

White-Nose Syndrome

The devastating disease of hibernating bats in North America

March 2014

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 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 west as Oklahoma.

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 has killed more than 5.5 million bats in the Northeast and Canada. In some areas, 90 to 100 percent of bats have died.

Jeremy Coleman/USFWS



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

Many non-governmental organizations, universities and state and federal agencies are investigating the cause of the bat deaths. A newly discovered fungus, *Pseudogymnoascus* (formerly *Geomyces*) *destructans*, has been demonstrated to cause WNS. Scientists are investigating the dynamics of fungal infection and transmission, and searching for 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. Eleven cave-hibernating bats, including four endangered species and one species recently proposed for listing, are currently affected by WNS.

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*) **proposed for listing**
- Tricolored bat (*Perimyotis subflavus*)

Bat species on which *Pseudogymnoascus destructans* has been detected with no confirmation of disease:

- Cave bat (*Myotis velifer*)
- Southeastern bat (*Myotis austroriparius*)
- Silver-haired bat (*Lasionycteris noctivagans*)
- 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



Ryan von Linder/NYDEC

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

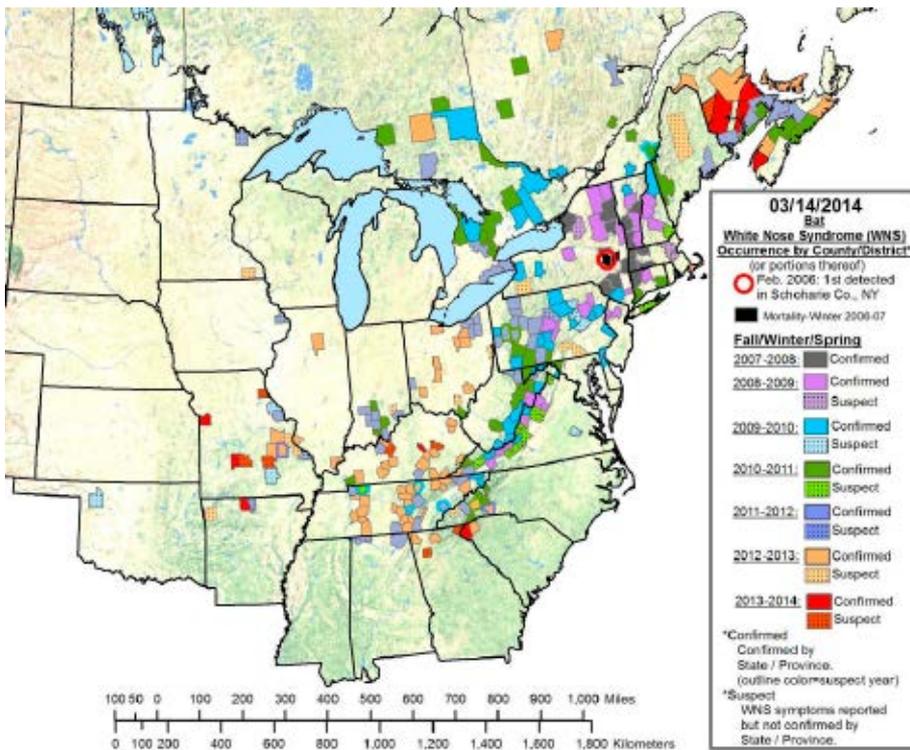
infection:

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

Where is it now?

White-nose syndrome has continued to spread rapidly. As of March 2014, bats with WNS were confirmed in 23 states and five Canadian provinces:

- | | |
|--------------------------------|------------------|
| ■ Alabama | ■ New Hampshire |
| ■ Arkansas | ■ New Jersey |
| ■ Connecticut | ■ New York |
| ■ Delaware | ■ North Carolina |
| ■ Georgia | ■ Ohio |
| ■ Illinois | ■ Pennsylvania |
| ■ Indiana | ■ South Carolina |
| ■ Kentucky | ■ Tennessee |
| ■ Maine | ■ Vermont |
| ■ Maryland | ■ Virginia |
| ■ Massachusetts | ■ West Virginia |
| ■ Missouri | |
| ■ New Brunswick, Canada | |
| ■ Nova Scotia, Canada | |
| ■ Ontario, Canada | |
| ■ Prince Edward Island, Canada | |
| ■ Quebec, Canada | |



Evidence of the fungus that causes WNS, *Pseudogymnoascus destructans*, has been detected in three additional states:

- Iowa
- Minnesota
- 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 2009 and 2010, the Service led a team of federal and state agencies and tribes in preparing 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 the actions necessary for state, federal and tribal coordination, and provides an overall strategy for investigating the cause of WNS and finding ways to manage it.

What have we learned?

- Biologists in New York and Vermont have found up to 50 percent of marked little brown bats at 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 research, 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.
- Other treatments under investigation include changing temperature and humidity in hibernation areas to slow fungus growth or improve bat survival, and vaccines to boost resistance to WNS.

- Researchers are looking into reducing the ability of *P. destructans* to cause disease at the molecular and genetic levels.

2014 Research Funding

In 2014 the Service anticipates awarding research grants totaling \$3.4 million. Nine grants were announced in March totaling \$1.4 million. Federal agency partners receiving these funds provided some of their own funding, resulting in total federal project support of \$3 million.

Projects funded by these grants will improve and expand surveillance of the disease and *Pseudogymnoascus destructans*; help to develop a standardized monitoring program for bat populations in North America; and identify and develop non-chemical control options for treatment and prevention of spread of *P. destructans*.

The Service announced a second funding opportunity in February, for up to \$2 million, to support research aimed at improving our understanding of bat populations that remain in the wake of WNS and how the fungus infects bats and causes disease.

2014 funding builds on approximately \$14 million that the Service has dedicated to WNS research and state capacity between 2008 and 2013.

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

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