



Decision Memo

Southern Region Cave and Abandoned Underground Mine Closure

USDA Forest Service

**National Forest System Lands in the following states:
Kentucky, Virginia, Tennessee, North Carolina, South Carolina,
Mississippi, Alabama, Georgia, Florida, Louisiana, Texas,
Arkansas, Oklahoma**

Background

In 2014, the Southern Region implemented a closure order that prohibited entry into any cave or abandoned underground mine. The closure was applicable to all National Forests that are administered by the Southern Region, excluding El Yunque National Forest in Puerto Rico and the Blanchard Springs Caverns on the Ozark St. Francis National Forest. Blanchard Springs Caverns remained open because human entry was controllable through the visitor's center and decontamination practices were in place. Consistent with the Federal Cave Resources Protection Act (16 U.S.C. § 4304(a)), the specific location of the cave and mines was not disclosed for the protection of the caves, mines and associated wildlife species.

The purpose of the five-year closure was to minimize the human transmission potential of *Pseudogymnoascus destructans*, the fungal agent causing white-nose syndrome (WNS), and for the protection of associated bat species. The fungus grows best in the cold and wet conditions common to caves and abandoned underground mines.

The primary transmission of the fungus is bat to bat and bat to caves and abandoned underground mines, although human transmission from location to location on boots, shoes, and/or gear of cave visitors is possible. In New York, *Pseudogymnoascus destructans* spores were identified morphologically on new clothing and gear after being used in contaminated caves and underground mines (Joe Okoniewski, NYSDEC, presentation at 2010 WNS symposium). Viable spores of many fungal species, not specifically *Pseudogymnoascus destructans*, have been retrieved from shoes of visitors after tours of Mammoth Cave National Park (Hazel Barton, University of Akron, personal communication). *Pseudogymnoascus destructans* was detected by genetic screening and fungal culture on equipment used to capture bats and gear used in contaminated sites (Anne Ballmann, USGS – National Wildlife Health Center, presentation at 2013 WNS symposium). Most recently, Roossinck et al. (2018) stated the longest spread of the fungus (almost 1,300 miles) to Washington State has roots in isolates from Kentucky (Marilyn Roossinck et al., Pennsylvania State University, presentation at 2018 WNS symposium). This is well beyond the dispersal distance of any bat in Kentucky and most likely a human-caused dispersal.

By 2014 WNS had killed more than six million bats across eastern North America and it was spreading to other areas. Currently WNS has been confirmed in 12 species of bats with another 8 species carrying *Pseudogymnoascus destructans* spores. WNS is known from 36 states and 7 Canadian provinces. (<https://www.whitenosesyndrome.org/>). As a result, white-nose syndrome was having a negative impact on bat populations and hibernating bats.

Purpose and Need

There is a need to continue prohibiting public access to caves and abandoned mines throughout the Forest Service Southern Region to reduce human transmission of *Pseudogymnoascus destructans*, the fungal agent that causes white-nose syndrome in bats, as well as minimize the disturbance of bats in caves and abandoned mines. Viable spores of *Pseudogymnoascus destructans* can spread any time of year. Cave and abandoned mine closures need to be in place year-round to reduce adverse impacts to cave dwelling bat species. This closure order is short-term (six (6) months) in nature until a new environmental analysis and decision notice are completed to support a permanent (until rescinded) closure order

Currently there are five bat species or subspecies listed under the Endangered Species Act (ESA) that occur in the Southern Region that use caves or abandoned mines for hibernation or maternity sites. Two more bat species, tricolored bat (*Perimyotis subflavus*) and little brown bat (*Myotis lucifugus*), are currently under review by the US Fish and Wildlife Service for listing under the ESA. Southeastern myotis (*Myotis austroriparius*) is not federally listed but is a species of conservation concern (SCC) on the Francis Marion Sumter National Forest and will likely become an SCC on every forest within its range.

