



BATS

Bats are beneficial. They eat insects and pollinate plants and play an important role in keeping ecosystems healthy and in balance. Many myths are associated with bats, such as the saying “blind as a bat.” This isn’t true. Bats can see quite well. Another myth is that bats get caught in people’s hair. They don’t. Nor are bats destructive pests like rats and mice. In fact, a colony of bats could cut down on unwanted mosquitoes around



your house and help keep your garden free of insects.

Bats are useful animals and the best protection for them is for us to learn more about them. Browse this Web page to learn more about these subjects relating to bats:

- interesting facts about bats
- what bats really are
- insect-eating bats and how bats catch prey by echolocation
- bat biology and lifestyles
- bats and rabies
- bats in houses--use of bat boxes
- bat conservation
- description of the 13 species of bats found in West Virginia
- where to learn more about bats.

Bats are unique animals. Here are some interesting facts about bats:

- There are nearly 1,000 species of bats in the world. However, bats are basically tropical animals and only about 40 kinds of bats live in North America.
- Bats have been around a long time, since the age of dinosaurs. Ancient bats resembled those living today. Except for the most extreme desert and polar regions, bats today live in almost every kind of habitat worldwide.
- Bats have some amazing abilities: Mexican free-tailed bats can fly 10,000 feet high. Townsend’s-big eared bats can pluck insects from foliage. Hibernating little brown bats can stop breathing for almost an hour during hibernation to reduce their energy needs. Fishing bats have an echolocation system so sophisticated they can detect a minnow’s fin as fine as a human hair. The Honduran white bat, a colorful snow-white bat with yellow nose and ears, cuts large leaves to make “tents” to protect its small colonies from drenching jungle rains.
- Bats eat a variety of foods from flower nectar to fish, small mammals, and insects. Bats also come in an array of colors and sizes and shapes. The spotted bat, which lives in Texas, is black with

a white patch on each shoulder and the rump. Other kinds of bats have patterns so bright they are called butterfly bats. Some bats have long angora-like fur varying in color from red to black and white. The bumblebee bat of Thailand weighs less than a penny. Some of the large bats known as flying foxes such as those living in Indonesia have wingspans up to 6 feet. Flying foxes live only in tropical and subtropical areas including Australia and eat primarily fruit and nectar. Other species of bats are carnivorous, preying on fish, frogs, mice, and birds. The fabled vampire bats feed on blood. There are only 3 kinds of vampire bats and all live in Latin America. However, most bats feed on insects — 70% of all bats are insectivorous. All bats living in the United States and Canada eat insects, except 3 species of nectar-feeding bats living along the Texas-Arizona border.

- Because they consume quantities of “bugs” such as mosquitoes, bats are a natural form of insect control. For instance, one little brown bat can catch 600 mosquitoes or more an hour.
- Many garden pests can hear bats and will avoid areas where bats are looking for a meal.
- Desert ecosystems rely on nectar-feeding bats to pollinate giant cacti, including the organ pipe and saguaro of Arizona.
- Agricultural plants from bananas to cashews, dates, and figs rely on bats for pollination and seed dispersal.
- Despite bats’ many benefits including pollination and insect control, their populations are declining nearly everywhere. More than half of American bats species are considered endangered due to disturbance of roosting bats in caves, loss of habitat

including forested areas, and inappropriate use of pesticides.

- Loss of bats destabilizes ecosystems and can cause people to increase their use of chemicals to control insects. Excessive use of chemicals can be harmful to human health and harmful to wildlife.

What a Bat Really Is

Like humans, bats are mammals. Bats are the only mammals that actually fly, flapping their wings to propel them in flight. Some mammals, such as flying squirrels, only glide rather than fly. Because bats are unique they are classified in their own special order of mammals, called Chiroptera. Chiroptera means “hand-wing,” referring to how the finger bones of a bat support its wings. The wings of a bat are actually thin membranes of skin that stretch between the fingers of the front leg and extend to the hind legs and tail. The bat’s elongated finger bones serve a purpose similar to struts on an airplane wing, providing support and maneuverability during flight. When a bat rests, it folds its wings alongside its body to protect the delicate finger bones and wing membranes.

