

INDIANA BAT

(Myotis sodalis)



Photo courtesy of Copperhead Consulting

BE AWARE!

There are potential seasonal tree removal restrictions around winter hibernacula (e.g., caves) and summer (e.g., maternity) roost trees.

“Tree removal” is defined as cutting down, harvesting, destroying, trimming, or manipulating in any way the trees, saplings, snags or any other form of woody vegetation likely to be used by Indiana bats.

Potential impacts from:

- Noise and vibration
- Loss of roost trees
- Death/injury during tree removal
- Disturbance during hibernation

BACKGROUND

The Indiana bat was listed as federally endangered under the Endangered Species Act in 1967 due to population declines caused by human disturbance of hibernacula [1]. A more recent threat is mortality caused by White-nose Syndrome (WNS) [2]. Indiana bats are protected and regulated by the United States Fish and Wildlife Service (USFWS) and state natural resource agencies.

KEY FACTS

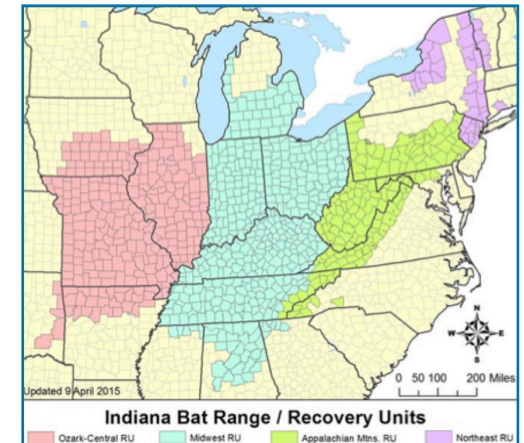
- Long-lived (15–20 yrs), nocturnal, small brown bat, weighs about as much as a nickel (< 8 grams / 0.3 ounces), and eats insects in flight.
- Range: eastern U.S. excluding the extreme northeastern states (i.e., Massachusetts, Rhode Island, New Hampshire, and Maine), most of Illinois and all of Missouri, parts of Iowa, Arkansas, and Oklahoma [3].
- Males and females hibernate together in winter → emerge in spring and move to summer habitat → females live and have young in colonies of 30 – 300 individuals, males live alone or occasionally with reproductive females → move from summer to winter habitat in fall → swarm and mate before hibernating.

SEASONAL HABITAT

- Winter (Hibernacula): caves, mines*
- Spring (Emergence) and Fall (Swarming): Trees within 5 miles of hibernacula
- Summer: dead or dying trees*

* For further information on this topic, see *Indiana Bat Supplemental Information*.

<https://www.fws.gov/midwest/endangered/mammals/inba/RangeMapINBA.html>



← Active Season →											
January	February	March	April	May	June	July	August	September	October	November	December
Hibernation			Spring Emergence		Young Rearing			Fall Swarming		Hibernation	

GENERAL HABITAT USE FOR ROOSTING AND FORAGING

- Forested areas of uneven stand age containing large trees
- Ponds or streams within the forest or nearby
- Forested corridors connecting isolated forest patches
- Woody wetlands and beaver-use areas resulting in ponds with dead standing trees

MATERNITY ROOSTS

- Roost during day in trees.
 - Under sloughing bark of dead or dying trees; tree species is dependent on where in the range and what habitat the tree is located*
 - Large trees (i.e., \geq 5-inch diameter at breast height [dbh])
 - High level of solar exposure
 - Cracks and crevices of trees devoid of bark
- Roost trees can be spread fairly far apart ($>$ 2 miles).
- Switch roosts every 2–4 days depending on the reproductive time of summer.
- Maternity colony size \geq 30 bats* but can be up to 300 individuals when pups can fly.
- Can forage up to 3 miles from roost tree. Home ranges are 400 – 3,000 acres*, depending on the time of year (e.g., pregnant bats use a much smaller foraging area than post-lactating individuals) and surrounding habitat.
- Females give birth to one pup as early as May in the southern limits of the range, and into July in the northern regions. Pups begin to fly 25–37 days after birth.

* For further information on this topic, see *Indiana Bat Supplemental Information*.

INFORMATION FOR UTILITY OPERATIONS, MAINTENANCE, AND PROJECT DEVELOPMENT PROJECTS

- No action required if:
 - Not removing trees or affecting an Indiana bat hibernaculum.

