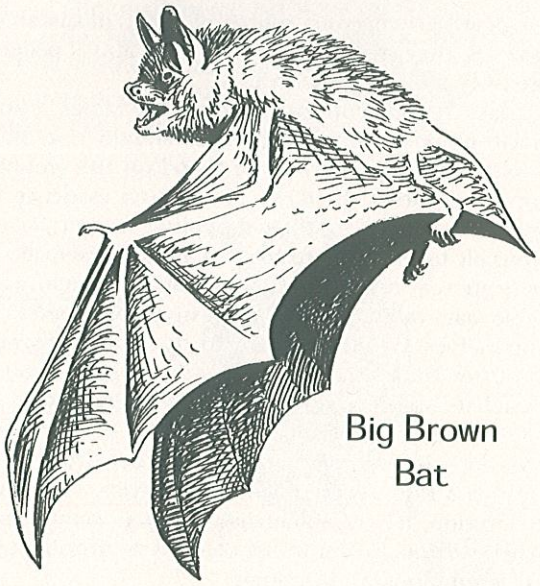
Wildlife Note — 35
LDR0103

Bats



Big Brown Bat

by Chuck Fergus

Bats are the only mammals that fly. Their wings are thin membranes of skin stretched from fore to hind legs, and from hind legs to tail. The name of their order, Chiroptera, means "hand-winged." Their long, slender finger bones act as wing struts, stretching the skin taut for flying; closed, they fold the wings alongside the body.

Pennsylvania bats range in size from the hoary bat (length, 5.1 - 5.9 inches; wingspread, 14.6 - 16.4 inches; weight, 0.88 - 1.58 ounces) to the pygmy bat, or pipistrelle (length, 2.9 - 3.5 inches; wingspread, 8.1 - 10.1 inches; weight, 0.14 - 0.25 ounces). Nine species of bats occur in Pennsylvania; two others are rare visitors from the South.

All Pennsylvania bats belong to family Vespertilionidae, and are also known as evening bats or common bats. They are insect eaters, taking prey on the wing. Often they feed over water, and some species occasionally land and seize prey on the ground. A bat consumes up to 25 percent of its weight at a single feeding.

The eyes of our bats are relatively small, but their ears are large and well developed. Bats can see quite well, but unique adaptations help them fly and catch prey in total darkness. While in flight, a bat utters a series of high-pitched squeaks (so high, in fact, they are almost always inaudible to humans), which echo off nearby objects — bushes, fences, branches, insects — and bounce back to the bat's ears. These sound pulses may be only 2.5 milliseconds in duration. Split-second reflexes help the creature change flight direction to dodge obstructions or intercept prey.

A bat will use its mouth to scoop a small insect out of the air. A larger insect is often disabled with a quick bite, cradled in a basket formed by the wings and tail, and carried to the ground or to a perch for eating. If an insect takes last second evasive action, the bat may flick out a wing, nab its prey, and draw the insect back to its mouth. Bats have sharp teeth to chew their food into tiny, easily digested pieces.

Most bats mate in late summer or early fall, although some breed in winter. The male's sperm is stored in the female's reproductive system until spring, when fertilization occurs. The young, born in summer, are naked, blind and helpless. They are nursed by their mothers and by six weeks of age, most are self-sufficient and nearly adult size.

The reproductive potential of bats is low. Most bats, including the smaller species, usually bear a single young per year; the larger species may have up to four. There is only one litter per year.

None of Pennsylvania's bats fly during the brighter hours of daylight, preferring to make their feeding flights in late afternoon, evening and early morning. However, it's not unusual to see a bat flying during the day. Roost disturbance and heat stress may cause bats to take wing during daylight hours. During the day, they roost — singly, in pairs, in small groups, or in large concentrations, depending on the species. They seek out dark, secluded spots such as caves, hollow trees and rock crevices. They may also congregate in vacant buildings, barns, church steeples and attics; some hide among the leaves of trees. They hang upside down, by their feet.

In fall, winter and early spring, insects are not readily available to bats in Pennsylvania and other northern states. At this time, three species migrate south; six others hibernate underground, usually in caves.

Bats are true hibernators. Throughout winter, they eat nothing, surviving by slowly burning fat accumulated during summer. A hibernating bat's body temperature drops close to the air temperature; respiration and heartbeat slow; and certain changes occur in the blood. Bats can be roused fairly easily from hibernation, and often are able to fly 10 to 15 minutes after being handled. Most favor cave zones having the lowest stable temperature above freezing. During winter, bats may awaken and move about within a cave to zones of more optimum temperature. In many caves, bats of several species hibernate together.

