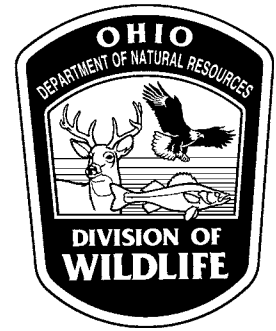
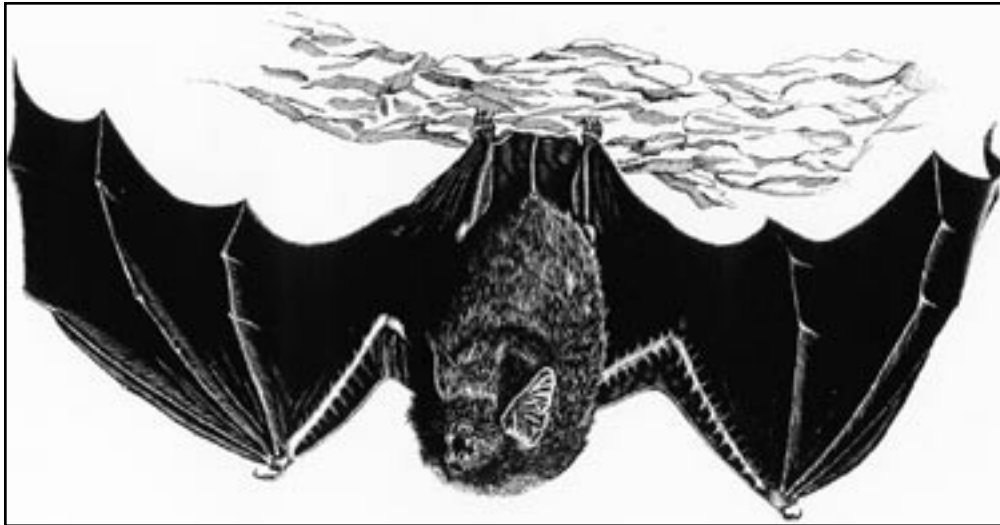


Ohio Division of Wildlife
Life History Notes

Indiana Bat

Scientific Name: *Myotis sodalis*



State
Endangered
Species

Publication 370
(399)

Introduction

Because they are active at night, bats are a mystery to most people. Although we don't often see them, bats are very important to the environment, agriculture, science, and in some instances to the economy. Worldwide, many plant species depend on bats for propagation; bats facilitate the pollination and/or seed dispersal of bananas, avocados, dates and cashews. All bats in Ohio eat insects, including the Indiana bat, and they significantly reduce insect populations. Bats are important animals in scientific research, providing insights into the biology of hibernation and sonar mechanisms.

There are many things that distinguish bats in the animal world. Bats are the only mammals capable of flight. For mammals, they are an evolutionarily old group with fossil records dating back 50 million years. The ears of most bats are unusually long in relation to their overall body size. There is a small flap called the tragus on their ears. It probably has a role in the bat's acute hearing and echolocation abilities. The tragus can also be used as an identifying feature in determining the species of bat.

The Indiana bat is one of 13 bat species recorded in Ohio. It is a rare species, and is listed on both the state and federal endangered species list. It was not until 1974 that the first maternity colony was discovered in Indiana. Like little brown bats (to which they bear a close resemblance), Indiana bats migrate to caves south of Ohio to hibernate.

Description

Indiana bats are widely distributed over the eastern United States. They are found in western and northern Ohio, but are absent from counties in the southeastern hill country (unglaciated Allegheny Plateau). Population declines have been caused by loss of summer habitat and disturbance at hibernation sites. In western Ohio, wooded areas along waterways probably represent the best summer habitat.

The back of the Indiana bat appears uniformly dark brown, often with a distinctive pinkish or chestnut color. However, individual hairs are actually tri-colored, which helps differentiate them from the little brown bat that they closely resemble. The wing membranes are dark brown. This similarity in appearance to the little brown bat can make the two species difficult to distinguish.

Indiana bats weigh between 0.18 and 0.28 ounces. They are usually 4.4 to 5.4 inches long with a wingspan of 9.4 to 10.5 inches.

The teeth are typical of an insectivore—they are all relatively sharp, including the molars. There is very little surface for grinding, as would be found in an herbivore or omnivore, categories in which bats in other parts of the world fall.

The bones of the lower skeleton are reduced in size and thickness to lighten the load a bat must carry in flight. This is part of the reason why bats hang upside down. The reduced skeletal structure is simply incapable of supporting a bat in an upright or roosting position like a bird.

The bat's femur (thigh bone) is rotated, resulting in a backward orientation of the knee. This also helps explain why they hang upside down.

Habitat and Habits

There are two distinctive types of habitats for the Indiana bat: hibernation sites during the winter, and roosting sites for reproduction during the summer. As with most species of bats, the Indiana bat has a highly developed homing ability, and will return to the same caves and roosts year after year.

Hibernation sites are usually caves, and most Indiana bats that summer in Ohio migrate to spend the winter in large caves to the south of the state, most probably being in Kentucky. A few individuals have been known to overwinter in Ohio, using small caves in the southern part of the state. It is critical that a hibernation site be cool, but have temperatures that remain above freezing. They also need to be relatively free of human disturbance, because if a bat is aroused from hibernation too many times, it will draw down its fat reserves at too great a rate to make it through the entire winter. Generally, bats don't feed during the hibernation period.

