



Bat Monitoring at Sleeping Bear Dunes, 2015–2019

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)*.

Three of the bat species found at Sleeping Bear Dunes are only here in the summer; they spend their winters in the southwestern U.S., Mexico, and even Central America (Table 1). The others, rather than migrating, hibernate here over the winter, roosting in caves or buildings. Three of these hibernating species—the little brown, northern long-eared, and tricolored bats—are **highly susceptible to WNS**. The big brown bat is also a hibernating species but has exhibited resistance to the disease.

Before formal bat monitoring began, a total of five species were documented at Sleeping Bear Dunes. Wildlife surveys on North and South Manitou Islands in the 1960s and 1970s found the little brown bat and eastern red bat on North Manitou and the eastern red, big brown, hoary, and silver-haired bats on South Manitou. Mist-netting was conducted in the park during the summers of 2000–2002 and again in 2015. In 2000, only three species were captured: big brown bat, eastern red bat, and little brown bat. These same three were also captured in 2001, 2002, and 2015, along with silver-haired and hoary bats.



Is the Indiana bat cruising the night skies over Sleeping Bear Dunes? So far, not even The Shadow knows. USFWS/R. HAGERTY.

Roost surveys conducted in 2000 located several little brown bat colonies in park buildings. Acoustic surveys completed in 2010 as part of a study of bird and bat migration along Great Lakes shorelines recorded little brown bats, red bats, and the big brown/silver-haired species pair (these two have very similar calls that cannot always be distinguished).

The park lies within the documented range for both the northern long-eared bat and tricolored bat and near the edge of the range for Indiana bats, but none of these three have been captured or otherwise identified in the park. A 2014 habitat assessment for Indiana and northern long-eared bats determined that high quality foraging and roosting habitat is available for both species at certain locations within the park. Nearby records from outside the park indicate these species are present in the area at least sometimes during the year. An acoustic survey recorded the northern long-eared bat during fall migration at Leelanau State Park, about 30 miles away, and all three species have been observed hibernating at Tippy Dam, less than 50 miles from the park, but where these individuals spend the summer has not been determined.

Breaking the Ultrasonic Barrier

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

Table 1. Bat species documented at Sleeping Bear Dunes National Lakeshore before the start of a formal monitoring program in 2015 and after five years of acoustic monitoring (2019). Asterisk (*) indicates winter hibernating species.

Common Name	Scientific Name	Pre-2015	2019
Big Brown Bat *	<i>Eptesicus fuscus</i>	Y	Y
Eastern Red Bat	<i>Lasiurus borealis</i>	Y	Y
Hoary Bat	<i>Lasiurus cinereus</i>	Y	Y
Indiana Bat *	<i>Myotis sodalis</i>	N	?
Little Brown Bat *	<i>Myotis lucifugus</i>	Y	Y
Northern Long-eared Bat *	<i>Myotis septentrionalis</i>	N	Y
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	Y	Y
Tricolored Bat *	<i>Perimyotis subflavus</i>	N	Y

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.

Who's Out There?

The five bat species previously documented at the park were reconfirmed: big brown, eastern red, hoary, silver-haired, and little brown bats. Two additional species—the northern long-eared bat and tricolored bat—were also documented. Although some acoustic files were identified by the software as Indiana bats, manual review did not confirm this species.

Recordings of all eight species were captured every year, with little brown, eastern red, big brown, and silver-haired bats among the three most commonly recorded in two or more years. Activity levels for big brown, hoary, and silver-haired bats appear to be

stable, while activity levels for eastern red, little brown, Indiana, northern long-eared, and tricolored bats showed declining trends.

The Future of Bat Monitoring

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.

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. However, the Great Lakes Network handed all aspects of bat monitoring over to the parks in 2022, so any further monitoring at Sleeping Bear Dunes will be conducted by park biologists.



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