Species of conservation concern and common bat species may benefit from the closure; for example, there are three large cisterns on old Camp Claiborne, Calcasieu Ranger District, Kisatchie National Forest that housed 40,000 southeastern myotis in 2005. The population dropped to less than 25,000 in 2020 and it is believed the decline was likely caused by human disturbance of these maternity colonies. Although, not identified as an SCC in the current Kisatchie National Forest Plan, the Southeastern myotis is a priority species in the Louisiana State Wildlife Action Plan.

Although there have been promising developments in bio-control of *Pseudogymnoascus destructans*, and the efficacy and potential implementation of field testing of these bio-control techniques should be allowed as necessary, such controls have not demonstrated that cave and abandoned mine closures on NFS lands throughout the Southern Region should be lifted. Therefore, a closure order should remain in place accordingly.

The closure needs to apply to winter months. Most bats hibernate during winter and they have limited fat supplies to make it to spring. Any arousal burns up fat reserves. Bats with white-nose syndrome exhibit uncharacteristic behavior during cold winter months, which includes flying outside in the day and clustering near hibernacula entrances. White-nose syndrome affects hibernating bats by depleting fat reserves and causes some bats to exit caves during winter in

order to try and feed. The insects bats feed on are not available due to winter conditions and ultimately those bats die.

Under normal hibernation times, bats are already stressed. Thus, it is essential they find food and shelter immediately upon leaving the cave in spring. It is important that quality foraging and roosting habitat is adequately available post hibernation.

The closure also needs to apply to summer months. Summer is also a critical period for bats because this is when the young are born and nurtured. Three federally endangered bat species or subspecies, (Gray bat *Myotis grisescens*, Virginia big-eared bat *Corynorhinus townsendii virginianus* and Ozark big-eared bat *Corynorhinus townsendii ingens*) and one species of conservation concern (Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) use caves year-round and need to be protected. All of these species have had *Pseudogymnoascus destructans* spores detected on them. Also, viable spores of *Pseudogymnoascus destructans* can be spread at any time of year so not closing caves and mines in summer would not meet the purpose and need to minimize the human transmission potential.

The latest and best available science has been reviewed. Recent research has shown *Pseudogymnoascus destructans* can persist in caves and mines in the absence of bats. Genetic testing confirmed the presence of *Pseudogymnoascus destructans* and related species in sediment samples from caves and mines that previously held white-nose syndrome infected bats (Linder et al. 2011, Lorch et al. 2012, and Peuchmaille et al. 2011a). *Pseudogymnoascus destructans* can persist for more than two years after bats are absent (Lorch et al. 2013). Spores of *Pseudogymnoascus destructans* may remain viable and/or grow under varying conditions outside of caves and mines. The USGS - National Wildlife Health Center has determined *Pseudogymnoascus destructans* can remain viable for at least five months under laboratory conditions at room temperature (David Blehert, USGS National Wildlife Health Center, personal communication). Puechmaille et al. (2011b) determined *Pseudogymnoascus destructans* spores remained viable after being stored for up to eight months dry and/or frozen.

A bat vaccine has been developed and in the lab survival of vaccinated bats was significantly higher ($P = 0.02$) than controls (Tonie Roche et al. USGS National Wildlife Health Center, presentation 2018 WNS symposium). Polyethylene glycol has proven successful at reducing *Pseudogymnoascus destructans* spores loads in cave sediment (Jake Perryman et al., Lock Haven University, presentation 2014 WNS symposium). In an ongoing field trial, Bat Conservation International in collaboration with the U.S. Forest Service, Lock Haven University, Northern Arizona University and the University of Winnipeg, are evaluating the efficacy of using two non-toxic agents — ultraviolet light and polyethylene glycol — to treat mine walls, and reduce the prevalence of the fungus that causes WNS on roosting surfaces in bat hibernacula (Winifred Frick, Chief Scientist at Bat Conservation International, personal communication).

