



Oklahoma Department of Wildlife Conservation's Recommendations and Suggested Best Management Practices to Address White-nose Syndrome in Oklahoma

The Oklahoma Department of Wildlife Conservation is aware of the serious threat posed by White-nose Syndrome (WNS), an infectious disease in bats, to bat populations in Oklahoma. WNS threatens Oklahoma's economy and ecology because of the natural role of bats in consuming night-flying insects. Bats are the front-line defense against many agricultural and forest health pests (such as moths and beetles) and public health pests (such as mosquitoes), and provide general control of insect populations. This document formalizes the Wildlife Department's Best Management Practices (BMP) for WNS, especially on Wildlife Department owned or managed lands. In a collaborative effort to address this threat to bat populations in Oklahoma, a copy of these recommendations has been provided to other public and private cave owners (i.e., OK Recreation and Tourism Department, University of Central Oklahoma, Oklahoma Chapter of The Nature Conservancy and other willing landowners). As bat needs and status trends for Oklahoma bats become more defined through research and surveys, additional suggestions may be provided.

Introduction of White-nose Syndrome and Oklahoma's Monitoring Efforts

White-nose Syndrome (WNS) is a disease caused by the non-native fungus *Pseudogymnoascus destructans* (*Pd*). WNS is named for the accumulation of white fungal material around the nose, ears and wings of infected individuals and is responsible for the deaths of at least 5.7 million hibernating bats in the eastern United States and five Canadian provinces. Bats affected with WNS can generally be recognized by abnormal winter behavior (e.g. flying outside when temperatures are below freezing) and a visible accumulation of white fungus on the nasal area. Hibernating bats will arouse more frequently than energy reserves allow, ultimately causing bats to emerge from roosts to forage for food and often starve. Bats affected by WNS will also cluster at the entrances of hibernacula. Although infected bats usually exhibit visible physical signs of the disease, many bats that lack visible fungal growth have tested positive for *Pd*. In addition, bats that carry the spores on their bodies may not become infected but can distribute the spores to other bat roosts. Confirmation of the presence of *Pd* or WNS requires histological (tissue samples) and/or genetic verification through the National Wildlife Health Center, the Southeast Cooperative Wildlife Disease Study, or the Canadian Cooperative Wildlife Health Centre.

Pd is acknowledged to be the cause of WNS, although the triggers for infection such as hibernacula microclimate, body condition prior to or during hibernation (e.g. malnutrition, dehydration, or suppressed immune system during hibernation), or other environmental vector-enhancing issues, are not yet widely understood. *Pd* grows optimally at temperatures ranging from 40 - 55 degrees Fahrenheit and at humidity levels of 90 percent or greater. The disease is primarily transmitted bat-to-bat, but accidental spread of the disease by humans appears possible. WNS has not been shown to affect any species other than bats. *Pd* apparently is native to Europe and arrived in North America accidentally. European bats appear to have already developed resistance to this fungus and available evidence suggests that with careful protection, small numbers of survivors in America will also be able to slowly rebuild immune populations.

To date, 12 bat species, including two endangered species and one threatened species, have been confirmed with WNS in North America. *Pd* has been found on an additional eight species and subspecies, including two endangered species, without confirmation of the disease. All but the Virginia Big-eared Bat, Long-legged Bat and Fringed Bat can be found in Oklahoma.

Confirmed: Bat species identified with diagnostic symptoms of WNS:

- Big brown bat (*Eptesicus fuscus*)
- Eastern small-footed bat (*Myotis leibii*)
- Long-legged bat (*Myotis volans*)
- Gray bat (*Myotis grisescens*) *
- Cave myotis (*Myotis velifer*)
- Fringed bat (*Myotis thysanodes*)
- Indiana bat (*Myotis sodalis*) *
- Yuma bat (*Myotis yumanensis*)
- Little brown bat (*Myotis lucifugus*)
- Tri-colored bat (*Perimyotis subflavus*)
- Western long-eared bat (*Myotis evotis*)
- Northern long-eared bat (*Myotis septentrionalis*) **

* Federally endangered

** Federally threatened

Pd Positive: Bat species and subspecies on which *Pseudogymnoascus destructans* has been detected, but no diagnostic sign of WNS has been documented:

- Eastern red bat (*Lasiurus borealis*)
- Silver-haired bat (*Lasionycteris noctivagans*)
- Rafinesque's big-eared bat (*Corynorhinus rafinesquii*)
- Mexican free-tailed bat (*Tadarida brasiliensis*)
- Western small-footed bat (*Myotis ciliolabrum*)
- Virginia big-eared Bat (*Corynorhinus townsendii virginianus*) *
- Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)
- Ozark big-eared bat (*Corynorhinus townsendii ingens*)*

* Federally endangered

Oklahoma's geological diversity includes limestone caves (eastern Oklahoma) and gypsum caves (western Oklahoma) with a separation of about 250 miles between these two cave formations. Potentially bridging these two geologic areas is the Arbuckle Mountains along south central Oklahoma with its network of limestone caves. Oklahoma's bat diversity includes 24 species and subspecies, 15 species of which are known to hibernate in Oklahoma.

