

Life History of the

# INDIANA BAT

*(Myotis sodalis)*

**2** SPRING STAGING

**3** SUMMER HABITAT

**1** WINTER HIBERNATION

**4** FALL SWARMING



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## 1 WINTER HIBERNATION (December to Mid-March)

Caves used by Indiana bats are well ventilated (usually have a chimney effect), and store large volumes of cool air with constant temperatures between 38 to 43 degrees F. The Indiana bat is very sensitive to temperature changes and do not use caves that flood. They prefer caves that have domes, caverns, and diversity in form. Individuals cluster together in these caves in different sized groupings, some as large as 36,000 Indiana bats or as small as 20 to 40 Indiana bats. The bats go into deep hibernation in winter, but have the ability to arouse very quickly which may be an adaptive mechanism for survival from a predator. During the hibernation period, the bats arouse about once every two (2) weeks and use up much of their stored energy in the process. The function of the arousal is not known for sure, but it may be to drink, to exercise, or to get rid of some waste products. The arousal is not to feed though. Disturbances in the winter can be deleterious. Awakening these bats can use up their fat reserves. For this reason, gates at the entrance or fences around these caves have been used as conservation measures. Their winter is huddled together at temperatures of their environment. Individuals on the perimeter of the group are more susceptible to freezing than those in the middle of the mass. Caves are most important in the survival of this species. Some caves are homes to more than 50,000 Indiana bats. Indiana has two (2) caves that are critical habitat for the Indiana bat. Mines are also used as hibernacula.

## 2 SPRING STAGING (Mid-March to Mid May)

Both males and females emerge from caves in spring. They are very hungry and thin from some three (3) to four (4) months of deep hibernation. Indiana bats take a week or so to feed and congregate around these caves before migrating to their summer homes. Males usually stay near the hibernacula (within 50 miles or so). However, this species has been found to migrate 40 or 50 miles a day with total distances of several hundred miles. Females usually migrate further than males. The females (as in other bats) show delayed fertilization, that is, they mate with males in the fall, and store such sperm alive in pouches connected to the uterus. Upon an egg moving down the uterus, the sperm move from these pockets and fertilize an egg. This fertilized egg (embryo) then implants itself into the uterus. When females leave the cave, they are pregnant and on a mission to start a new generation in their summer home.

## 3 SUMMER HABITAT (Mid-May to Mid-August)

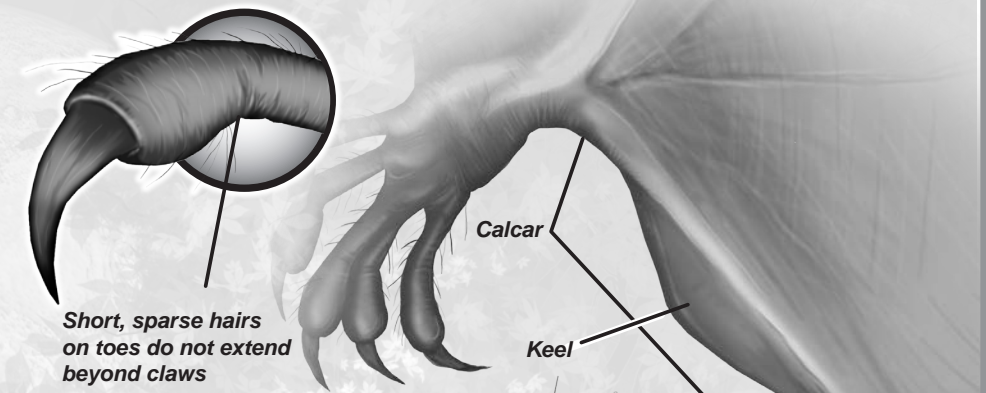
Females and males arrive at their summer habitat (home) in May. Summer roosting sites include primarily dead trees with concavities with exfoliating bark or living trees with shaggy bark (e.g., shagbark hickory). Larger trees are usually preferred over smaller trees where there is an ample amount of solar radiation, and protection from the wind and rain. The nursery colonies often use several roost trees. Roost trees may be primary roost trees (>30 bats) or alternate roost trees (< 30 bats). Primary roost trees are large trees with sloughing bark in the sun. Bats have a strong fidelity for this complex of roost trees and use such areas for food (flyways), water, and shelter. The bats secure themselves under the bark or in crevices or concavities during the day. While at night, they are active feeding on insects and use the underside of bridges on occasion as night roosts. The majority of summer maternity colonies are in big dead and live trees near major streams in both bottomland and upland areas. A maternity colony typically consists of 25 to 325 adult females (average is 80), but usually less than 100 adult females are in such maternity colonies. Babies are born between late June and early July. This process is called parturition and the adult females are lactating (producing milk) at that time. The mother's do not carry the young unless they need to move them, and under such conditions, they will carry them on their abdomen. The young become volant (able to fly) between early July and early August at which time the adult females become non-reproductive. Most young are volant by mid-July.

