 1312 Shiloh Road, Sturgeon Bay, WI 54235*.

Homeowners can make their own simple bat-excluding device by using 1/2-inch plastic bird netting available at local garden or hardware stores. Cut a piece

of netting several feet larger than the opening so that at least two feet hang to the side of and below the entry hole. Hang the netting, during the day, several inches above the entry hole. The sides may be stapled, taped, or nailed to the building, but the bottom must be allowed to hang free (Figure 3).

Building a Bat House

Another way to keep your house free from bats is to provide them with a dwelling of their own. A properly constructed bat house can give bats a place to roost and raise their young, thereby concentrating their insect-eating activities nearby, but some distance away from, your living quarters.

Plans for building several types of bat houses can be found at the end of this publication (Figure 4). An excellent alternative to building your own bat house is to buy a ready-built one from *Bat Conservation International, P.O. Box 162603, Austin, Texas, 78716*. Part of this money goes directly to conserving bats and bat habitats.

Not every bat house will be used. Just like birds, bats are fussy about the design and location of their living quarters. Bat nurseries should have a fairly stable temperature of 80-110°F depending on the species. Thus, the house should be made as airtight as possible. Glue all external joints and seal them with silicone caulk to prevent heat loss.

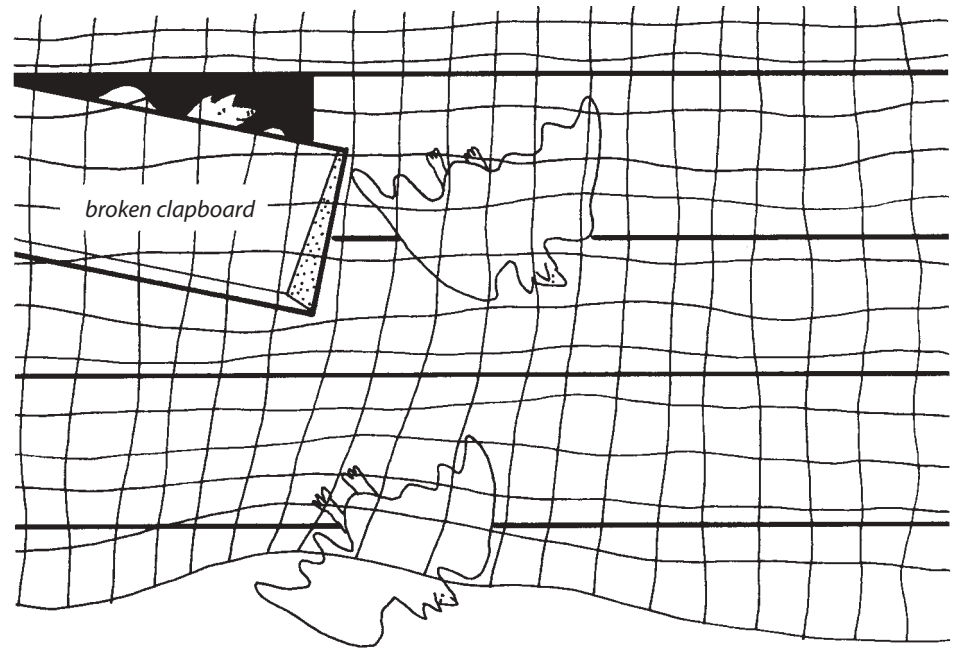
Bats are also very susceptible to chemicals. Therefore, do not use treated wood, and do not paint or varnish the completed house. Use rough lumber because it is easier for the bats to secure a good foothold. If rough lumber is not available, roughen the inside of the house with a file or other tool. Be sure to place the rough sides inward. You may also wish to cut 1/16 inch grooves in each partition to help the bats climb and roost.

Western red cedar is the recommended construction material because it withstands outdoor exposure. Houses can also be built of redwood or cypress if western red cedar is not available at your local lumber store.

To ensure that temperatures remain constant, the house should be oriented to receive maximum sunlight, especially in the early morning. You may need to experiment to determine the direction the house should face. South-facing houses will be warmer than north-facing houses.

By testing several choices and recording the high and low temperatures inside the house, you can determine which di-

Figure 3. Using bird netting to exclude bats from a house.



rection is best. Europeans sometimes mount four houses in a group, each facing a different direction to provide a wide range of temperatures for the bats to select from. You may have to place tar paper or dark shingles on the top of the house to increase heat absorption.

Bat houses should be erected from 10 to 15 feet above the ground and protected from the prevailing (north and west) winds. Never place a house where the entrance is obstructed by tree limbs or

vegetation. A good site for a house is on an old building or home. Houses placed near a permanent water source are more likely to attract bats.

