



Bat Population Monitoring and White-nose Syndrome



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Why is Shenandoah National Park 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 (white-nose syndrome) is affecting bats across the United States. To better protect bats, the park is interested in 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 fungus was first discovered in a New York cave in 2006 and is believed to have originated in Europe. Since 2006, it has spread across the country. In Virginia, the disease has reduced some bat populations by more than 90%.

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. Bats that hibernate in large groups are most susceptible. 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

- Recent monitoring detected nine species of bats in the park, including two federally threatened or endangered species.
- White nose-syndrome has greatly reduced the populations of some species.
- High-elevation areas, including rocky slopes, are important habitat for some rare bats (e.g. eastern small-footed bat).

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?

During the summer, bats use a variety of forests, fields, and wetland habitats for foraging. Live and dead trees (i.e. snags) are used by several species for roosting and raising their young. Bats that hibernate also need secure caves, mines, buildings, or rock outcrops during winter seasons.



After a bat is captured, biologists can check the wings for damage from white-nose syndrome. See page 2 to learn what biologists have learned about bats in the park. 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) are used to catch bats at key locations in the park. When bats are captured, biologists can identify the species, determine the age and reproductive status of the animal, and can examine individual bats for wing damage from the disease. Sometimes tiny radio-tracking devices are attached to bats and they can be followed to important habitats.

Scientists also use acoustic detectors with special microphones to measure bat activity. Although bat activity in the park is relatively low, nine species have been documented (see graph below). White-nose sensitive species are rarely observed, but other species are believed to be widespread. The most commonly detected bat species was the big brown bat (*Eptesicus fuscus*). This is somewhat expected as big brown bats are not as sensitive to the disease as many other bats.



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.

Northern long-eared bats (*Myotis septentrionalis*) and Indiana bats (*Myotis sodalis*) are very sensitive to white-nose syndrome and are both protected by the Endangered Species Act. At Shenandoah, these species were detected at relatively low levels in 2016 and 2017. In the Northeast, northern long-eared bats have declined by more than 90% due to the disease.

In 2015, biologists captured a pregnant northern long-eared bat near Rapidan Camp. This exciting discovery indicated that these rare bats were reproducing in the area. Radio tracking

showed that hemlock snags were important habitats for these bats. Unfortunately, since 2015, no more breeding northern long-eared bats have been documented near Rapidan Camp.

Another rare bat found in Shenandoah is the eastern small-footed bat (*Myotis leibii*). During summer months, this unique species spends its days roosting in cracks and crevices on rock outcrops and on Shenandoah's high-elevation talus slopes.



In Shenandoah, a number of rare species live around rock outcrops and talus slopes. This includes the eastern small-footed bat. To the left, a small-footed bat spends the day hiding in a rock crevice on a mountain top in Shenandoah. NPS photo.

High-elevation habitats are important!

Many rare plants and animals can be found at high elevations in Shenandoah. To study how elevation influences bat activity, acoustic detectors were placed at low, mid, and high elevations in the park. Information to date suggests that bat activity for a number of species is greatest in high-elevations areas. In addition, talus slopes, which often occur at higher elevations, are important habitats for eastern small-footed bats—another example of the significance of Shenandoah's mountaintops.

What is the park doing to help bats?

The data being collected will help park managers conserve bats and their habitat. Protecting cavity trees, snags, rocky slopes, and areas where bats raise their young will help reduce the impacts of the disease. Nevertheless, white-nose syndrome remains an extraordinarily dangerous threat to bat populations—sadly, some species may ultimately disappear from the region.

To learn more about bats, visit www.nps.gov/subjects/bats or www.whitenosesyndrome.org.