## 4 FALL SWARMING (Mid-August to November)

With the onset of fall and cooler temperatures, males return to the caves. They are at the entrances to the caves when the females and young arrive. Hormones run high and males mate with females. Swarming is a milling of the bats around and out of the cave entrance. It may have several functions, but one seems to bring the sexes together for mating. Members of both sexes feed and gain weight through the fall, thus putting on fat (energy) to help them make it through hibernation. It is not known if juvenile females mate their first autumn, and limited mating may occur in the spring. Limited mating may occur in the cave in winter as well. The males follow the females into hibernation. When temperatures are 50 degrees F or less, the bats start to stay inside the cave.

## COMMON NAME

The Indiana bat was first described as a distinct species by Miller and Allen in 1928 from a female specimen collected by J. O. Sibert on March 7, 1904 from Wyandotte Cave in Crawford County, Indiana. The scientific name of the Indiana bat is *Myotis sodalis*. *Myotis* means "mouse ear" and refers to the genus. *Sodalis* is the trivial species name and is a Latin word for "companion." The species is called the Indiana bat because the first specimen described to science came from the state of Indiana.



Short, sparse hairs on toes do not extend beyond claws

## STATUS

The Indiana bat is presently listed as a Federally endangered species (as of March 11, 1967) which means that it is in danger of becoming extinct. Population declines and vulnerability to human disturbances in winter have prompted its listing with the U.S. Fish and Wildlife Service. During hibernation, bats cluster in groups of up to 484 bats per square foot and some winter hibernacula may support from 20,000 to 50,000 bats. The U.S. Fish and Wildlife Service developed a recovery plan for the Indiana bat in 1976, followed by a revised plan in 1983. A new revision is currently underway.

## MYOTIS SODALIS Weights and Measurements

Total Length	2.8 - 3.9 inches
Forearm Length	1.3 - 1.6 inches
Tail	1.1 - 2 inches
Hind Foot	0.3 inches
Ear	0.4 - 0.6 inches
Skull Length	0.6 inches
Skull Width	0.4 inches
Weight	0.1 - 0.2 ounces