DETERMINE IF INDIANA BAT ACTION REQUIRED BEFORE A PROJECT STARTS

- Identify if the proposed project is located near known Indiana bat maternity areas (i.e., summer habitat) and/or hibernacula (i.e., winter habitat).
- Will Indiana bat suitable summer habitat* be adversely affected, or
- Will hibernacula be altered (including entrances or physical environment), or
- Will trees be removed around hibernacula?

IF YOU ANSWERED YES TO ONE OF THE BULLETS ABOVE:

- Contact company environmental representative and discuss next steps before conducting proposed activities (e.g., environmental representative may need to coordinate with federal or state agency)

RESOURCES

1. USFWS page about Indiana bats – <https://www.fws.gov/midwest/Endangered/mammals/inba/index.html>
2. Information about White-nose Syndrome (WNS) – <https://www.whitenosesyndrome.org/>
3. Map of Indiana bat species range – <https://www.fws.gov/midwest/Endangered/mammals/inba/RangeMapINBA.html>
4. Studies on conservation efforts and their effectiveness – <https://www.conservationevidence.com/>

CONTACT INFORMATION

Insert company contact information here.

INDIANA BAT SUPPLEMENTAL INFORMATION

ADDITIONAL INFORMATION

WINTER HIBERNACULA

Hibernacula are designated in order of priority based on the number of Indiana bats hibernating therein. The priority designation affects tree clearing restrictions around hibernacula.

As of 2017 the definitions are:

P1A = recorded pop. $\geq 10,000$ bats with $\geq 5,000$ over past 10 yrs.

P1B = recorded pop. $\geq 10,000$ bats with $< 5,000$ over past 10 yrs.

P2A = recorded pop. $\geq 1,000$ bats with ≥ 500 over past 10 yrs.

P2B = recorded pop. $\geq 1,000$ bats with < 500 over past 10 yrs.

P3 = recorded pop. ≥ 50 bats

P4 = recorded pop. < 50 bats

<https://www.fws.gov/midwest/Endangered/mammals/inba/pdf/2017BatPopEstimate5July2017.pdf>

List of caves in the P1 category can be found here:

<http://www.batcon.org/pdfs/whitenose/11-MAMMA-A-355.pdf>

TREE SPECIES

For Indiana bats, species of tree is less important than the characteristics that the tree species provides (Rommé et al. 1995). Different tree species are used in different parts of the range. For example, live shagbark hickory trees are used in northern portions of the Indiana bat range, but dead green ash trees are used frequently in northern Kentucky and dead pine trees are used most often in northern Alabama and the lower Appalachian Mountains. Other species used include but are not limited to maples, hickories, oaks, elms, cottonwood, and hemlocks (Menzel et al. 2001).

MATERNITY ROOSTS

Maternity roost trees tend to be large (i.e., ≥ 5 -inch diameter at breast height [dbh]) but male bats have been found roosting singly in trees as small as 2.5 in dbh. Average maternity trees in different studies measured 14.4 in, 15.7 in, 23.0 in, 20.9 in, and 16.1 in (Menzel et al. 2001). Maternity colonies are considered ≥ 30 bats emerging on two different evenings (Callahan et al. 1997), but alternate roosts within the colony can house fewer bats. Maternity colonies have been found in churches (Butchkoski and Hassinger 2001) and in artificial roosts, both under artificial bark (Adams et al. 2015) and in bat boxes (Ritzi et al. 2005). Roost height varies with the forest type and amount of solar exposure. Roost heights from multiple studies include 25.6 ft and 32.5 ft (Menzel et al. 2001), 28.2 ft (Lacki et al. 2009), and ranging anywhere from 16.4 ft to 52.5 ft with an average of 29.5 ft (Kurta 2005).

HOME RANGES

Generally female Indiana bats stay within 2 mi of roost trees during maternity season. Some reported home ranges sizes include 398.1 ac (Menzel et al. 2005), 523.9 ± 327.2 ac (Kniowski and Gehrt 2014), and $2,809.8 \pm 356.1$ ac (Womack et al. 2013).