Volatile organic compounds are being used to treat tricolored bats (*Perimyotis subflavus*) in an abandoned railroad tunnel in Georgia with promising results (Chris Cornelison et al. Kennesaw State University, presentation 2018 WNS symposium). Ultra-violet light is also being used to treat bats and cave substrate (Dan Lindner et al. USDA Forest Service, presentation 2018 WNS symposium).

Proposed Action

Implement a six (6) month closure order that:

- Prohibits human entry into any cave or abandoned underground mine (except Blanchard Springs Caverns) in National Forests that are administered by the Southern Region in the following states: Kentucky, Virginia, Tennessee, North Carolina, South Carolina, Mississippi, Alabama, Georgia, Florida, Louisiana, Texas, Arkansas, and Oklahoma.
- Persons with written authorization by a Forest Service Officer specifically authorizing an otherwise prohibited act or omission would be exempt from the closure as would any Federal, State or local officer or member of an organized rescue or firefighting force working in the performance of an official duty.

Decision

I have decided to authorize the closure, to human entry, all caves and abandoned underground mines in the Southern Region for up to six (6) months from the date of signature. I have determined that this action is necessary for the protection of the cave, mine, and/or associated bat species. Currently there are five bat species or subspecies listed under the Endangered Species Act that occur in the Southern Region that use caves or mines for hibernation or maternity sites. Two more bat species, tricolored and little brown bat *Myotis lucifugus*, will likely be listed in the next few years.

The only exceptions to this closure are 1) for caves that are posted as open with official Forest Service signs, 2) for caves with entrances completely under water, 3) for persons with written authorization by a Forest Service Officer specifically authorizing entry to aid the Forest Service in our cave resources management activities, and 4) for any Federal, State or local officer or member of an organized rescue or firefighting force working in the performance of an official duty.

Specifically, Blanchard Springs Caverns on the Ozark St. Francis National Forest in Arkansas will remain open. The Forest Service has complete control of entry through a visitor's center and all visitors will undergo decontamination. Decontamination has proven more than 99.9% effective in laboratory tests (Shelley et al. 2013) and full and proper decontamination is effective in controlling *Pseudogymnoascus destructans* in the field.

During the six (6) month closure period, the USDA Forest Service Southern Region will utilize our existing Memoranda of Understanding with Bat Conservation International, National Speleological Society, and Cave Research Foundation and their affiliate organizations to gather data to help us better manage our cave and karst resources. This may include cave mapping, white-nose syndrome surveys, bat monitoring, water quality monitoring, biological inventories, placement of data loggers, photo documentation of cave resources, and any other activity deemed mutually beneficial.

This action is categorically excluded from documentation in an environmental impact statement (EIS) or an environmental assessment (EA). The applicable category of actions is identified in agency procedures as 36 CFR 220.6(d)(1), "Orders issued pursuant to 36 CFR 251 – Prohibitions to provide short-term resource protection or to protect public health and safety". This category of

action(s) is applicable because this decision authorizes a short-term (six month) closure for the purposes of protecting bats from further exposure to WNS.

I find that there are no extraordinary circumstances that would warrant further analysis and documentation in an EA or EIS. The Southern Region has had a cave and abandoned mine closure in place for 11 years and has identified no resource conditions that could be categorized as extraordinary circumstances. I took into account resource conditions identified in agency procedures that should be considered in determining whether extraordinary circumstances might exist:

Federally listed threatened or endangered species or designated critical habitat, species proposed for Federal listing or proposed critical habitat, or Forest Service sensitive species. There are five bat species or subspecies listed under the Endangered Species Act that occur in the Southern Region that use caves or mines for hibernation or maternity sites. Two more bat species, tricolored and little brown bat will likely be listed in the next few years. On June 10, 2019 the US Fish and Wildlife Service determined no re-initiation of consultation was needed because the action is an unchanged continuation of existing policy (Krusac and Ziewitz 2019 Personal Communication June, 2019)

Flood plains, wetlands, or municipal watersheds – There will be no effect to these resources because no ground-disturbing actions are authorized in this administrative action.

