

Upper Delaware Scenic and Recreational River

National Park Service
U.S. Department of the Interior
Northeast Region



Bat Population Monitoring and White-nose Syndrome



*Little brown bat colony roosting in an old church attic.
This colony is closely monitored by the park.*

Why are park managers interested in bats?

Bats are an important part of ecosystems and local food webs. They consume huge numbers of insects every night and play a unique role in the environment. Unfortunately, a new bat disease named white-nose syndrome is affecting bats across the United States. To better protect bats, the park is working to understand how the disease is changing local bat populations.

White-nose syndrome...what's that?

White-nose syndrome is a bat disease caused by the fungus *Pseudogymnoascus destructans*. The disease is named for the white fungal growth that occurs on bats' faces and wings. The fungus was first observed in 2006 in a New York cave and is believed to have originated in Europe. In the Northeast, the disease has reduced some bat populations by more than 90%.

Which bat species are susceptible to white-nose syndrome? How are they infected?

Many species of bats spend the winter hibernating in caves, mines, buildings, or rock outcrops. Bats that hibernate in caves and mines are more susceptible to the fungus. Other bat species migrate south to warmer climates in the winter. These bats, in general, are not susceptible to the fungus.

Once the fungus causing white-nose syndrome is introduced, it can persist in the cold, humid environments often preferred by hibernating bats. It then infects bats when they return to hibernate. Because bats hibernate in clusters, the fungus can spread from bat to bat. Bats that hibernate in large groups are most susceptible. Humans don't get the disease but can spread it from cave to cave on contaminated clothing or equipment.

Once exposed to the fungus that causes white-nose syndrome, the fungus begins to grow on the bats' skin surfaces. This causes them to wake up more frequently during winter hibernation. When they wake up, they use up stored fat supplies before spring arrives with its abundance of insect prey. Without food or water during hibernation, bats that repeatedly wake up due to white-nose syndrome frequently die of starvation or dehydration over the winter.

Highlights

- Nine species of bats have been documented in the park, including two federally threatened or endangered species.
- White-nose syndrome has dramatically reduced the populations of some bats.
- Little brown bats—a species now rare across the Northeast—can still be found in unusually large colonies in the park.
- Conservation of roosting habitat is one important action being taken by park staff.

How do bats contribute to ecosystems?

Generally active at night, bats are major predators of insects and are an important component of biodiversity. Bats can eat more than half their body weight every night—that's hundreds to thousands of insects! Some of these insects, such as mosquitoes, can transmit human diseases. Others can be agricultural or forest pests. Scientists estimate that bats save U.S. farmers almost \$3.7 billion per year by eating crop-destroying insects.

What habitats are important for bats?

Many species of bats use buildings for summer roosting habitat. Others roost under tree bark or inside hollow trees. During the summer, bats use a variety of forests, fields, and riparian areas for foraging. Bats that hibernate need secure caves, mines, buildings, or rock outcrops for the winter seasons.



A biologist holding a hoary bat. Hoary bats migrate south during the winter. As such, these bats are generally not susceptible to white-nose syndrome. Hoary bats were the third most common bat species detected in the park in recent surveys. NPS photo.

How do biologists study bats? What have they learned about bats in the park?

Biologists use a variety of techniques to study bats. Special nets (i.e. mist nets) can be used to catch bats at specific sites in the park. After capturing a bat, biologists can identify its species, determine the sex of the animal, evaluate its age, and examine the wings for damage from the white-nose fungus.

Biologists have other creative ways of studying these amazing animals. Bats use echolocation to navigate and catch insect prey during the night. People can't hear these bat calls, but biologists use special microphones, called acoustic detectors, to record the sounds. By analyzing the bat calls, biologists can identify which bat species are present in an area.



Acoustic detectors can be mounted to vehicles for bat surveys. The vehicles are then driven on specific routes through the park at night, recording bat calls as they go. NPS photo.

Biologists also monitor bats at birthing locations called maternity roosts—these are the places where bats raise their young. Biologists can watch a roost in the evening and count bats as they emerge. These “emergence counts” help biologists estimate how healthy a bat population is from year to year.

Since 2008, the park has been cooperating with East Stroudsburg University to study bat populations. To date, nine species of bats have been documented (see graph below). These include the federally endangered Indiana bat (*Myotis sodalis*) and the federally threatened northern long-eared bat (*Myotis*

septentrionalis). Once common, the northern long-eared bat is now rare due to white-nose syndrome. The most frequently detected bat in the park's acoustic detector surveys is the big brown bat (*Eptesicus fuscus*). This is not surprising since big brown bats have been less affected by white-nose syndrome than other hibernating bat species.

