

Night FLIERS

Unheard and seldom

seen by people,

bats are flying

in the **dark.**

BY Christine Petersen

EASTERN RED BAT ©MERLIN D. TUTTLE,
BAT CONSERVATION INTERNATIONAL

Cree-ee-eeek! Peep! Bzzzzz!

A spring night is full of sounds. As darkness falls, frogs begin to sing from ponds. Flying squirrels skitter up tree trunks, chirping. Beetles buzz and mosquitoes hum. The voices of bats also ring out across the night sky, but our human ears cannot detect their high-pitched calls.

Watch the shadowy edge where treetops brush the sky to glimpse



these *nocturnal* mammals. Bats aren't afraid of the light or harmed by it, but they have practical reasons for being creatures of the night. Many food sources are available at night. Bats fly under cover of darkness to keep from being hunted by other predators, though owls are skillful nighttime hunters of bats.

More than 1,200 bat species live around the world in all kinds of habitats, from deserts to tundra to rainforests. Minnesota has seven bat species, which live all around the state. Look for them zipping through beams of streetlights, dipping over lakes and streams, and swooping above fields and through forests.

mammal with wings

Bats are mammals—furry, warm-blooded animals that produce milk to feed their young. Flying squirrels can glide through the air, but bats are the only mammals capable of true flight.

Wings. A bat wing has a thin, sturdy layer of skin covering its arms and long finger bones. The wing *membranes* stretch from its shoulders and fingertips to its ankles. The wings are attached to the sides of the body.

When it's ready to fly, the bat drops into the air from its *roost* high in a cave, hollow tree, or attic and opens its arms wide. Air slips across the top and bottom of the wings, lifting the bat like a kite in the wind. It then begins to flap its wings. The widest part of the wing near the body provides *lift*—it catches air to keep the bat in flight.

A bat uses its wingtips for *thrust*—to push itself forcefully through the air.

A flying bat can instantly roll to one side, drop, and soar upward. These acrobatic flight maneuvers are possible because its wings are extremely flexible. By wiggling and curling its finger bones, a bat can curve a wing to change flight direction.

Bones. Any animal that flies must be as light as possible. That's why bats have *evolved* thin bones. A bat's knees point backward, and the soles of its feet face forward. As a bat flies, its clawed toes are perfectly positioned to grab flying insects to eat.

Wing membranes cover the bat's finger bones but not its thumb bones. Each thumb has a hooked claw. A bat uses its thumbs to grab, climb, and hang.



An adult big brown bat is 5 inches from head to tail and has a wingspan of 10 inches. The big brown bat usually goes into hibernation in November—later than any other Minnesota bat species.



Bats can see, but when hunting at night they use echolocation to find flying insects to eat. This big brown bat calls out and follows the sound that bounces back. These echoes guide the bat toward a spotted cucumber beetle.

finding food

Around the world, bats eat all kinds of things. There are fruit-eating bats and nectar-sippers. Some bats hunt frogs and mice. Others prefer fish. Three species in other countries feed on blood. Like most bats, Minnesota's seven species eat insects.

Awesome Echoes. Like all animals, bats use their senses to survive. It's a common myth that bats are blind. On moonlit nights, some bat species watch for prey moving on the ground or among tree

leaves. But the key to a bat's success at flying and finding food is its ability to use both voice and hearing to *echolocate*.

Sounds are vibrations of air. Sound travels in waves. A bat makes sound through its *larynx*, a voice box in the throat. As it flies, a bat calls out repeatedly—up to several hundred times per second. The sound waves strike objects in the bat's path and bounce back. The bat's large ears work like antennae to collect the echoes.

By listening to the echoes, the bat discov-

ers information about objects in its environment. Is a thing smooth or rough, large or small? Is it moving, and if so, in which direction? *Echolocation* helps the bat navigate around obstacles, even in a dark, tangled forest. Using echolocation, the bat can find and capture food.