Congressionally designated areas such as wilderness, wilderness study areas, or national recreation areas – There will be no effect to these resources because no ground-disturbing actions are authorized in this administrative actions.

Inventoried roadless areas or potential wilderness areas – There will be no effect to these resources because no ground-disturbing actions are authorized in this administrative action.

Research natural areas – There will be no effect to these resources because no ground-disturbing actions are authorized in this administrative action.

American Indians and Alaska Native religious or cultural sites and archaeological sites, or historic properties or areas - There will be no effect to these resources because no ground-disturbing actions are authorized in this administrative action. Therefore, the proposed action is categorically excluded from the terms and conditions of the Section 106 process of the National Historic Preservation Act as defined in 36 CFR 800.4(d)(1).

Public Involvement

This action was coordinated with each National Forest, and agencies which may be affected by the proposed action. Partners with whom the Forest Service has a national Memorandum of Understanding, including Bat Conservation International, National Speleological Society, and the Cave Research Foundation, were contacted.



Findings Required by Other Laws and Regulations

The following laws and regulations are relevant to this decision:

National Forest Management Act (NFMA): This decision is consistent with all relevant land and resource management plans (forest plans) because each forest plan has direction which supports the protection and recovery of federally listed species and their habitat (see project record).

Endangered Species Act (ESA): This decision is consistent with the ESA. On June 10, 2019 the USFWS determined no re-initiation of consultation was required. This action is extending the existing closure order by six (6) months until a new environmental analysis is completed. The USFS has determined that this is an administrative action that will not change the effect of the current closure order on listed bat species and re-initiation of consultation is not required.

Administrative Review Opportunities

Decisions that are categorically excluded from documentation in an Environmental Assessment (EA) or Environmental Impact Statement (EIS) are not subject to an administrative review process (pre-decisional objection process) (Agriculture Act of 2014, Subtitle A, Sec. 8006).

Implementation Date

Implementation may begin immediately. The duration of time for this decision is six (6) months from the date of signature unless rescinded sooner by the Regional Forester.

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Date



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APPENDIX A.

RECOMMENDATIONS FOR MANAGING ACCESS TO SUBTERRANEAN BAT ROOSTS TO REDUCE THE IMPACTS OF WHITE-NOSE SYNDROME IN BATS

Background

White-nose syndrome (WNS) is a devastating fungal disease that has killed unprecedented numbers of hibernating bats in eastern North America. The first evidence of WNS was documented in photographs from New York State in 2006; as of May 2021 WNS has spread to 36 states and seven Canadian provinces. The fungus causing the disease, *Pseudogymnoascus destructans* (Pd), has been detected in an additional four states where signs of the disease have not yet been observed (see current map available at www.whitenosesyndrome.org).

In North America, 12 bat species have been confirmed with WNS, and eight additional species have been detected carrying Pd. Pd invades the skin of hibernating bats and the resulting disease often leads to death. Genetic analyses indicate the fungus is likely not native to North America and it is expected that human activity led to its introduction to North America. Pd may have originated in Europe or Asia, where it or the disease has been confirmed on 13 bat species. There have been no documented deaths of European bats from WNS.

The best available information indicates Pd will continue to spread across North America, exposing more populations and species to the disease. Although bat-to-bat and bat-to-environment-to-bat transmission are believed to be the primary ways Pd is spread, human-assisted transmission is also possible. The severity of the impacts of WNS on bat populations justifies taking universal precautions to reduce the risk of human-assisted transmission of Pd and to minimize disturbance to hibernating bats potentially susceptible to WNS.

Purpose

The recommendations below are intended to reduce the potential for humans to disturb hibernating bats or inadvertently transport Pd to uncontaminated bat habitats. However, we acknowledge that in some cases, subterranean bat roosts may be under regulatory authority or usage policies that cannot accommodate these recommendations. Where possible, we advise following these recommendations to the extent practicable in the development of site-specific recommendations or policies. Additional guidance is being developed to assist with implementing these recommendations at subterranean sites managed specifically for visitation or tourism. The recommendations below address four main objectives to help wildlife and resource management agencies and non-government organizations develop local strategies to protect bats and subterranean ecosystems.