Insect-eating Bats

Most North American bats are insectivorous. Insect-eating bats capture their prey by foraging on the wing, catching flying insects from a perch, or collecting insects from plants. Some bats seize insects with their mouths. Other bats use their wings or tail membrane to trap prey. Bats may disable large insects with a quick bite, then envelop the insect meal in a basket formed by the bat’s wings and tail, and carry the insect to a perch for eating. Bats have sharp teeth to chew their food into tiny, digestible pieces. A bat may consume nearly 50 percent of its body weight in insects during just one night.

Echolocation--Contrary to popular opinion, bats are not blind. Although they can see quite well, many bats have a sonar system called echolocation for locating prey. Echolocation works by bats' emitting a series of high-pitched squeals through their mouth or nose (these pulses usually are inaudible to humans). These sounds bounce back to the bats, thus enabling these remarkable animals to navigate in total darkness. The echolocation is so sensitive that bats can detect objects as thin as monofilament fishing line. The echolocation calls, or pulses, are produced in the larynx, or voice box, by forcing air past thin vocal membranes that only bats have. Most bats give signals through their mouth, but some emit pulses through a complex nose structure. Some bats use tongue clicks instead of vocal cords. Usually, the echoes are received by large funnel-shaped ears. Many bats have a vertical flap, called a tragus, inside each ear. The tragus may help direct the incoming echoes. Bats' ears are specialized for frequencies in the ultrasonic range. Nerve impulses generated by these sounds are transported to the brain for processing. Bats also use echolocation to help them identify their young in crowded roosts.

When insect-eating bats search for food, they often emit sounds at 10 pulses per second. Once they locate a meal, bats may emit pulses as high as 200 pulses per second as they chase and capture prey.

Bats are therefore natural "bug" consumers. Large colonies of bats can eat tons of insects each night.

Bat Biology and Lifestyles

Depending on species, bats have many different lifestyles. Some bats are solitary and hang in tree foliage, attics, barns, and other protected places during the day. Other bats are colonial and cluster in caves and

mine tunnels. When they are at rest, bats hang with their heads down.

Male and female bats tend to remain separate in summer. Mating occurs in early fall. However, in a process known as delayed fertilization, sperm is stored in the females' reproductive system until the following spring when ovulation occurs and embryonic development begins. The young bats, known as pups, are born in spring. The newborn bats are blind and furless and are nursed by their mother until they are 6 weeks old. Young bats begin to fly by the time they are a month old.

Bats have one of the slowest reproductive rates for animals their size. Most bats in northeastern North America have only one or two pups a year, and many females do not breed until their second year. This low reproductive rate is somewhat offset by a long life-span, often over 20 years. The little brown bat, common in North America and in West Virginia, is the world's longest-lived mammal for its size, with a life-span over 32 years, although it is rare for a bat to live this long.

During the winter, some bats migrate south in search of food, while others hibernate through the cold weather when insects are scarce. Bats that do migrate usually travel less than 200 miles, often following the same routes as migratory birds.

Bats prepare for hibernation by putting on fat to last through the cold weather. Bats may also move from nursery caves suited for rapid growth of their young to cooler caves with stable winter temperatures. When a bat hibernates, its body temperature drops almost to air temperature, and respiration and heartbeat become very slow. Throughout the winter, bats eat nothing, surviving by slowly burning fat accumulated during the summer. Bats can be roused from hibernation fairly easily and may fly around for 15 minutes after being disturbed, thereby

using up fat reserves needed to survive long winters. Disturbances that cause bats to awaken and use fat stores can be fatal to the bat. Hibernating bats should be left alone.