Insect Feasts. A bat typically eats enough insects in a single night to equal half its body weight. A mother bat is much hungrier when she is producing milk to nurse her young. Then she might eat twice as many insects—an amount equal to her own weight.

The little brown bat, also known as the little brown myotis, is the only Minnesota species that often eats mosquitoes. Its nightly menu also includes flies, small moths, and wasps.

Big brown bats are beetle specialists. They chow down on beetles that mangle leaves of garden plants and eat roots of corn and soybeans.

Hoary bats prefer moths, especially large species such as armyworm moths and forest tent caterpillar moths. Forest tent caterpillars eat tree leaves. Hoary bats help control these pests by eating adult moths before they lay eggs that become caterpillars.

Bat Food

Little brown bats often eat mosquitoes. Other bats eat them too. Big brown bats devour beetles. During one summer, a colony of 150 big brown bats can consume 16,000 June beetles as well as other insects. Bats eat lots of insect pests such as armyworm moths, which are on the menu of hoary bats.



© ROD PLANCK, DEMBINSKY PHOTO

Mosquito



ALLEN BLAKE SHELDON

June beetle



BILL JOHNSON

Yellow-striped armyworm moth



DEBORAH ROSE, DNR

BAT Hangouts

The *little brown bat* and *big brown bat* are Minnesota's most common bat species. They and the *northern myotis* roost in hollow trees, caves, and buildings during the day. Our smallest species is the *tri-colored bat*, which weighs about as much as a quarter. Our biggest species, the *hoary bat*, weighs five times more—about an ounce. The hoary bat, *eastern red bat*, and *silver-haired bat* all live alone in the woods and fly south for winter.

Upside Down. You've probably heard that bats sleep upside down during the day. To gain this position, the bat flies toward its roosting place and does a last-second flip.

Have you ever hung from playground monkey bars? Imagine if you had to do that for hours. Your muscles would stiffen, and you would drop from exhaustion. Unlike you, a bat requires no energy to grip its roost. Each of its toes has a built-in lock. The bat's hanging weight clicks the

locks into place. To release them, the bat just moves its foot.

Sleep takes up only part of a bat's day. A bat bathes daily to keep its fur and wings clean. Bats spend time just looking around, perhaps on the lookout for trouble.

Summer Roosts. Tri-colored and silver-haired bats roost on tree branches or under loose bark. Eastern red and hoary bats hang among clumps of leaves. All these forest bats have thick fur for warmth. Color patterns on the hairs camouflage them from cats, raccoons, owls, and other predators.

Little brown, big brown, and northern myotis bats usually roost in tree holes, attics, barns, and caves. Females often gather into colonies to give birth to *pups*. Colonies can have a few bats or hundreds. Lone males might squeeze beneath loose shingles or window shutters. Bats that live in colonies sometimes use bat houses.

Bat Pups. Many bat species have one pup, usually born in midsummer. Big brown bats, eastern red bats, silver-haired bats, and hoary bats are more likely to produce twins.

At birth, a bat pup is hairless and blind but quite large, up to one-third of its mother's weight. The newborn pup clings to its mother's belly. Older pups hang out together when their mothers fly out to feed at night. As they hang, pups stretch their wings and flap to build strong flight muscles. Pups can fly in three to five weeks.



The opposite page shows a little brown bat roosting at Soudan Underground Mine State Park. This page, clockwise from top left: big brown bat, northern myotis, tri-colored bat, silver-haired bat, eastern red bat, and hoary bat.

CLOCKWISE FROM TOP LEFT: © GJSBERT VAN FRANKENHUYZEN, DEMBINSKY PHOTO ASSOCIATES. ©MERLIN D. TUTTLE, BAT CONSERVATION INTERNATIONAL. TIM KRYNAK, USFWS. © BRUCE MONTAGNE, DEMBINSKY PHOTO ASSOCIATES. ©MERLIN D. TUTTLE, BAT CONSERVATION INTERNATIONAL. © ALAN G. NELSON, DEMBINSKY PHOTO ASSOCIATES.