As of Feb. 2021, 39 states and seven Canadian provinces are confirmed for WNS and/or the fungus that causes WNS, including Oklahoma. To date, *Pd* has been confirmed in 10 counties and WNS has been confirmed in Delaware and Adair counties and is suspect in LeFlore and Woods counties.

Through the Oklahoma Department of Wildlife Conservation, the Oklahoma Bat Coordinating Team (OBCT) was established to facilitate information flow to partners, scientific cooperators, interested parties, stakeholders and user groups on bat and cave management, bat research and bat diseases, particularly WNS, in Oklahoma. The coordinating team members, listed below, include those entities that have direct bat and cave management responsibilities in Oklahoma:

• Central Oklahoma Grotto	• Rogers State University
• Tulsa Regional Oklahoma Grotto	• Oklahoma Department of Wildlife Conservation
• Arbuckle Karst Institute (East Central University)	• Oklahoma Tourism and Recreation Department (Alabaster Caverns State Park)

<ul style="list-style-type: none"> • The Oklahoma Chapter of The Nature Conservancy 	<ul style="list-style-type: none"> • United States Forestry Service (Ouachita NF)
<ul style="list-style-type: none"> • United States Fish and Wildlife Service (Ecological Services and Ozark Plateau National Wildlife Refuge) 	<ul style="list-style-type: none"> • University of Central Oklahoma (Selman Cave System)

The OBCT also partners with two regional organizations, the Western Bat Working and the Southeastern Bat Diversity Network.

Winter surveillance and monitoring efforts on select caves for WNS in Oklahoma began in 2010. Monitoring activities include swabbing bats to collect DNA evidence of the fungus, looking for the physical presence of the fungus, installing data loggers to collect humidity and temperature readings within hibernation sites, collecting tissue and blood samples from hibernating bats, and collecting soil samples. At times, bat specimens are collected for sample submission to certified laboratories when surveying bat hibernacula or for evaluating unusual bat morbidity or mortality during the winter. Winter surveillance efforts are conducted through the efforts of Rogers State University, University of Central Oklahoma, Central Oklahoma Grotto, Tulsa Regional Oklahoma Grotto, U.S. Fish and Wildlife, United States Forestry Service, Alabaster Caverns State Park, East Central University, Karst Research Institute, Kansas Department of Wildlife, Parks and Tourism, the University of Science & Arts of Oklahoma, the Sam Noble Museum of Natural History, and the Oklahoma Department of Wildlife Conservation.

Goal

The goal of the following recommendations is to protect the diversity of Oklahoma's bats and other cave wildlife and to minimize the spread of WNS by humans.

Objectives

1. Avoid winter disturbance at bat hibernaculum
2. Increase year-round protection for all roosts (maternity, hibernacula)
3. Promote minimally invasive research to better understand bat needs and status trends
4. Educate the public to understand the values of conserving bats

Avoid Winter Disturbance at Bat Hibernaculum

- Researchers interested in studying Oklahoma's wildlife must apply for a Scientific Collector's Permit from the Oklahoma Department of Wildlife Conservation. Biologists with the Wildlife Department's Wildlife Diversity Program review these applications and issue permits as well as provide recommendations and/or restrictions for lessening the impact to certain wildlife populations. Those permit applications that propose entering bat hibernacula during the winter must show evidence that the cave owner and/or manager has been contacted and that the applicant has received permission to access the cave. If the research or survey spans multiple years, the Wildlife Department may restrict the number of times the hibernaculum can be entered. If the Scientific Collector's Permit is issued, researchers will be required to use equipment and supplies that have not been in any WNS confirmed or *Pd* positive counties in the nation. Researchers will be required to follow the [decontamination protocol](#) set forth by the National WNS Committee.
- Caves that are located on Wildlife Department owned or managed lands are closed to the public and signs will be posted about the threat of WNS. Requests to access these caves for

research during the winter will be carefully considered by the Wildlife Department including the respective Wildlife Management Area (WMA) biologist and biologists with the Wildlife Diversity Program and may be denied based on measuring the value of the possible information gained against the impacts to the hibernating bats. If approved for access, researchers will be required to use equipment and supplies that have not been in any WNS confirmed or *Pd* positive counties in the nation. Researchers will be required to follow the [decontamination protocol](#) set forth by the National WNS Committee.

