



Bat Monitoring at Pictured Rocks, 2015–2018

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 seven bat species found at Pictured Rocks are only here in the summer; they spend their winters in the southwestern U.S., Mexico, and even Central America (Table 1). The other four species, 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.

There are no park-specific records of bat observations prior to 2003, but an early report on wildlife at Pictured Rocks National Lakeshore (PIRO) noted that six bat species were found in the region. Bat surveys were conducted in the park in 2003–2004, resulting in both captures and acoustic recordings of the little brown bat, northern long-eared bat, and eastern red bat. In addition, acoustic recordings were obtained for the big brown bat, hoary bat, and silver-haired bat.

PIRO is near the edge of the known range for tricolored bat, but this species has never been captured in the park, nor was it recorded during previous monitoring efforts. However, acoustic surveys in 2015



Pictured Rocks is just north of the tricolored bat's range, and one has never been captured in the park, but recordings suggest it is here. NPS PHOTO.

on the nearby Hiawatha National Forest did record tricolored bats about 20 miles south of the national lakeshore. Tricolored bats have also been observed hibernating in mines in Michigan's Upper Peninsula. The combination of both summer and winter records in relative proximity to PIRO suggests the species may be present in the park.

Pictured Rocks National Lakeshore began an acoustic monitoring program for bats in 2015, at the same time the Great Lakes Inventory and Monitoring Network was beginning surveys in the other eight network parks. Data collected at PIRO were provided to the Great Lakes Network to be processed and analyzed with data from the other network parks.

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 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 Pictured Rocks National Lakeshore before the start of a formal monitoring program in 2015 and after four years of acoustic monitoring (2018). Asterisk (*) indicates winter hibernating species.

Common Name	Scientific Name	Pre-2015	2018
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
Little Brown Bat *	<i>Myotis lucifugus</i>	Y	Y
Northern Long-eared Bat *	<i>Myotis septentrionalis</i>	Y	Y
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	Y	Y
Tricolored Bat *	<i>Perimyotis subflavus</i>	N	Maybe

Species Count: Seven ...ish

The six bat species previously documented at the park were reconfirmed: big brown, eastern red, hoary, silver-haired, little brown, and northern long-eared bats. All except the northern long-eared bat were verified through manual vetting. The presence of northern long-eared bats in the park has been separately verified by mist-net captures.

A seventh species—the tricolored bat—has never been physically captured in the park. However, our acoustic data suggest it may be present based on four manually verified recordings from one site. The park is just north of the tricolored bat's known range, but it has been recorded in other parts of northern Michigan. Still, the status of tricolored bats in the park remains uncertain.

All seven species were recorded every year, with silver-haired, hoary, and little brown bats being the most commonly recorded species. However, recordings of little brown bats dropped to less than 5% of total call files in 2017 and 2018. Four species were heard at 70% or more of sampling sites, but no species was recorded at all sites.

Activity levels for hoary bat and silver-haired bat appear to be stable, while activity levels for big brown bat, eastern red bat, little brown bat, and northern long-eared bat show decreasing 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. Any further monitoring at Pictured Rocks will be conducted by park biologists.



The bats of Pictured Rocks (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, and little brown bat. NPS PHOTOS UNLESS CREDITED OTHERWISE.