It is important to note that the park supports some large colonies of little brown bats (*Myotis lucifugus*)—potentially some of the largest colonies in Pennsylvania. These groups of bats spend summer days living in various man-made structures in the park. Park biologists monitor these colonies closely, using emergence counts to document the number of bats each year.

What is the park doing to protect bats?

Biologists continue to learn about bats and are working to conserve bat habitat in the park. For example, in places where roosting habitat isn't adequate, roosting structures (“bat boxes”) are being installed. Park staff are also working with private landowners to identify important colonies of bats and to find ways to protect those colonies. Bat research efforts are ongoing.

White-nose syndrome is an extraordinarily dangerous threat to bats—sadly, some species may ultimately disappear from the region. To learn more, visit www.nps.gov/subjects/bats/ or www.whitenosesyndrome.org.



To help protect one of the large little brown bat colonies in the park, the park partnered with East Stroudsburg University, the Pennsylvania Game Commission, and Delaware Water Gap to install these bat boxes. The boxes provide a safe environment where bats can rest during the day. NPS photo.

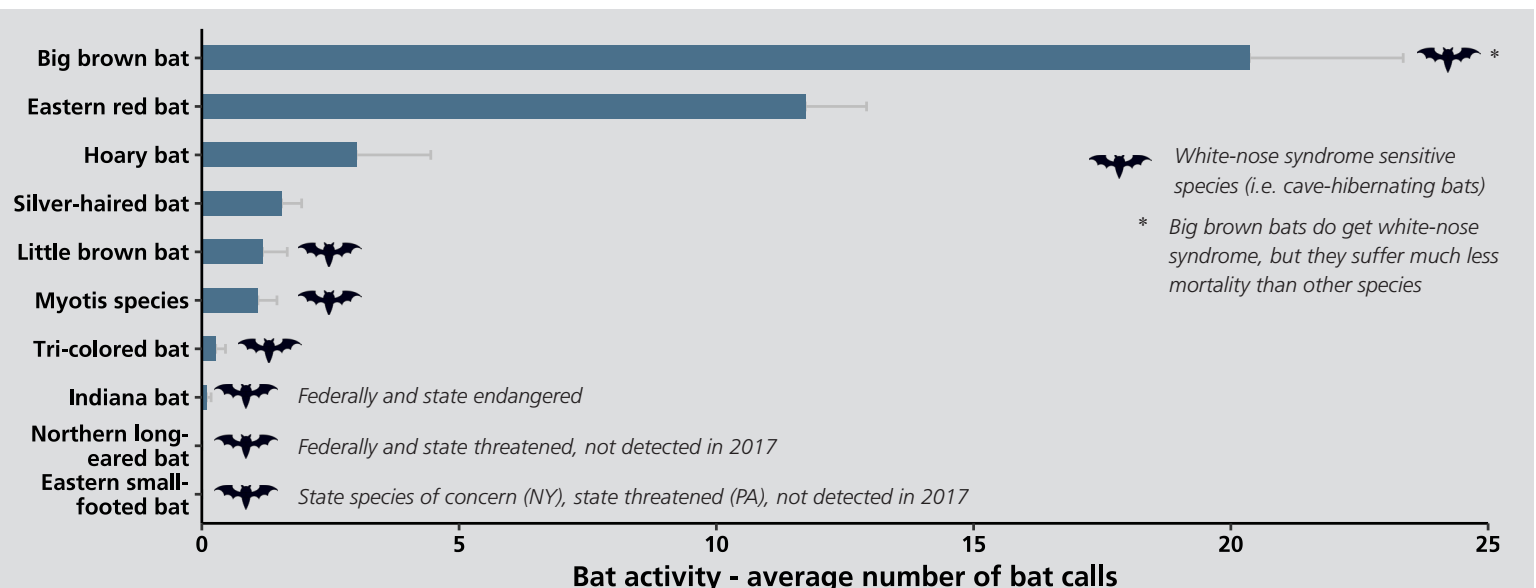


Figure 1. Average activity levels of bat species per driven transect (i.e. driving route) as recorded by acoustic detectors, 2017. Error bars represent +1 SEM. “Myotis species” includes bats of the genus *Myotis* that could not be identified to the species level.