



Bat Monitoring at Indiana Dunes, 2016–2019

Bats nationwide are struggling to survive against threats posed by climate change, habitat loss, wind turbines, and a devastating fungal disease called *white-nose syndrome* (WNS).

Prior to the initiation of our monitoring program, eight bat species were documented in the Indiana Dunes area (Table 1). A single evening bat was collected in 1958, an unverified record of a little brown bat was noted from a study in 1975–1980, and comprehensive mammal surveys conducted in 1987–1989 used mist-net captures and roost surveys to confirm the presence of eastern red, silver-haired, and big brown bats; it was suggested that additional bat species were likely present.

More recently, in 2003, mist-netting resulted in captures of four species, reconfirming earlier records for big brown and eastern red bats plus new records for little brown and Indiana bats. In 2005, the tricolored bat was verified when two individuals were captured. Acoustic surveys in 2014 recorded a total of five species plus call sequences that were identified to the *Myotis* group (three species in the genus *Myotis* with similar calls that can be difficult to distinguish).

The northern long-eared bat, a federally endangered species, is probably in the park, as its known range overlaps with Indiana Dunes. However, despite the capture of an individual in 2003 less than 25 miles away, this species has not been confirmed in the park.

Four of the nine bat species at Indiana Dunes are here in the summer, but then migrate to the southwestern U.S., Mexico, and even Central America for the winter. The other five species do not migrate. Instead, they hibernate here over the winter, roosting in caves and buildings. These hibernating species—the Indiana, little brown, northern long-eared, and tricolored bats—are highly susceptible to WNS. The big brown bat is also a



Indiana Dunes is the only Great Lakes Network park where Indiana bats are found. It is also the only park that has all nine species of bats known to occur in the Great Lakes region. NPS PHOTO

hibernating species but has exhibited resistance to the disease.

Breaking the Ultrasonic Barrier

Beginning in 2016, we placed ultrasonic audio recorders throughout the park to identify what bat species are present. Bats give different calls while in flight to help them navigate and to locate things like food. Like bird songs, we can identify bat species by their calls, but the calls are ultrasonic—beyond the range of human hearing—so special microphones and software are used to record and identify them. But, also like birds, some bat species have similar calls, and there can be variation in the calls of any one species. As a result, the software we use to analyze and identify the recordings is not 100% accurate. In these cases, a proportion of call files are reviewed “manually” using a spectrogram to verify the identifications.

Table 1. Bat species documented at Indiana Dunes before the start of this monitoring program in 2016 and after four years of acoustic monitoring (2019). Asterisk (*) indicates winter hibernating species.

Common Name	Scientific Name	Pre-2016	2019
Big Brown Bat *	<i>Eptesicus fuscus</i>	Yes	Yes
Eastern Red Bat	<i>Lasiurus borealis</i>	Yes	Yes
Evening Bat	<i>Nycticeius humeralis</i>	Yes	Yes
Hoary Bat	<i>Lasiurus cinereus</i>	Yes	Yes
Indiana Bat *	<i>Myotis sodalis</i>	Yes	Yes
Little Brown Bat *	<i>Myotis lucifugus</i>	Yes	Yes
Northern Long-eared Bat *	<i>Myotis septentrionalis</i>	No	Probably
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	Yes	Yes
Tricolored Bat *	<i>Perimyotis subflavus</i>	Yes	Yes

A Suspected Full House

Seven bat species previously documented at the park were reconfirmed: big brown, eastern red, hoary, silver-haired, evening, little brown, and tricolored bats. Two others—the northern long-eared and Indiana bats—were identified by the software on some of the recordings, but were not verified by manual review. Nevertheless, both are considered to be present in the park.

Big Brown, eastern red, evening, hoary, little brown, and silver-haired bats were recorded at every sample site each year. Big brown bats were the most commonly recorded species (33%–50% of total recordings) in three out of the four years, while eastern red and silver-haired bats were among the top three most commonly recorded species every year.

Activity levels for big brown, hoary, silver-haired, evening, northern long-eared, and Indiana bats all appeared to be stable or slightly increasing. The remaining three species—eastern red, little brown, and tricolored bats—showed slightly decreasing activity trends.

Busy Places

Tricolored bats were particularly active at one site south of Kemil Beach. In 2016, they accounted for more than 20 recorded calls per night, which was more than they were heard at any other sites in any other years. Similarly, sites at Cowles Bog, East State Park

Road, and east of Kemil Road had consistently high silver-haired bat activity in most years. The habitat at these three locations includes open wetland and forest edge, both of which are good foraging areas.

Finally, sites at Cowles Bog and East State Park Road had the top two highest numbers of hoary bat calls per recording night of all sites in three out of four years. Both sites are located at extensive open wetlands that provide good foraging opportunities.

The Future of Bat Monitoring

When this project began, the Great Lakes region was at the leading edge of the WNS spread. This monitoring program helped parks to document baseline data on their bat populations and to assess changes over time.

We are working with the NABat Midwest Bat Hub (<https://midwestbathub.nres.illinois.edu/>) to create statistical models of bat occupancy, particularly those most affected by WNS. *Occupancy* measures the probability that a species is using an area, while taking into account the fact that we cannot always perfectly detect the species.

The Great Lakes Network handed over the equipment and responsibility for coordinating bat monitoring to Indiana Dunes staff in 2023.



The bats of Indiana Dunes (top): Big brown bat, northern long-eared bat (WISCONSIN DNR/D. REDELL), silver-haired bat (WISCONSIN DNR PHOTO), hoary bat (USGS/P. CRYAN), Indiana bat (USFWS/R. HAGERTY); (bottom) eastern red bat, tricolored bat, little brown bat, and evening bat (U.S. ARMY PHOTO). NPS PHOTOS UNLESS CREDITED OTHERWISE.