

White-Nose Syndrome

The devastating disease of hibernating bats in North America

July 2015

What is white-nose syndrome?

White-nose syndrome (WNS) is a disease affecting hibernating bats. Named for a white fungus that appears on the muzzle and other parts of bats, WNS is associated with extensive mortality of these animals in eastern and mid-western North America. First documented in New York in the winter of 2006-2007, WNS has spread rapidly across the eastern and midwestern United States and eastern Canada, and evidence of the fungus that causes WNS has been detected as far south as Mississippi.

Bats with WNS act strangely during cold winter months, including flying outside during the day and clustering near the entrances of caves and other hibernation areas. Bats have been found sick and dying in unprecedented

numbers in and around caves and mines. WNS is estimated to have killed more than 5.5 million bats in the Northeast and Canada. In some areas, 90 to 100 percent of bats have died.

Many non-governmental organizations, universities and state and federal agencies are investigating the cause of the bat deaths. A newly discovered fungus, *Pseudogymnoascus destructans*, has been demonstrated to cause WNS. Scientists are investigating the dynamics of fungal infection and transmission and are developing ways to control it.

What bats are being affected?

More than half of the 47 bat species living in the United States hibernate to survive the winter. Seven cave-hibernating bats, including two endangered species and one threatened species, have been confirmed with WNS. The fungus has been detected on an additional five species, including one endangered species, with no confirmation of disease.

Bat species confirmed with WNS:

- Big brown bat (*Eptesicus fuscus*)
- Eastern small-footed bat (*Myotis leibii*)
- Gray bat (*Myotis grisescens*) **endangered**
- Indiana bat (*Myotis sodalis*) **endangered**
- Little brown bat (*Myotis lucifugus*)
- Northern long-eared bat (*Myotis septentrionalis*) **threatened**
- Tri-colored bat (*Perimyotis subflavus*)

Bat species on which *Pseudogymnoascus destructans* has



Ryan von Linder/NYDEC

Eastern small-footed bat with white fungus on nose, arms and wings

been detected with no confirmation of disease:

- Eastern red bat (*Lasiurus borealis*)
- Southeastern bat (*Myotis austroriparius*)
- Silver-haired bat (*Lasionycteris noctivagans*)
- Rafinesque's big-eared bat (*Corynorhinus rafinesquii*)
- Virginia big-eared bat (*Corynorhinus townsendii virginianus*) **endangered**

Federally listed species found in the affected area that have not yet been confirmed with WNS or fungal infection:

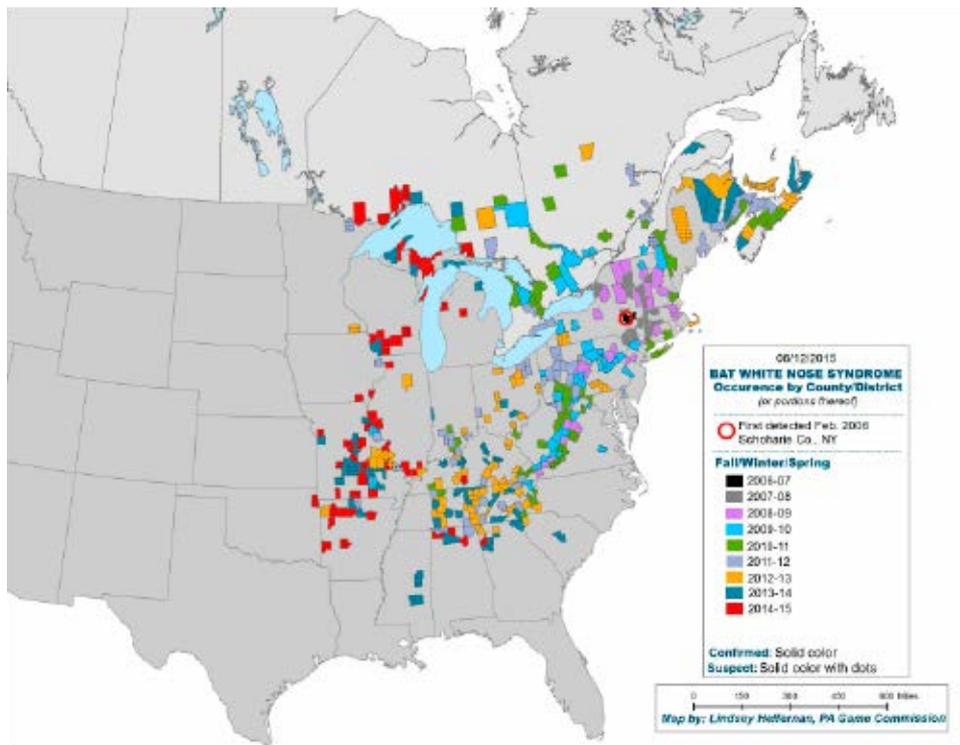
- Ozark big-eared bat (*Corynorhinus townsendii ingens*) **endangered**