Objectives

1. Minimize the risk of human-assisted spread of Pd to decrease the probability of long-distance transfer of the fungus to uncontaminated areas.
2. Avoid disturbing bats in their roosts to the greatest extent possible.
3. Carry out science-based best management practices for achieving conservation and recovery goals for bats.

4. Foster cooperation and collaboration among government agencies, non-government organizations, and landowners.

Supporting Evidence for Concern (See Appendix 1 for description of scientific literature.)

1. Pd can persist and grow in the absence of bats.
2. Spores of Pd can remain viable outside of subterranean environments.
3. Spores of Pd cling to clothing, footwear, and gear and can be inadvertently transported out of contaminated sites.
4. Pd may be present on bats or in bat roosts without being visibly detectable.
5. Spread of Pd may be slowed by geographic or biological barriers to bat movements that may not be barriers to human movement.
6. Repeated and/or prolonged human disturbance during hibernation is detrimental to bats, especially bats already stressed by WNS.

Recommendations

1. Where feasible, prevent unrestricted access to subterranean bat roosts, especially while bats are present.
2. Decontamination protocols greatly reduce the risk of transporting viable Pd spores on gear but are not 100% effective. In accordance with the National White-nose Syndrome Decontamination Protocol, equipment that has been used in a subterranean bat roost should only be reused in a roost that is similarly or progressively more contaminated.
3. Require visitors to subterranean bat roosts to clean and treat clothing and gear after visiting a subterranean bat roost regardless of season or time of year (refer to the National WNS Decontamination Protocol). On a site-specific basis, management agencies may consider identifying reduced or additional cleaning requirements for gear between roosts in small geographic areas.
4. Minimize disturbance to bats by coordinating and combining, when possible, scientific and management activities involving access to subterranean bat roosts, especially while bats are likely present.
5. Designate “no entry” restriction for subterranean bat roosts when wintering bats are present unless access is to conduct agency-sanctioned or permitted activities. The period of winter occupancy may include fall and spring as well. Additional restrictions to access may be required for sites with sensitive colonies of bats during summer.
6. Partner with individuals and organizations that utilize subterranean bat roosts to best conserve underground environments and their fauna and flora.
7. Work to educate visitors and local communities about WNS and conservation of bats, caves, and other subterranean habitats.

Conclusion

Many species of North American bats are highly vulnerable to this lethal fungus. Multiple efforts are underway to determine how we can halt the spread of Pd and/or reduce the threat of WNS to bats. These efforts involve states, provinces, tribes, federal agencies, universities, conservation organizations, and local communities. Our collaborative efforts are essential to bat and cave conservation. Key to this effort is reducing the risk of human-assisted spread of the fungus and avoiding activities that disturb bats during critical periods of hibernation.

This document is the product of a multi-agency and organization committee working within the framework of the National WNS Plan (A National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats, finalized May 2011). On March 18, 2016, this document, Recommendations for Managing Access to Subterranean Bat Roosts to Reduce the Impacts of White-Nose Syndrome in Bats, was accepted by the WNS Executive Committee, a body consisting of representatives from Federal, State, and Tribal agencies which oversees the implementation of the National WNS Plan. These recommendations serve as a revision to the 2009 Cave Advisory issued by the U.S. Fish and Wildlife Service (USFWS 2009).

APPENDIX B.

Supporting evidence for RECOMMENDATIONS FOR MANAGING ACCESS TO SUBTERRANEAN BAT ROOSTS TO REDUCE THE IMPACTS OF WHITE-NOSE SYNDROME IN BATS

Since the discovery of WNS in January 2007 and the identification of *Pseudogymnoascus destructans* in 2009 (initially as *Geomyces destructans*, Blehert et al., 2009), considerable attention has been paid to understanding the cause and occurrence of this disease, and the biology and distribution of the fungus. Research in these areas has been funded and conducted by numerous government agencies and nonprofit, private, and academic institutions. The findings of the following studies, published and unpublished, have provided evidence that indicates human activity in subterranean bat roosts has the potential to contribute to the spread of WNS and may impact the survival of hibernating bats.