SUITABLE SUMMER HABITAT

While trees < 5 inches dbh that have exfoliating bark, cracks, crevices, and/or hollows may have some potential to be male Indiana bat summer roosting habitat, the USFWS does not consider early-successional, even-aged stands of trees < 5 inches dbh to be suitable roosting habitat for the purposes of this guidance. Suitable roosting habitat is defined as forest patches with trees of 5-inch dbh or larger. Early successional habitat with small diameter trees, however, may be used as foraging habitat by Indiana bats. Therefore, a project that would remove or otherwise adversely affect ≥ 20 acres of early successional habitat containing trees between 3 and 5 inches dbh may require coordination/consultation with the USFWS Field Office to ensure that associated impacts would not rise to the level of take. The USFWS may request presence/absence surveys if > 20 acres of early successional habitat were proposed for removal.

DISTANCE RESTRICTIONS AROUND MATERNITY ROOSTS

Bats engage in a fission-fusion society where, several times throughout the summer, the colony splits up and uses multiple roosts but comes back together to roost in the same tree. The result is Indiana bats switch roosts often (Barclay and Kurta 2007). Any suitable tree within 2.5 miles of a known roost can be used as a roost by this species, so removing any trees could result in potential roost removal.

ADDITIONAL INFORMATION

DISTANCE RESTRICTIONS AROUND HIBERNACULA	Bats engage in swarming behavior around hibernacula in the fall where they mate and build fat reserves in preparation for hibernation. Bats visit multiple hibernacula and roost in trees around hibernacula during this time (Cope and Humphrey 1977). Removing trees around hibernacula reduces this swarming habitat and could impact the microclimate of the hibernaculum. In addition, forested areas around caves are also used during staging when bats emerge from hibernation and utilize the landscape outside the hibernaculum before migrating. Male Indiana bats can use this area year-round.
TREE REMOVAL TIMES	These dates will vary depending on where in the range the project is but is generally from October - March. Consult the local USFWS field office for specifics.
TREE CLEARING SHOULD ONLY OCCUR FROM OCTOBER 15 TO MARCH 31 ON PERMIT AREAS THAT:	<ul style="list-style-type: none"> (A) Are within a 5 mile radius of a maternity capture record and no hibernaculum exists within a 5 mile radius of permit area; or (B) Are within a 2.5 mile radius of a male capture record and no hibernaculum exists within a 5 mile radius of permit area; or (C) Are within a 2.5 mile radius of a known maturity tree and no hibernaculum exists within a 5 mile radius of permit area; or (D) Contain potential summer habitat, Indiana bat presence is assumed, and no hibernaculum exists within a 5 mile radius of the permit area.
TREE CLEARING SHOULD ONLY OCCUR FROM NOVEMBER 15 TO MARCH 31 ON PERMIT AREAS THAT:	<ul style="list-style-type: none"> (A) Contains caves. (B) Are within a 10 mile radius of a P1 or P2 hibernaculum; or (C) Are within a 5 mile radius of a P3 or P4 hibernaculum.

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KEY COMPARISON OF INDIANA BAT AND NORTHERN LONG-EARED BAT



Photo courtesy of Copperhead Consulting

	INDIANA BAT	NORTHERN LONG-EARED BAT
RANGE	Found over most of the eastern half of the United States. States within the current range of the Indiana bat include Alabama, Arkansas, Connecticut, Illinois, Iowa, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia.	Range in the US: Maine down to South Carolina, across to Louisiana and Oklahoma, and up to eastern Montana.
WINTER HABITAT	During winter, females and males cluster and hibernate in only a few caves. Almost half of all Indiana bats hibernate in caves in southern Indiana.	Females and males hibernate singly in caves, mines, rock crevices, and tree cavities throughout the range of the species.
SUMMER HABITAT	Contiguous forest >10 acres, tree rows connecting larger forested habitat, water sources within 0.5 mi	Cluttered forests, amount of contiguous habitat needed unknown
ROOST TREE CHARACTERISTICS	Use large trees (i.e., ≥ 5 inch diameter at breast height (dbh)). Significant solar exposure. Will use isolated tree if within 1000 ft of other forested habitat. Use 10 – 20 trees per year. Tend to return to the same site, area, or roosts each year.	Use large or small trees (i.e., ≥ 3 inch dbh. Use 4 – 16 roosts per year. Will use the same roosts between years, but less often than Indiana bats
COLONY SIZE	30 – 300 individuals in a single roost	Smaller than Indiana bat colonies: 10 – 60 individuals in a single roost
FORAGING DISTANCES FROM ROOSTS	2.5 miles	1.5 miles

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