Where do bats live? Not always where you might think. A group of small-footed *Myotis* made their home in an underground tunnel at an inactive nuclear reactor in the state of Washington. Bats more typically live in abandoned mines, caves, on the underside of bridges, in trees, in crevices in old buildings and barns, in woodpecker holes in trees, occasionally in homes and attics, and in bat houses constructed especially for them.

Bats and Rabies

All mammals, including bats, can get rabies. However, it is estimated that less than 1 percent of bats have rabies. The best way to avoid getting rabies from bats is never to pick up a bat, especially if you see one fluttering on the ground during the day and it looks sick. (Volunteers and professionals working with bats are often required to get pre-exposure rabies shots.)

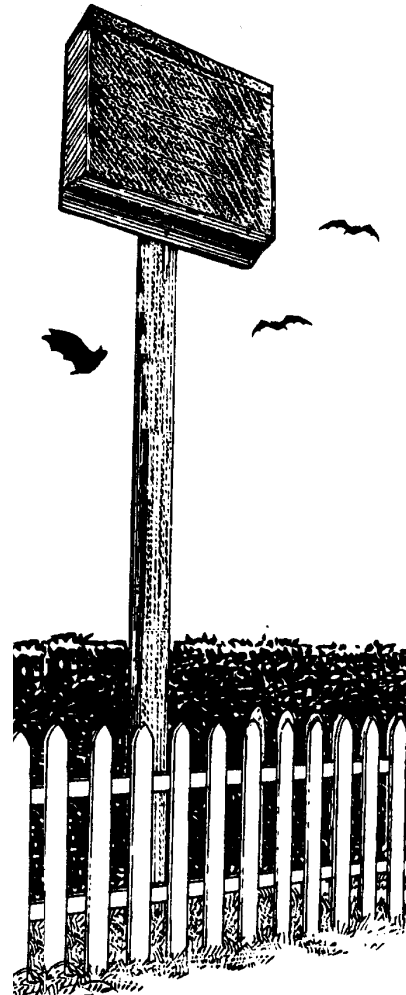
Bats in Houses

The two species of West Virginia bats most likely to enter homes are the little brown bat (also known as the little brown *Myotis*) and the big brown bat. The only way to keep a house free of bats is to block up the openings the bats are using. Openings must be blocked when the bats are not present. Bats may have young in the summer so it is best to block openings later when the bats have left. Netting can also be used to cover crevices in houses. Bats can slip under the netting to get out, but then they can't fly back in the house.

If a bat gets into the house, one way to get it outside is to open a window or door and let it fly back outside.

If a colony of bats are to be removed from a home, attic, or barn, another place for the bats to roost such as a bat house should be considered.

Bat Boxes. Bat boxes and houses and information on how to construct and take care of them are available from such



organizations concerned about bats, such as Bat Conservation International or your state wildlife agency. Commercially purchased bat boxes may not provide for the bat's needs. Size, interior construction, and temperature control are the three most important design elements of bat boxes. Bat boxes should be installed well before the bats are shut out so bats can find their new home. January to April are the recommended times to install the boxes.

Bat Conservation Projects

One project to conserve bats is the construction of an artificial cave (called a chiroptorium) to attract bats. Other activities include catching and placing radio transmitters on bats and tracking them to learn more about their feeding and roosting areas. Another project involves monitoring hibernation caves to determine number of bats present, and educating cave users about not disturbing bats.

West Virginia Bats

West Virginia has 13 species of bats.

West Virginia bats are members of the bat family called Vespertilionidae, also known as evening or common bats. They eat insects, taking prey on the wing.

Bats considered common in West Virginia:

Little brown Myotis

The little brown Myotis (*Myotis lucifugus*), also called the little brown bat, is one of the most common bats in North America, found in much of the United States, Canada, and Alaska. These bats have a large variety of summer roosts, including caves, abandoned mines, buildings, tree hollows, and cliffs. This is the bat most likely to be found near people's homes.

