

Marsh-Billings-Rockefeller National Historical Park

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



Bat Population Monitoring and White-nose Syndrome



Why is Marsh-Billings-Rockefeller National Historical Park interested in bat populations?

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

How do bats contribute to ecosystems?

Due to their massive appetites, bats are a valued component of biodiversity. Bats can eat more than half their body weight every night—that's hundreds to thousands of bugs! 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 do bats need?

During the summer, bats use a variety of forests, fields, and wetland habitat for foraging. Live and dead trees, as well as buildings, are utilized by many species for roosting and raising their young. Bats that hibernate need secure caves, mines, buildings, or rock outcrops during winter seasons.

What's white-nose syndrome?

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 get the disease?

Many species of bats spend the winter hibernating in caves, mines, buildings, or rock outcrops. Bats that hibernate in caves and mines are most likely to get the disease. Other bat species migrate south to warmer climates for the winter. These bats, in general, are not susceptible to white-nose syndrome.

Highlights

- Since 2001, eight species of bats have been observed in the park. It is unclear if all of these species are currently found there.
- White-nose syndrome has certainly reduced bat populations in Marsh-Billings-Rockefeller and may have resulted in the loss of several species.
- Activity of bats in the genus *Myotis* has declined dramatically in the park. Bats in this genus are sensitive to white-nose syndrome.

How are bats infected? What happens?

Once the fungus is introduced, it can persist in the cold, humid environments often preferred by hibernating bats. When bats return to these environments, they can be infected. The fungus can also spread from bat to bat when they touch, and 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.

Ongoing studies suggest that the fungus irritates and damages the skin of an infected bat. The infection causes the bat to wake up more frequently during winter hibernation. Each time they wake up, bats use more of their limited energy reserves needed to last the winter. If they wake up too frequently, they can die of starvation before the return of spring and their insect prey.



After a bat is captured, biologists can check the wings for damage from white-nose syndrome. See page 2 to learn methods that biologists use to study bats. 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. Captured bats can reveal important information about bats. Biologists can learn when females give birth to their pups (bat babies), the locations of roost sites, and when and where bats are most vulnerable to disturbance. Biologists also can assess bat health and learn if the bat is infected with the fungus.

Biologists have other creative ways of studying these unique animals. Bats use echolocation (i.e. sonar) to navigate and catch insect prey during the dark of 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 specific bat species are present in an area during certain times of the year.



An acoustic detector attached to a tree. NPS photo.

In 2001 and 2010, acoustic detectors were used to measure bat activity levels in the park. In all, eight species of bats were identified. Many of these bats were of the genus *Myotis*—a group of bats that are generally sensitive to white nose syndrome. These include the federally threatened and state endangered northern

long-eared bat (*Myotis septentrionalis*), the state endangered little brown bat (*Myotis lucifugus*), and the state endangered eastern small-footed bat (*Myotis leibii*). Biologists may have recorded a ninth species in 2010—the federally endangered Indiana bat (*Myotis sodalis*)—but they were not certain about the identification. *Myotis* species activity declined dramatically in the park following the introduction of white-nose syndrome.



A northern long-eared bat showing symptoms of white-nose syndrome. Photo courtesy of Steve Taylor/University of Illinois.

More recent monitoring in 2017 only detected six of the eight species documented in 2010. In 2017, no northern long-eared bats or eastern small-footed bats were observed. It is possible that these species are still present in the park—they may just be too rare to find.

What is the park doing to protect bats?

The data being collected on bats helps park managers conserve bats and their habitat. Protecting important areas where bats raise their young or hibernate for the winter and minimizing the loss of mature forests will help reduce the impacts of the disease. White-nose syndrome is an extraordinarily dangerous threat to bat populations—sadly, some species may ultimately disappear from the Northeast region. To learn more, visit www.nps.gov/subjects/bats or www.whitenosesyndrome.org.

Bat species documented in Marsh-Billings-Rockefeller National Historical Park

- *Myotis* bats (genus *Myotis*)
 - Little brown bat (state endangered)
 - Northern long-eared bat (federally threatened, state endangered)
 - Eastern small-footed bat (state threatened)
- Tri-colored bat (state endangered)
- Big brown bat
- Silver-haired bat
- Hoary bat
- Eastern red bat

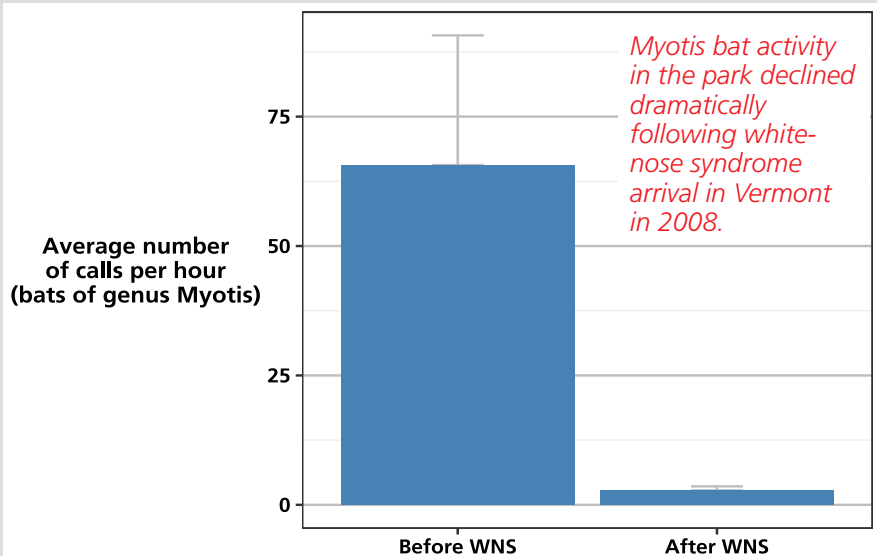


Figure 1. Average number of calls per hour of *Myotis* bats in the park before and after white-nose syndrome's (WNS) arrival in Vermont (2008). The bat genus *Myotis* includes a number of species, many of which are very sensitive to white-nose syndrome. Data are from 2001 (3 sites) vs. 2010 (5 sites). Error bars represent +1 SEM.