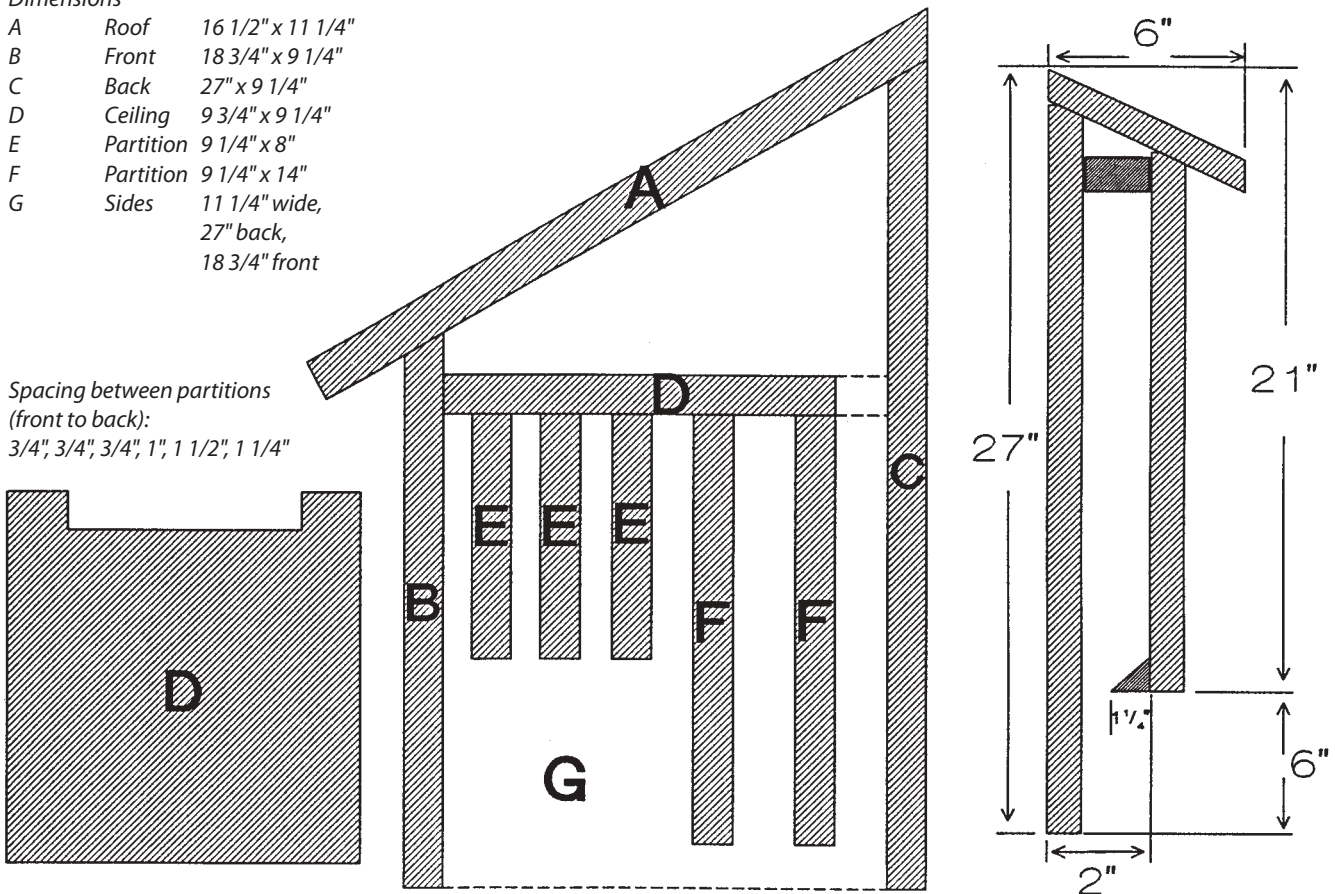
Don't be discouraged if bats don't occupy the house right away. Most bat houses are not used the first year they are erected, and some may never be used. However, most bat houses are used eventually.

Figure 4. Plans for constructing a bat house.

Dimensions

A	Roof	16 1/2" x 11 1/4"
B	Front	18 3/4" x 9 1/4"
C	Back	27" x 9 1/4"
D	Ceiling	9 3/4" x 9 1/4"
E	Partition	9 1/4" x 8"
F	Partition	9 1/4" x 14"
G	Sides	11 1/4" wide, 27" back, 18 3/4" front

Spacing between partitions
(front to back):
3/4", 3/4", 3/4", 1", 1 1/2", 1 1/4"



* Insert cut 1 1/4" x 6 1/4"

Kentucky Bats

Little Brown Bat (*Myotis lucifugus*):

A small brown bat weighing about 10 grams. Common throughout Kentucky, it can sometimes be found in attics of buildings or roosting on boat docks. One of bats most commonly encountered by humans. Lives in colonies, hibernates.