Perhaps because of their nocturnal nature, secretive habits and unique appearance — not to mention supersitions — bats have long been misunderstood and sometimes feared, and many misconceptions exist about them. They include: Bats are prone to rabies; their drop-

pings are a dangerous source of tuberculosis and other diseases; they are aggressive and often attack people; they are dirty and ridden with lice.

Bats are no more apt to contract rabies than other warm-blooded animals. (People should not, however, handle bats, especially those found on the ground or in the open during the day.) There is no evidence to suggest that bats — or their droppings, called "guano" — transmit tuberculosis to man. A host of scientific studies indicate that healthy bats do not attack people, and even rabid bats rarely become aggressive. Bats need to keep themselves extremely clean to fly. They host no more parasites than other animals, and parasites that do afflict bats are very specialized and rarely pose problems to humans. Histoplasmosis, caused by a soil fungus that can grow in accumulated bird and bat droppings, does not, as a rule, survive in hot dry attics. However, as a precaution, it's recommended that you wear a respirator when stirring up dust in bat quarters or cleaning out large accumulations of droppings.

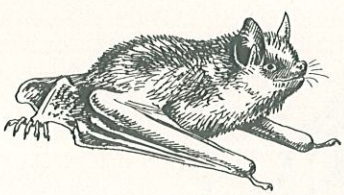
The colonial bats may congregate at favorite roosting sites, often in buildings. While these bats do no real harm to human occupants, their droppings, odor and noise may become a nuisance. To exclude bats correctly may take two years. The first summer you should watch the home at dusk to see where the bats are exiting. Try to get a count of the number of bats. If possible, erect a well-placed bat box of good design before August.The box should be large enough to accommodate the bats you plan to evict. When the bats leave in the fall, seal all entrances. Next spring, when they return, they are likely to move into the bat box, rather than search for a new way into your home, or your neighbor's. Do not seal bats out during June or July because you will trap flightless young inside.

Exterminating is a questionable practice. Poisons used on bats can be dangerous to humans, and may cause sickened bats to scatter and fall to the ground, where they are more likely to come into contact with people and pets. Currently no pesticides are approved for use on bats. Reputable pest control operators use bat exclusion techniques.

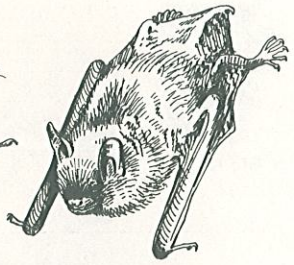
To counterbalance their low reproductive rates, bats are relatively long-lived. Some have been banded, released and recaptured more than 30 years later. Because they feed in mid-air and are active at dusk and at night, bats are not often caught by predators. Owls and hawks take some, as do housecats, raccoons and foxes. Rat snakes occasionally eat roosting bats. Other causes of mortality include cave floodings and accidents.

The greatest threat to bats comes from humans. In winter, hibernating bats may be aroused by people exploring caves; repeated disturbances force bats to squander precious calories needed for overwintering. Caves may be flooded by dams, or dynamited shut. Some scientists suspect that widespread use of pesticides also harms bat populations.

Little Brown Bat (*Myotis lucifugus*) — Pennsylvania's most common bat, the little brown, is found statewide. Length, including tail, is 3.1 - 3.7 inches; wingspread, 8.6 - 10.5 inches; weight ranges from 0.25 - 0.35 ounces,



Little Brown Bat



Indiana Bat

and is greatest just before hibernation. Females are slightly larger than males. Color: a rich brown approaching bronze, usually with a dark spot on the shoulders. The fur is dense, fine and glossy; the wings are black and bare.

This bat eats a wide variety of flying insects, including nocturnal moths, bugs, beetles, flies and mosquitoes. Insects are regularly caught with the wing or tail membrane, and transferred to the mouth. An individual emerges from its day roost at dusk, and usually seeks a body of water, where it skims the surface for a drink, and then hunts insects. Bats examined within an hour of taking flight often have full stomachs weighing one-fifth of their body weight. The little brown bat makes several feeding flights each night, and is capable of catching 1,200 insects per hour. A nursing female may eat her own weight in insects nightly.