Length including tail is around 3 inches, with an 8 - to 10-inch wingspan. Females are larger than males. The glossy, dense fur is brown, almost bronze; wings are black with no fur.

Little brown bats eat a variety of insects including moths, mosquitoes, flies, and beetles. Insects are caught with the wing and tail membrane and transferred to the mouth.

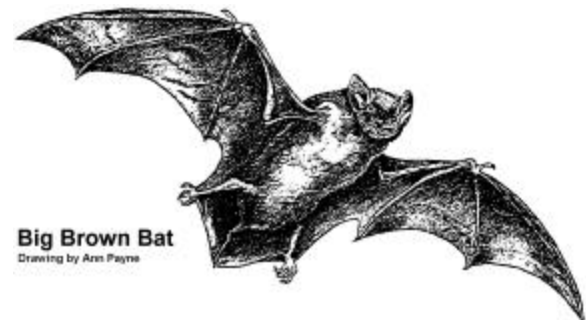
In October and November, the bats leave their summer roosts and move to tunnels, mines, shafts, and caves to hibernate for the winter, emerging again in April and May. Bats use the same hibernation sites year after year.

After females leave the hibernation sites, they gather in colonies varying in size from 10 to 100 or more, roosting in attics, barns, and other dark retreats. The males are solitary, roosting in hollow trees, under loose bark, and in other crevices.

Young bats are born in June or July and are fully grown in 4 weeks, usually able to hunt by mid-July. Females are mature at 8 months, and males mature in their second summer.

Big brown bat

The big brown bat (*Eptesicus fuscus*) lives in most of the United States and into Canada and Mexico. Big brown bats are just under 5 inches long with a wingspan of about a foot. Their fur is dark brown with darker faces, ears, and flight membranes. They primarily eat beetles. This bat ranges throughout West Virginia and is found in diverse habitats in both urban and rural areas in belfries, in barns, behind doors, and in hollow trees. They may enter houses.



Big brown bats fly at dusk, and often use the same feeding ground each night. They fly in a nearly straight course 30 feet in the air, often emitting an audible chatter.

These bats are among the last to enter hibernation, seeking out caves, buildings, mines, and storm sewers October to November. Big brown bats can live to 19 years or longer in the wild.

Eastern pipistrelle

The eastern pipistrelle (*Pipistrellus subflavus*) lives in most of the eastern United States. It is also called the pygmy bat because of its small size, less than 3 ½ inches long, with an 8- to 10- inch wingspan. The fur is yellowish brown, darker on the back. The back hairs are tricolored: gray at the base, then a band of yellow brown, and dark brown at the tip. Its small size and blunt tragus helps distinguish it from other bats.

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 deep inside caves from September to April or May. Pipistrelles eat flies, grain moths, and other insects.



Bats considered uncommon in West Virginia:

Silver-haired bat

The silver-haired bat (*Lasionycteris noctivagans*) lives throughout the United States and parts of Canada. This bat is 3 to 4 inches long, with a wingspan of 10 to 12 inches. Fur is soft and long, blackish brown tipped with white, giving this bat a frosted look. The silver-haired bat lives in wooded areas bordering lakes and streams. It roosts in dense foliage, behind loose bark, and sometimes in caves. It begins feeding earlier than most bats, often before sunset. Because they are tree-dwelling, they are rarely a problem around homes.

Red bat

The red bat (*Lasiurus borealis*) lives in much of the United States and into Canada and Mexico. Bats living in the north may make long migrations. The sexes migrate separately. The red bat has bright rusty angora-like fur and sometimes has a frosted look. Wings are pointed. Length is about 4 ½ inches and the wingspan slightly under 13 inches. During the day, red bats hang by one foot, wrapped in their big furry tails. Red bats are solitary except for mating. Unlike most bats, red bats may give birth to twins or even triplets.

Red bats fly early in the evening and have been timed at an impressive 40 miles per hour. They are most often found along forest edges.