Southeastern Bat (*Myotis austroriparius*): May be confused with little brown bat because of numerous similarities. Found in western Kentucky. State endangered species and candidate for federal endangered species. Found in buildings, caves, culverts, or tree cavities. Lives in colonies, hibernates.

Gray Bat (*Myotis grisescens*): Similar to other *Myotis* bats but larger. It can be identified by the wing membrane attached to the ankle instead of base of toes. Found in inner Bluegrass and cave region

of south-central Kentucky. Federal endangered species. Lives in colonies, hibernates.

Northern Long-eared Bat (*Myotis septentrionalis*): Similar to little brown bat except for its longer ears and a long pointed tragus (inner ear membrane). Rare. A state special concern species. Found in caves, rockhouses or shelters, old mines, and buildings. Lives singly or in small colonies, hibernates.

Indiana Bat (*Myotis sodalis*): Difficult to distinguish from other *Myotis*. Federal endangered species. Found in winter throughout Kentucky cave regions. Lives in forested areas during summer, roosting in snags and under tree bark. Lives in colonies, hibernates.

Small-footed Bat (*Myotis leibii*): Very tiny bat identified by small size, small forearm and foot, and keeled calcar (a long bone spur on one of the ankle

bones). Found in eastern and central cave regions of Kentucky. State endangered species and candidate for federal endangered species list. Lives in colonies, hibernates.

Big Brown Bat (*Eptesicus fuscus*): Abundant statewide resident. The bat most commonly found in buildings. A large bat about twice the size of the little brown bat. In Kentucky, this species is by far the most commonly encountered by people. Lives in colonies, hibernates.

Silver-haired Bat (*Lasiurus noctivagus*): Medium-sized black bat with white-tipped fur. Usually found during spring migration. Seasonally solitary, migrates. Some hibernate in caves, mines, and rock crevices in Kentucky.

Eastern Pipistrelle (*Pipistrellus subflavus*): Tiny bat with tricolored fur. Abundant statewide resident. Prefers caves in winter and trees and buildings

in the summer. Hibernates, singly scattered through caves and mines.

Red Bat (*Lasiurus borealis*): Abundant statewide resident. Fur is rusty red, washed with white. Cannot be confused with any other species. Seeks daytime refuge in trees. Solitary, migrates. In June, females laden with young (up to four) often fall onto lawns.

Hoary Bat (*Lasiurus cinereus*): Rare, but found throughout Kentucky. Larger than Big Brown Bat. Color is grayish yellow-brown, overcast with grayish white. Spends summer days in tree foliage. Solitary, migrates.

Evening Bat (*Nycticeius humeralis*): Found in western and southern Kentucky. State threatened species. Found in trees and buildings; avoids caves. Lives in colonies, migrates.

Virginia Big-eared Bat (*Plecotus townsendii virginianus*): Known only from eastern Kentucky cave region. Federal endangered species. Largest known winter colony occurs in one eastern Kentucky cave. Lives in colonies, hibernates.

Rafinesque's Big-eared Bat (*Plecotus rafinesquii*): Uncommon but scattered throughout the state. Occurs in caves, mines, wells, and abandoned buildings. Very similar in appearance to Virginia big-eared bat. State threatened species and candidate for federal endangered species list. Lives in colonies, hibernates.

Brazilian Free-Tailed Bat (*Tadarida brasiliensis*): Accidental. Autumn wanderer from the south.

For Further Reading

America's Neighborhood Bats: Understanding and Learning to Live in Harmony with Them by M.D. Tuttle. University of Texas Press, 1988, 104 pp.

Bats: A Natural History by J.E. Hill and J.D. Smith. University of Texas Press, 1984, 243 pp.

Just Bats by M.B. Fenton. University of Toronto Press, 1983, 165 pp.

"Most 'Facts' About Bats are Myths" by B. Strohm. In *National Wildfire Magazine*, 1982, 20(5):35-39.

Bats of America by R.W. Barbour and W.H. Davis. University Press of Kentucky, 1969, 286 pp.

Mammals of Kentucky by R.W. Barbour and W.H. Davis. University Press of Kentucky, 1974, 322 pp.

Acknowledgments

Special thanks to Bart Rulon for his drawing of a Brazilian free-tailed bat used on the cover. Bat house plans were provided courtesy of Bat Conservation International. Manuscript reviewers were Dr. Wayne Davis, Dr. Mike Lacki, Dr. Rudy Scheibner, University of Kentucky; Patricia Morton, Bat Conservation International; and John MacGregor, U.S. Forest Service.