



Bat Population Monitoring and White-nose Syndrome



J. Yates



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Why is New River Gorge National River interested in bat populations?

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 fungus that appears on the faces and wings of infected bats. The disease was first discovered in a New York cave in 2006 and is believed to have originated in Europe. Since 2006, the fungus has spread across the U.S. In West Virginia, some bat populations have declined by more than 96% because of the disease.

Which bat species get 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 most likely to get the disease. Other bat species migrate south to warmer climates in the winter. These bats, in general, are not susceptible to the fungus.

Once introduced, the white-nose fungus can persist in the cold, humid environment of caves and mines, infecting bats when they return to hibernate. The fungus can also spread from bat to bat when they touch. Humans don't get the disease, but people can spread it from cave to cave on contaminated clothing or equipment.

When bats contract white-nose syndrome, the fungus damages their skin. This causes them to wake up more frequently during winter hibernation. When they wake up, they use precious energy to stay warm. If they wake up too frequently, they can die of starvation or dehydration before spring arrives.

Highlights

- Ten species of bats have been documented in New River Gorge, including three federally threatened or endangered species.
- White-nose syndrome has dramatically reduced the populations of some bat species.
- The park helps conserve bats by surveying and protecting critical tree habitats. Gating of mine entrances also protects bats from people and protects people from mines.

How do bats contribute to ecosystems?

Generally active at night, bats are major predators of insects and an important 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 are important for bats?

Many species of bats use trees for summer roosting habitat. Hollow trees and trees with flaking bark (i.e. shagbark hickory) are often utilized as a safe place for roosting or raising young. 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.



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

Biologists use a variety of techniques to study bats. Special traps (e.g. harp traps) can be used to catch bats at specific sites in the park, such as mine entrances. Biologists can then identify the species and number of bats that are living in a mine. Trapping of bats in the park both before and after white-nose syndrome's arrival in West Virginia shows a dramatic decline in some species due to the disease (see figure below, right).

Biologists have other creative ways of studying these unique 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.

In all, ten species of bats have been documented in the park. These include the federally endangered Indiana bat (*Myotis sodalis*), the federally endangered Virginia big-eared bat (*Corynorhinus townsendii virginianus*), the federally threatened northern long-eared bat (*Myotis septentrionalis*), and the

eastern small-footed bat (*Myotis leibii*) which is a West Virginia state species of concern (S1).

What is the park doing to protect bats?

New River Gorge National River works to conserve important bat habitats. During summer seasons, many species of bats live under loose tree bark or in hollow trees. Bats also use these trees as birthing areas for young. In fact, some bats may return to the same tree to roost year after year! In order to identify important tree habitats, biologists survey trees for bats prior to any park management activity that might disturb the area. These surveys help minimize the impact of park activities on bats.

Limiting disturbance at important mines is critical too, so when necessary, the park installs metal gates across mine entrances. To date, 30 mines have been gated. These gates allow bats, but not people, to move in and out of the mine. Despite these efforts, many bat species will continue to struggle. White-nose syndrome is an extraordinarily dangerous threat to bats—sadly, some species may ultimately disappear from the region.

To learn more, visit www.whitenosesyndrome.org or www.nps.gov/neri/learn/nature/bats.htm.



Acoustic detectors, like this one, record bat calls over a period of weeks or months. Biologists then use special computer programs to analyze the calls. Since different species use unique calls, biologists can identify which species are present based on sounds alone. NPS photo.



Bat gates are installed by the park across some mine entrances. These gates not only protect bats from people, they also to protect people from dangerous mine environments. NPS photo.

Bat species in New River Gorge National River

Hibernating bats

- Big brown bat (*Eptesicus fuscus*)*
- Eastern small-footed (*Myotis leibii*)*
- Indiana bat (*Myotis sodalis*)*
- Little Brown bat (*Myotis lucifugus*)*
- Northern long-eared bat (*Myotis septentrionalis*)*
- Tri-colored bat (*Perimyotis subflavus*)*
- Virginia big-eared bat (*Corynorhinus townsendii*)

Migratory bats

- Eastern red bat (*Lasiurus borealis*)
- Hoary bat (*Lasiurus cinereus*)
- Silver-haired bat (*Lasionycteris noctivagans*)

* bat species known to get white-nose syndrome

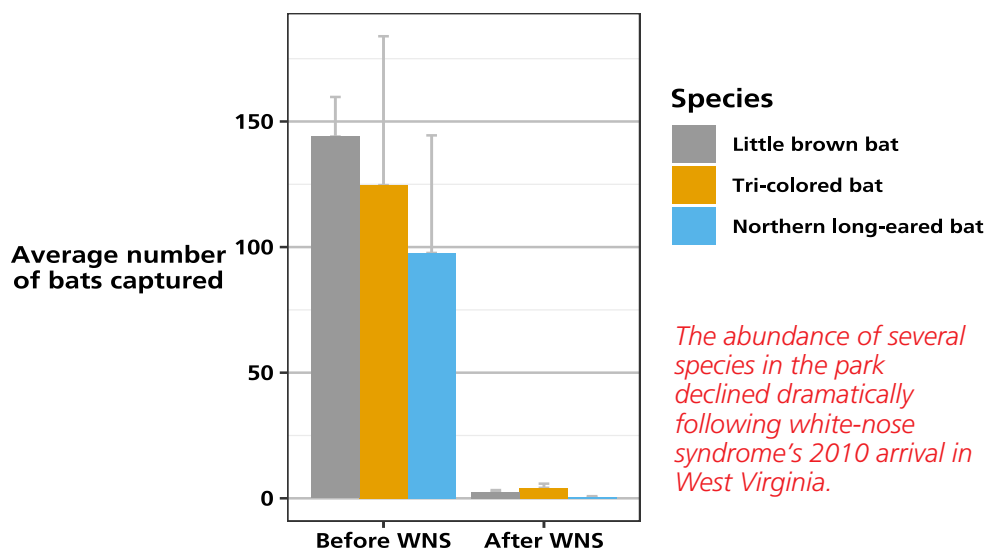


Figure 1. Average number of bats captured for three species at a undisclosed mine in New River Gorge National River both before and after white-nose syndrome (WNS) was first detected in the park. Before WNS includes data from 2005, 2007, and 2009. After WNS includes data from 2011-2016. Error bars = +1 SEM.

The abundance of several species in the park declined dramatically following white-nose syndrome's 2010 arrival in West Virginia.