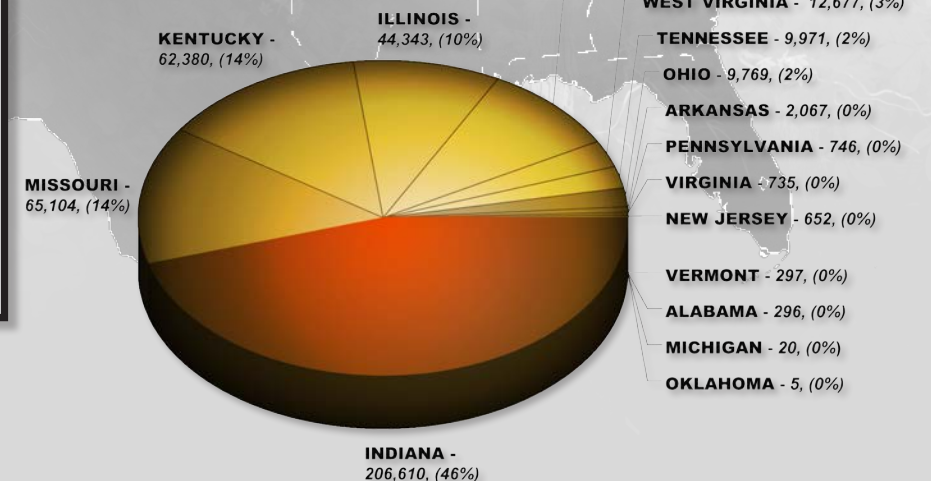
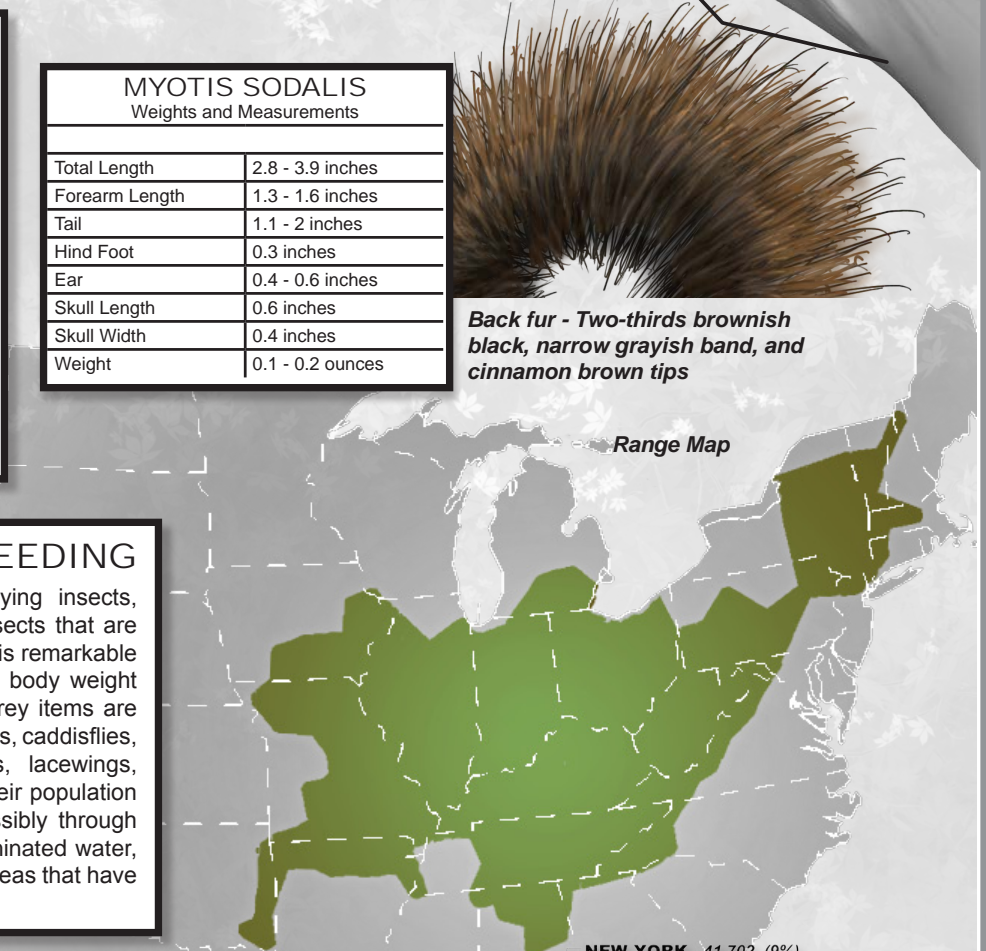
Back fur - Two-thirds brownish black, narrow grayish band, and cinnamon brown tips

## FEEDING

Indiana bats eat aquatic and terrestrial flying insects, and in this, benefit people by consuming insects that are considered pests. Their role in insect control is remarkable when you consider they eat about half their body weight in insects each night. Examples of some prey items are moths, beetles, midges, flies, wasps, flying ants, caddisflies, brown leafhoppers, treehoppers, stoneflies, lacewings, and weevils. Some scientists believe that their population is declining today due to pesticide use, possibly through eating contaminated insects, drinking contaminated water, or absorbing the chemicals while feeding in areas that have been recently treated with pesticides.

## PREDATION

Feral cats are potential predators within their hibernacula. They are also killed by natural predators such as snakes, owls, hawks, opossums, minks, and raccoons. They can also die from natural disasters such flooding of a cave, collapse in caves and mines, freezing in winter, climate and weather changes, and summer habitat deforestation.



For additional information, please refer to the United States Fish and Wildlife Service's Region 3 website: <http://www.fws.gov/midwest/endangered/mammals/index.html>

Acknowledgements - The design, text, and artwork for this product were developed by Bernardin, Lochmueller and Associates, Inc. located in Evansville, Indiana in cooperation with U.S. Fish and Wildlife - Bloomington, Indiana Field Office.