Indiana bats hibernate in dense clusters, in some cases literally carpeting cave walls and ceilings. The hibernation clusters can contain up to 300 bats per square foot. Unfortunately, this habit of forming such large hibernation concentrations makes them vulnerable if there is a winter disturbance. For the Indiana bat, 50 percent of the population can be found in seven caves. Having this many individuals in one, small space means that any disturbance such as people entering the cave or flooding of the cave can result in the death of massive numbers of bats, representing a large proportion of the population.

Indiana bats are nocturnal, and their diet consists of small soft-bodied insects such as moths and flies. Feeding occurs in riparian areas with a closed canopy, where their favored insect prey are trapped and eaten during flight. The insects are located by a highly developed sense of echolocation. In this process, bats emit high frequency sounds, which bounce off the potential prey and return to the bat's ears. They use the information gained from the speed and direction of the returning sound signals to pinpoint prey.

Reproduction and Care of Young

Indiana bats are polygamous. This means that males mate with a large number of females and have no role in the rearing of young. Breeding takes place during the late summer and early fall during a behavioral phenomenon known as "swarming." At this

time, large numbers of bats visit and congregate in a succession of caves just prior to hibernation. Although sperm is transferred to the female during copulation that occurs in the fall, ovulation and fertilization of the egg are delayed until the females arouse from hibernation the following spring.

During the summer, females form maternity colonies, almost always under the loose bark of trees or in tree cavities. Maternity colonies usually consist of fewer than 100 females, and can occur in both upland and streamside areas containing trees greater than eight inches in diameter.

A single young is born in early summer, and is fed milk from the female. The females actually hang "right side up" during the birthing process. The young can fly after about three weeks, and begin to leave the roost around four weeks of age.

Its low reproductive rate indicates a longer-lived species, and individuals up to 20 years of age have been found in the wild. One reason for this relatively long life-span is thought to be the fact that these bats spend a great deal of time in a state of reduced metabolic activity (much like suspended animation). During the warm months of the year, these bats lower their body temperatures on a daily basis and enter a state of torpor. In winter, when their insect food is not available, the bats store fat and enter hibernation, a long-term form of deep sleep during which time their heartbeats and respiration rates decrease. This is thought to prevent some of the "wear and tear" on the body allowing it to "last" longer.

Management Plans

The Division of Wildlife works closely with other agencies to protect the Indiana bat's summer habitat, especially for projects that might disturb woodland canopy or suitable roost trees along waterways. Because the animal is on the federal and state lists of endangered wildlife, impacts on the species must be considered during project planning and development.

The most important actions to protect the species in Ohio involve the protection of wooded habitats along waterways, although recent research has shown that maternity colonies can be established in upland, wooded sites one to two miles from permanent water.

There is a relatively high level of interest in bats, and the Division has funded several bat management and education projects through its Wildlife Diversity Grant Program.

Viewing Opportunities

Partly because they are so uncommon, it would be very difficult to be in the right place, at the right time to actually see an Indiana

bat. In addition these bats prefer to forage mostly in and above the woodland canopy. However, in general, the best time to view any bat is about one-half hour after sunset, during the summer months. The best locations are around ponds and lakes, or around street lamps where insects concentrate. Ultrasonic sound detectors can be purchased, which allow you to hear the bat's echolocation calls.

Do Something Wild!

The Indiana bat, as stated earlier, is a federal and state endangered species. Loss of appropriate habitat is the primary threat to its existence. The Division of Wildlife uses money donated through the state's income tax checkoff program to evaluate, monitor, and when possible, acquire habitat. Through the generosity of Ohio citizens, who either donated through the checkoff or their direct contribution to the Endangered Species Special Account, the Division is able to sponsor a variety of special projects to benefit wildlife diversity in the state.

Tax time **is not** the only time you can help. Contributions to our Endangered Species and Wildlife Diversity Program are accepted throughout the year. To make a donation, please send a check to: Endangered Species Special Account, Ohio Division of Wildlife, 2045 Morse Road, Bldg. G, Columbus, Ohio 43229-6693. All contributions, whether made on your tax return or directly, are tax deductible.

At a Glance

Mating: Polygamous

Peak Breeding Activity: September and October

Young are Born: June and July

Litter Size: 1

Number of Litters per Year: 1. Young bats are called pups and are dependent on their mother

Adult Weight: 0.18-0.28 ounces

Adult Length: 4.4-5.4 inches

Life Expectancy: 1-20 years

Migration Patterns: Seasonal resident. Indiana bats live in small summer colonies in the state. They home in on site-specific locations

to roost. Little is known about the dispersal of young. The bats migrate south to caves for the winter.

Feeding Periods: One hour or two after sunset and before sunrise.

Typical Foods: Insects, especially small soft-bodied moths, beetles, flies, and caddisflies that are trapped under closed tree canopies over small streams.

Native to Ohio: Yes

Active or Potential Nuisance Species: No

The Indiana bat is a state and federal listed endangered species.

Facts and Falsehoods About Bats

* **Most bats do not carry rabies.**

* **Attacks by bats are extremely rare, even when the animals are provoked.**

* **Bats are not blind**, nor are they interested in anyone's hair.

Additional Reading

House Bat Management (USFWS Resource Publication 143) by A. M. Greenhall.

America's Neighborhood Bats by M. D. Tuttle. Available from most bookstores or Bat Conservation International, P.O. Box 162603, Austin, Texas, 78716-2603. \$9.95.

The Bat House Builder's Handbook by M. D. Tuttle and D. L. Hensley. Available from the same address as above for \$6.95.

The Division of Wildlife extends its thanks to Dr. Jacqueline J. Belwood for her assistance in the preparation of this Life History Note.