In October and November, bats leave their summer roosts and move to tunnels, mine shafts and caves. Here, clinging to the ceilings and clustered against one another, they hibernate, until they emerge in April and May. They return to the same hibernation and summer roost sites year after year.

Females disperse from the hibernation roosts and gather in summer nursery colonies of just a few to 1,000 or more individuals in attics, barns and other dark, hot retreats. Males are solitary, roosting in hollow trees, under loose bark, behind loose siding and shingles and in rock crevices.

A single young is born to each female in June or early July. After four weeks, the young bat is fully grown, and ready to leave the colony. Females mature sexually at about 8 months of age, while males mature in their second summer. Little brown bats may live more than 30 years.

Indiana Bat (*Myotis sodalis*) — The Indiana bat resembles the little brown bat, but has a pinkish cast to its fur, giving it a light purple-brown coloration. Length, 2.9 - 3.7 inches; wingspread, 9.4 - 10.3 inches; weight, 0.18 - 0.28 ounces. Sexes are equal in size.

Indiana bats probably roost in trees in summer; and they do not commonly roost in buildings. In winter, some 97 percent of the total species population hibernates in certain large caves in Missouri, Kentucky, Indiana and Illinois. Pennsylvania is on the fringe of the species' range. Indiana bats have been found wintering in 12 sites (caves, as well as abandoned mines and railroad tunnels), and are monitored regularly by the Game Commission, and it is on the federal endangered species list.

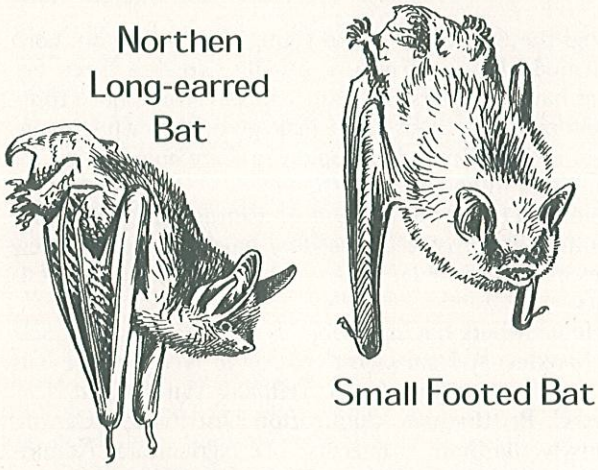
The Indiana bat hibernates in clusters of about 250

bats per square foot on the ceilings and side walls of caves. In this formation, it is vulnerable to disturbance by cave explorers: when a bat on the edge of the cluster is awakened, it moves about, starting a ripple of activity that spreads throughout the group. A winter of repeated disturbances causes bats to burn vital fat stores, and they may run out of energy before spring.

Females of this species are believed to bear a single young in late June. Feeding habits are probably similar to those of the little brown bat.

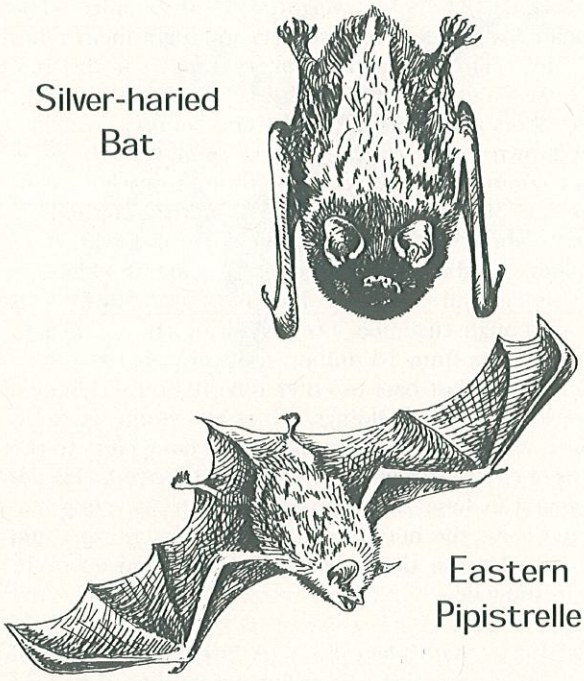
Northern Long-Eared Bat (*Myotis septentrionalis*) — Similar in size and color to the little brown bat, the northern long-eared bat may be distinguished by its longer tail and narrower and longer ears. It ranges in forested areas throughout the state, but is much less common than the little brown bat; its distribution is considered local and irregular. Length, 3.0 - 3.7 inches; wingspread, 9.0 - 10.7 inches; weight, 0.25 - 0.32 ounces.