Winter Habitats. The hoary bat, eastern red bat, and silver-haired bat *migrate* hundreds of miles each fall. They head south to states where they can find insects to eat throughout winter.

Tri-colored, big brown, little brown, and northern myotis bats gather in caves and mines to *hibernate*. Hibernation looks like sleep because the animal's body slows way down to save energy. When a little brown bat flies, its heart might beat as many as 1,365 times per

minute. But when it hibernates, its heart can slow to 25 beats per minute.

Forestville Mystery Cave, Banning, and Soudan Underground Mine state parks are favorite winter hideouts for Minnesota bats. At Soudan, in the deep shafts of old mines, bats enjoy stable air temperatures and humidity. Park naturalist James Pointer and wildlife biologists track the mine's bat population. They estimate up to 12,000 bats hibernate there.



LAYNE KENNEDY

Wind turbines can injure and kill bats. When migrating south in winter or north in spring, hoary bats, eastern red bats, and silver-haired bats are especially likely to fly into wind turbines. The little brown bat (above) and other bat species that hibernate are in danger of catching a disease called white-nose syndrome. This deadly bat disease has not been found in Minnesota.

Bat conservation

Bats have been around for more than 52 million years. Today they face new threats to their survival.

Tall *wind turbines* are built in open spaces where bats sometimes fly. The wind catches turbine blades, spinning them to produce electricity. Every summer and fall, people find dead bats on the ground below turbines.

No one quite understands why bats fly near the turbines. Perhaps they are drawn to swarming insects. Bats might also be attracted to sounds made by turbine blades.

Tree bats are especially likely to be harmed. Biologists think these species pass wind turbines during migration. One solution is to adjust turbines so

they spin only when winds are strong. Bats are not harmed by motionless blades, and they stay away from blades spinning very fast.

Even more worrisome is a new disease that is spreading among cave bats in the United States and Canada. *White-nose syndrome* is caused by a fungus that grows on a bat's wings, ears, and nose. It damages the wings and makes the bat thirsty. Instead of hibernating through winter, infected bats awaken and fly around. Then they might starve or freeze to death.

The fungus has spread from a single cave in New York to 22 states and five Canadian provinces. Since this disease was discovered in 2006, at least 7 million bats have died. So far, Minnesota bats seem healthy.

"All bats that hibernate in caves are at risk of white-nose syndrome," warns DNR mammalogist Gerda Nordquist. The fungus passes from bat to bat within a cave. People who visit caves can carry the fungus on shoes, clothing, or other things and spread it to other caves.

You can help protect bats in several ways. Never wear the same clothing and shoes when you visit different caves. Follow other rules such as staying out of closed caves. Treat bats respectfully by leaving them alone wherever you see them. Share your knowledge of these remarkable mammals. 



LEFT: HOARY BAT, © BRUCE MONTAGNE, DEMBINSKY PHOTO ASSOCIATES. RIGHT: ROSE BREASTED GROSBEEK, BY BILL MARCHEL.

Bats, Birds, or Both?

Match the traits in the list below with the creatures above.

- A. have teeth
- B. make milk to feed their young
- C. hibernate during the winter
- D. have feathers
- E. have finger bones in their wings
- F. all members of this group fly

Answers:

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- F. Bats** fly, but not all birds do. For example, ostriches and penguins walk.
 - E. Both!** Birds have three finger bones in each wing. Bats' finger bones are the same as yours, only much longer.
 - D. All birds** are covered in feathers. Bats have fur.
 - C. Some bats** hibernate during the winter. Birds do not.
 - B. Bats** produce milk to feed their young.
 - A. Bats** have teeth. Birds have beaks.

NOTE TO TEACHERS

Find links to teachers guides for this and other stories at www.mndnr.gov/young_naturalists.