- The Wildlife Department strongly recommends that other cave managers and/or owners (state agencies, universities, and conservation organizations) minimize access to bat hibernacula during the winter. This recommendation includes the consideration to reduce WNS monitoring to every other year.

Increase Year-round Protection for all Roosts (maternity, hibernacula)

- As stated above, researchers must apply for a Scientific Collector's Permit from the Oklahoma Department of Wildlife Conservation. Biologists with the Wildlife Department's Wildlife Diversity Program review these applications and issue permits as well as provide recommendations and/or restrictions for lessening the impact to certain wildlife populations. Those permit applications that propose entering bat roosts (hibernacula, maternity) must show evidence that the cave owner and/or manager has been contacted and that the applicant has received permission to access the cave. If the research or survey spans multiple years, the Wildlife Department may restrict the number of times the roost can be entered. If the Scientific Collector's Permit is issued, researchers will be required to use equipment and supplies that have not been in any WNS confirmed or *Pd* positive counties in the nation. Researchers will be required to follow the [decontamination protocol](#) set forth by the National WNS Committee. No Scientific Collector's Permits, where required will be issued by the Wildlife Department for experimental treatments of bats, caves, or mines without careful review by multiple biologists to ensure potential detrimental outcomes are avoided.
- No actions that are detrimental to the ecology of a cave or to the state's wildlife will be approved in or around caves that are located on Wildlife Department-managed lands. Requests for cave access for research will be carefully considered by the respective WMA biologist and Wildlife Diversity Program and may be denied. Experimental treatments of bats or caves will not be approved on Wildlife Department managed lands.
- The Wildlife Department will continue to research other possible methods to protect caves located on Wildlife Department-managed lands including installing bat-friendly gates at cave entrances.
- The Wildlife Department recommends other cave managers or owners (state agencies, universities, conservation organizations) minimize access to bat roosts (maternity, hibernacula). If access is approved, the Wildlife Department recommends researchers be required to use equipment and supplies that have not been in any WNS confirmed or *Pd* detected counties in the nation and that researchers are required to follow the [decontamination protocol](#) set forth by the National WNS Committee.
- The majority of the caves in Oklahoma are privately owned. To increase year-round protection of these caves (hibernacula, maternity or both), private lands biologists with the Wildlife Department will conduct outreach to inform landowners with caves about how the fungus is spread and ways they can protect important roost locations.

Promote minimally invasive research to better understand bat needs and status trends

- The Wildlife Department has initiated an acoustic bat survey on some of the agency's managed Wildlife Management Areas. Acoustic monitoring is non-invasive and allows for monitoring multiple bat species simultaneously at large spatial scale. Data generated through the acoustic surveys will be provided to the North American Bat Monitoring Program (NABat). Funding for this bat survey is provided through the OKC Zoo Conservation Fund.
- The Wildlife Department will continue to consider proposals submitted for minimally invasive research to better understand bat needs and status trends in Oklahoma, as well as management and or restoration efforts for bats identified as Species of Greatest Conservation Need through the State Wildlife Grant Program.

Educate the public to understand the values of conserving bats

- The Wildlife Department will continue to provide information and news updates about Oklahoma's bat diversity and the occurrence and potential spread of WNS through news releases, Facebook posts and articles in the Wildlife Diversity Program's monthly e-newsletter, "The Wild Side."
- The Wildlife Department will continue to involve members of the Oklahoma Bat Coordinating Team to facilitate information flow about Oklahoma's bat and disease surveillance efforts. This team will serve as one avenue for the Wildlife Department's public communication outreach ideas.
- The Wildlife Department will continue to promote the importance of bats through the Selman Bat Watch Program, a series of evening bat watches at a Mexican free-tailed bat maternity cave owned by the Wildlife Department.
- The Wildlife Department will continue to participate in watchable wildlife events that showcase Oklahoma bats, such as the annual Bat Wing-Ding at Alabaster Caverns State Park.

Contact Information

Please contact Melynda Hickman at melynda.hickman@odwc.ok.gov to:

- Report any large-scale bat mortalities, especially those that occur during the winter months or if you find five or more dead bats at a location between the months of November through May or notice bats exhibiting unusual behavior such as flying outside during freezing (below 32°F) weather.
- Visit with a wildlife biologist about protecting a cave used by bats (winter, summer or year-round) or other areas used by bats (trees, human structures, bridges, etc.).

Where bats are a threat to human health, contact a [Nuisance Wildlife Control Operators](#).