Unlike other hibernating bats, they may wake and feed, if temperatures rise above 55 degrees. They may also feed in bright sunlight. Red bats seldom enter human habitations.

Bats considered rare in West Virginia:

Hoary Bat

The hoary bat (*Lasiurus cinereus*) is the most widely distributed bat in North America, found in all 50 states. It is the only native land mammal of Hawaii. Hoary bats live from Iceland through Central America and Chile, although they are considered uncommon in the eastern United States. At 6 inches long and with a 16-inch wingspan, hoary bats also the largest bats in the eastern United States' forests. Their fur is dark brown, tinged with white. They have conspicuous white wrist markings and yellowish or orange fur around the throat, which looks like a collar. These bats are solitary except for mating and migration. They eat moths and mosquitoes.

Hoary bats prefer to roost in trees in places such as woods, farmlands, and forest edges. They are strong, swift fliers that begin feeding later in the evening than most other bats.

Evening Bat

The evening bat (*Nycticeius humeralis*) lives in the eastern United States and into Mexico. It is a small brown bat with no distinctive characteristics, except that the tragus is short, curved, and rounded. Not a great deal is known about its feeding habits or seasonal movements. They are common around southern coastal areas.

Indiana Bat

The Indiana bat, also known as Indiana Myotis (*Myotis sodalis*) resembles the little brown bat, but Indiana bats have a pinkish cast to their fur, giving them a light purple-brown color. Length is about 3 ½ inches, and the wingspan 10 inches. Indiana bats usually roost in trees in the summer; however, in winter, more than 90 percent of

the total population hibernates in certain large caves in Missouri, Kentucky, Indiana, and Illinois. These bats are vulnerable to disturbances by cave explorers, and repeated disturbances may destroy the bats due to burning up energy before spring arrives. Indiana bats are on the periphery of their eastern United States range in West Virginia, but significant colonies exist in the state, including one cave that has thousands of hibernating bats each winter.

Small-footed Myotis

The small-footed bat (*Myotis leibii*) is one of the smallest bats in North America, with a 3-inch length and 9-inch wingspan. The small-footed bat resembles the little brown bat, but has a golden tint to its fur. Feeding and breeding habits are probably similar to those of the other small Myotis bats. The small-footed bat hibernates during November in cracks in walls, floors, roofs, and similar locations, singly or in groups. It emerges in March.

Virginia Big-eared Bat

The Virginia Big-eared bat (*Plecotus townsendii virginianus*) is quite rare in West Virginia. It is easily recognized with its very long ears, which are over an inch high, and joined across the forehead. There are also two prominent lumps on the nose of this unusual bat. The general color is clove brown. These bats live in caves, mine tunnels, and buildings. The bats are colonial in nurseries and during hibernation, but may be solitary otherwise.

Most of the world's Virginia big-eared bats live in West Virginia, including the largest known concentration of hibernating individuals and the largest known maternity colony of females.

The **northern bat or northern Myotis** (*Myotis keenii*), and **Rafinesque's bat** (*Plecotus rafinesquii*) also occur in the

state, but they are very rare. The **gray bat** (*Myotis grisescens*) also occurs, but only a few individuals from this species have been reported.

Where to learn more about bat conservation and bat education materials and get plans for a bathouse:

- Nongame Wildlife Program, West Virginia Division of Natural Resources, Elkins, West Virginia
- Bat Conservation International, PO Box 62603, Austin, Texas, 78716
(512) 327-9721 FAX (512) 327-9724
<http://www.batcon.org>

Videos on bats suitable for educators and classroom use:

- “Bats of America”, produced by Bat Conservation International. 15 minutes

- “The Secret World of Bats”, produced by Bat Conservation International and Survival Anglia. This 48-minute video was seen originally on the CBS network television.

See: BCI web site:
(<http://www.batcon.org/batsmag/batindex.html>)
to find more information on the magazine *BATS* published by Bat Conservation International.

Where to learn more about animal control on the Web:

www.crittercontrol.com

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