



Bat Population Monitoring and White-nose Syndrome



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Why is Acadia National 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 in part 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'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. The disease has dramatically reduced bat populations in the park and across the Northeast.

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 underground areas 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.

Most bats in Acadia don't migrate. Instead, Acadia's bats appear to hibernate locally for the winter. Research indicates that most of these bats use non-traditional hibernation areas like rock outcrops or rocky talus slopes. Some hibernate in buildings or other human structures. The specific locations where bats hibernate are called "hibernacula."

Highlights

- Most bats in the park are hibernating bats that are sensitive to white-nose syndrome.
- The disease has dramatically reduced bat populations and continues to infect bats.
- Little brown bats and northern long-eared bats, once very common, are now rare.
- Much remains to be learned about white-nose syndrome, bat biology, and bat habitat use in Acadia.

How are bats infected? What happens?

Once the fungus causing white-nose syndrome is introduced, it can persist in the cold, humid environments often preferred by hibernating bats. The fungus can spread from bat to bat when they touch or from contact with contaminated hibernacula surfaces (i.e., walls, ceilings). Bats that hibernate in large groups are most susceptible. Humans don't get the disease but can spread it to new areas on contaminated clothing or equipment.

Ongoing studies suggest that the fungus irritates and damages the bats' skin. This causes them to wake up more frequently during hibernation. When bats wake up, they burn precious fat reserves to stay warm. If they wake up too frequently, they can die of malnutrition or dehydration before spring arrives.



After capturing a bat, biologists can examine the wing for damage from white-nose syndrome. See page 2 to learn what methods biologists use to study bats. NPS photo.

How are park biologists studying bats? What have they learned?

Biologists use a variety of techniques to study bats. Since 2008, special “mist nets” have been used to catch bats at specific sites in the park. By recording the number of bats caught each year, biologists can calculate an index of bat abundance. This index shows an 86% decline in bat populations since the arrival of white-nose syndrome in the park (see graph below).

Captured bats can reveal important information about local populations. Park biologists can learn when females give birth to their pups (bat babies), the locations of roost sites and movements of mothers and pups, and when and where these mother bats and pups are most vulnerable to disturbance. Biologists also can assess bat health and learn if the bat is infected with the fungus.



Using tiny radio-tracking devices, biologists can track bats to important habitats. This work has identified critical roosting areas for bats like this rock outcrop on Dorr Mountain. NPS photo.

After capturing a bat, a tiny radio-tracking device can be temporarily attached to the animal. Biologists can then follow bats to important habitats. Once identified, these areas can be protected from park or visitor activities. For example, park biologists have documented different female bats using the same rock features and spots on buildings as maternity roosts over several years. Limiting disturbance to these areas can help protect bat populations.

Biologists have other creative ways of studying these unique animals. Bats use echolocation to navigate and catch insect prey during the dark of night. People can't hear these bat calls, so scientists developed acoustic call detectors to record the sounds. Special software is then used to analyze the recorded calls, which allow biologists to identify the bat species that made each call, the time of the call, and interpret the bat's activity (i.e., feeding or navigating) when the call was made.

In all, eight species of bats have been documented in Acadia. These include the federally threatened northern long-eared bat (*Myotis septentrionalis*), the state endangered little brown bat (*Myotis lucifugus*), and the state threatened eastern small-footed bat (*Myotis leibii*). Since 2012, little brown bats and northern long-eared bats are rarely observed.



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

What is the park doing to protect bats?

The data from these efforts provides information to park managers on how to conserve bats and their habitats. Protecting important habitats where bats raise their young or where they hibernate for the winter will help bats while scientists study how to manage the disease. Nevertheless, much remains to be learned about bats, especially as habitats and environmental conditions continue to change.

White-nose syndrome is an extraordinarily dangerous threat to bat populations—sadly, some species may disappear from the park and perhaps across New England. To learn more, visit www.nps.gov/subjects/bats or www.whitenosesyndrome.org.