Biologists have learned little of the ecology and behavior of the northern long-eared bat, although they suspect feeding habits are similar to those of the little brown. Long-eared bats roost singly or in small colonies in caves, behind window shutters, under loose tree bark and in cliff crevices. Females gather in nursery colonies in attics, barns and tree cavities. Probably a single young is born in July. Long-eared bats return to caves in fall, often sharing space with little brown bats, big brown bats and pipistrelle bats.



Small-Footed Bat (*Myotis leibii*) — Also known as Leib's bat, this species is one of the smallest in North America: length, 2.8 - 3.3 inches; wingspread, 8.3 - 9.7 inches; weight, 0.18 - 0.28 ounces. As the name implies, it has a very small foot when compared with other bats. When viewed from the front, the bat has a distinct black mask that stretches from ear tip to ear tip. In Pennsylvania, it is rare, and the population is thought to be decreasing; it is classified as a threatened species on the state list. Very little is known about this bat's summer habitat and lifestyle.

The small-footed bat resembles the little brown bat, but has a golden tint to its fur. Feeding and breeding habits probably parallel those of the other small, closely related bats. The small-footed bat waits until November to enter caves for hibernating, and emerges in March. It hibernates in narrow cracks in the wall, floor or roof, singly and in groups of up to 50 or more. It usually stays close to entrances where the temperature is just above freezing.



Silver-Haired Bat (*Lasionycteris noctivagans*) — A medium-size bat: length, 3.7 - 4.5 inches; wingspread, 10.5 - 12.1 inches; weight, 0.25 - 0.35 ounces. The fur is soft and long; the sexes are colored alike, blackish-brown tipped with white, for a bright, frosted appearance.

The silver-haired bat inhabits wooded areas bordering lakes and streams. It roosts in dense foliage, behind loose bark, or in a hollow tree — rarely in a cave. It begins feeding earlier than most bats, often before sunset. Silver-haired bats do not hibernate in Pennsylvania, migrating farther south. In summer, a few may breed in the cooler, mountainous sections of the state, but most go farther north.

Eastern Pipistrelle (*Pipistrellus subflavus*) — The pipistrelle is also called the pygmy bat because of its small size: length, 2.9 - 3.5 inches; wingspread, 8.1 - 10.1 inches; weight, 0.14 - 0.25 ounces. Its fur is yellowish brown, darker on the back. The back hairs are tricolored: gray at the base, then a band of yellowish brown, and dark brown at the tip.

Pipistrelles take wing early in the evening and make short, elliptical flights at treetop level. In summer, they inhabit open woods near water, rock or cliff crevices, buildings and caves. They hibernate from September through April or early May, deep inside caves and away from the openings, in zones where the temperature is about 52 to 55 F. They sleep soundly, often dangling in the same spot for months.

Pipistrelles eat flies, grain moths and other insects.

They breed in November, and young — usually two per litter — are born in June or July. Pipistrelles live up to 15 years, and are found throughout Pennsylvania, except in the southeastern corner.

Big Brown Bat (*Eptesicus fuscus*) — Second in size to the hoary bat, the big brown is 4.1 - 4.8 inches long; wingspread, 12.1 - 12.9 inches; weight, 0.42 - 0.56 ounces. The fur is dark brown, and the face, ears and flight membranes are blackish. This common bat ranges throughout the state in diverse habitats: attics, belfries, barns, hollow trees, behind doors and shutters, in city and country.

Big brown bats fly at dusk, and generally use the same feeding grounds each night. They fly in a nearly straight course 20 - 30 feet in the air, often emitting an audible chatter. Major foods include beetles and true bugs (junebugs, stinkbugs and leafhoppers) many of which are major agricultural pests. A colony of 150 big brown bats can eat enough cucumber beetles during the summer to protect farmers from 18 million rootworm larvae.

Among the last bats to enter hibernation, big brown bats seek out caves, buildings, mines and storm sewers in October, November or December. They hang close to the mouths of caves, and emerge in March and April. Females bear young in June, usually two per litter. As young mature and leave the nursery colony, adult males enter and take up residence. Big brown bats have lived up to 19 years in the wild.