In the statements below, we use “Pd”, although the cited publications may have used the “Gd” nomenclature for the fungus.

1. Pd can persist and grow in the absence of bats.
 - a. Genetic tests (PCR) confirmed presence of Pd and related species in sediment samples from caves and mines that previously held infected bats (Lindner et al., 2011; Lorch et al., 2012a; Puechmaille et al., 2011a).
 - b. Caves can harbor viable Pd for over two years after bats are absent (Lorch et al., 2013).
 - c. Growth of Pd on a variety of cave sediments can lead to accumulation of Pd spores in the absence of bats (Reynolds et al., 2015).
2. Spores of Pd can remain viable outside of subterranean environments.
 - a. Pd can remain viable for at least 5 months at room temperature, and under laboratory conditions (USGS-National Wildlife Health Center, unpublished data).
 - b. Pd spores can remain viable after being stored for up to eight months dry and/or frozen (Puechmaille et al., 2011b).
 - c. Pd stored on dry agar plates at 5°C and 20-30% relative humidity (which is low compared to typical hibernaculum conditions) can remain viable for more than 5 years in the absence of bats (Hoyt et al., 2014).
3. Spores of Pd cling to clothing and footwear and can be inadvertently transported out of contaminated sites.
 - a. Pd spores were identified by morphology on clothing and gear used in contaminated caves and mines (Joe Okoniewski, New York Dept. of Environmental Conservation, unpublished data).
 - b. Viable fungal spores (many species, not specifically Pd) were retrieved from shoes of visitors after tours through Mammoth Cave (Hazel Barton, University of Akron, unpublished data).

c. Pd has been detected by genetic screening (PCR) and fungal culture on equipment used to capture bats and on gear used in contaminated sites (USGS – National Wildlife Health Center, unpublished data).

4. Pd may be present on bats or in bat roosts without being visibly detectable.

a. Bats, including Rafinesque’s big-eared bats, eastern red bats, and silver haired bats, in and near contaminated sites may test positive for presence of Pd via PCR or fungal culture while failing to exhibit obvious signs of WNS (USGS – National Wildlife Health Center, unpublished data; Bernard et al., 2015; Langwig et al., 2015).

b. Pd was detected by microscopy, genetic screening (PCR), and culture on bats and bat houses during summer months in upstate NY (Dobony et al., 2011; US Army, unpublished data); Pd was detected by PCR on two species of bats in May and June in Tennessee (Grace Carpenter, University of Tennessee, unpublished data).

5. Spread of Pd may be slowed by geographic or biological barriers to bat movements that may not be barriers to human movement.

a. Genetically dissimilar colonies of wintering little brown myotis in westernmost Pennsylvania remained Pd-free for 1-2 years after WNS had spread through the rest of Pennsylvania and beyond to the south (Miller-Butterworth et al., 2014).

6. Repeated and/or prolonged human disturbance during hibernation is detrimental to bats (McCracken, 1989; Mohr, 1972; Thomas, 1995; Tuttle, 1979), especially bats already stressed by WNS.

a. More frequent arousals during hibernation hasten depletion of critical fat reserves (Boyles and Willis, 2009), which can threaten bats’ survival.

b. Increased arousal frequency is associated with more severe cutaneous infections in WNS affected bats and likely contributes to mortality (Reeder et al., 2012).

Secondary evidence:

7. If done correctly, current decontamination procedures have a high probability of significantly reducing the risk of spreading viable Pd.

a. The effective kill rate of correctly applied decontamination agents or techniques is greater than 99.995% in laboratory experiments (Shelley et al., 2013).

b. Appropriate application methods are critical for effective decontamination.

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