In Europe, 13 bat species have been confirmed with WNS or the fungus.



Jeremy Coleman/USFWS

Vermont Fish and Wildlife Department biologists remove the gate to conduct a winter survey at Plymouth Cave



- researchers have discovered new unrelated bat disease agents.
- Researchers have made significant strides in understanding disease response of hibernating bats and factors that influence bat vulnerability to WNS.
 - Studies of natural bacteria and skin chemistry of bats have led to new lines of research for treatments using biological or non-chemical agents for bats at risk of WNS infection. We are developing a process for field testing the most promising of these treatments.
 - Other treatments under investigation include changing temperature and humidity in hibernation areas to slow fungal growth or improve bat survival, and vaccines to boost resistance to WNS.
 - Researchers are looking into molecular and genetic tools to reduce the ability of *P. destructans* to cause disease.

Where is it now?

White-nose syndrome has continued to spread rapidly. As of July 2015, bats with WNS were confirmed in 26 states:

- Alabama
- Arkansas
- Connecticut
- Delaware
- Georgia
- Illinois
- Iowa
- Indiana
- Kentucky
- Maine
- Maryland
- Massachusetts
- Michigan
- Missouri
- New Hampshire
- New Jersey
- New York
- North Carolina
- Ohio
- Pennsylvania
- South Carolina
- Tennessee
- Vermont
- Virginia
- West Virginia
- Wisconsin

and five Canadian provinces:

- New Brunswick
- Nova Scotia
- Ontario
- Prince Edward Island
- Quebec

Evidence of *Pseudogymnoascus destructans* has been detected in three additional states:

- Minnesota
- Mississippi
- Oklahoma

What is being done?

Partnerships

The U.S. Fish and Wildlife Service leads an extensive network of state and federal agencies, tribes, organizations, institutions and individuals in working cooperatively to investigate the

source, spread and cause of bat deaths associated with WNS and develop management strategies to minimize the impacts of WNS.

WNS National Plan

In 2011, the Service and a team of federal and state agencies and tribes prepared a national white-nose syndrome management plan to address the threat to hibernating bats. The plan is a framework for coordinating and managing the national investigation and response to WNS. The *National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats* outlines actions necessary for state, federal and tribal coordination, and provides an overall strategy for investigating ways to manage WNS and conserve bats.

What have we learned?

- Biologists in New York and Vermont have found up to 50 percent of marked little brown bats at a few test sites surviving from one winter to the next in recent years, giving some hope that this species might one day be able to recover. Little brown bat populations at these sites remain at less than 10 percent of their pre-WNS size, however.
- Scientists have developed new ways to detect *Pseudogymnoascus destructans* on bats and in the environment, including using UV light and molecular analyses.
- Because of WNS investigation,

Research Funding

From 2008 to 2015 the Service has allocated \$32 million to meet high priority needs for research and field support. This includes more than \$24 million in grants to other federal agencies, academic institutions, non-governmental organizations and state natural resources agencies.

For more information on recent research developments see www.WhiteNoseSyndrome.org

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