Red Bat (*Lasiurus borealis*) — A bright rusty coat and long, pointed wings distinguish this species. Length is 3.7 - 4.8 inches; wingspread, 11.3 - 12.9 inches; and weight, 0.28 - 0.49 ounces. Individuals roost singly in trees (except for females with young), often on forest edges, in hedgerows, and shrubby borders; they seem to prefer American elms. Rarely do they use caves or buildings.

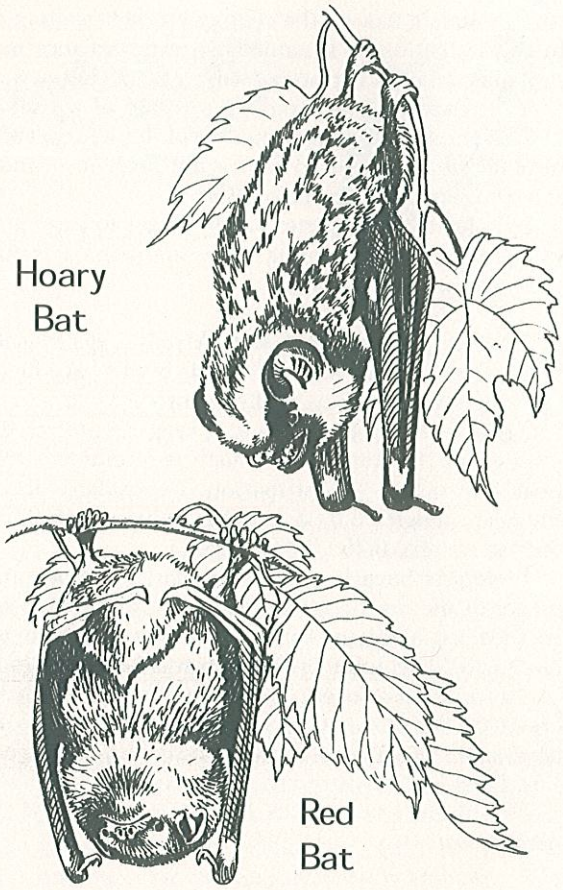
Red bats start flying early in the evening, preying on moths, flies, bugs, beetles, crickets and cicadas, which they take from air, foliage and ground. Strong fliers, red bats are considered migratory, although little is known about their patterns. The sexes may migrate separately. Red bats start south in September or October, flying at night. They can withstand body temperatures as low as 23 F.

Females bear 1 - 5 young (usually 2 - 3) in their treetop roosts. For the first few days, the young remain clinging to their mother when she flies out on hunts. Young are able to fly at 3 - 4 weeks, and are weaned when 5 - 6 weeks old. Longevity is about 12 years. The red bat ranges across Pennsylvania.

Hoary Bat (*Lasiurus cinereus*) — The largest bat of the Eastern forests, the hoary is 5.1 - 5.9 inches long; has a 14.6 - 16.4-inch wingspread; and weighs 0.88 - 1.58 ounces. The fur is dark brown, heavily tinged and white. The species ranges across the state, but is uncommon.

Hoary bats roost in trees — they prefer conifers, but also use deciduous trees — in woods, forest edges and farmland. They choose protected sites 12 - 40 feet above the ground. Strong, swift fliers, they take to the air later than most other bats. They prey mostly on moths, but also take beetles and mosquitoes.

Hoary bats migrate to warmer climates in winter. In spring, they return and raise young. The young are born from mid-May to early July, usually two to a litter. Females have two pairs of breasts and sometimes have three or four pups in a litter. The female gives birth while hanging in a tree. Young grow rapidly and are able to fend for themselves in about a month.



Note: The Seminole Bat (*Lasiurus seminolus*) and Evening Bat (*Nycticeius humeralis*) have been found a few times in Pennsylvania, but are not considered regular residents.

Homeowners having problems with bats may request the booklet, *A Homeowner's Guide to Northeastern Bats and Bat Problems*, by Lisa M. Williams-Witmer and Margaret C. Brittingham, Publication Distribution Center, Pennsylvania State University, 112 Agricultural Administration Building, University Park, PA 16802. A video, *The Season of the Bat*, is available from: Wild Resource Conservation Fund, P.O. Box 8764, Harrisburg, PA 17105-8764 (Phone — 717-783-1639).

Wildlife Notes are available from the
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