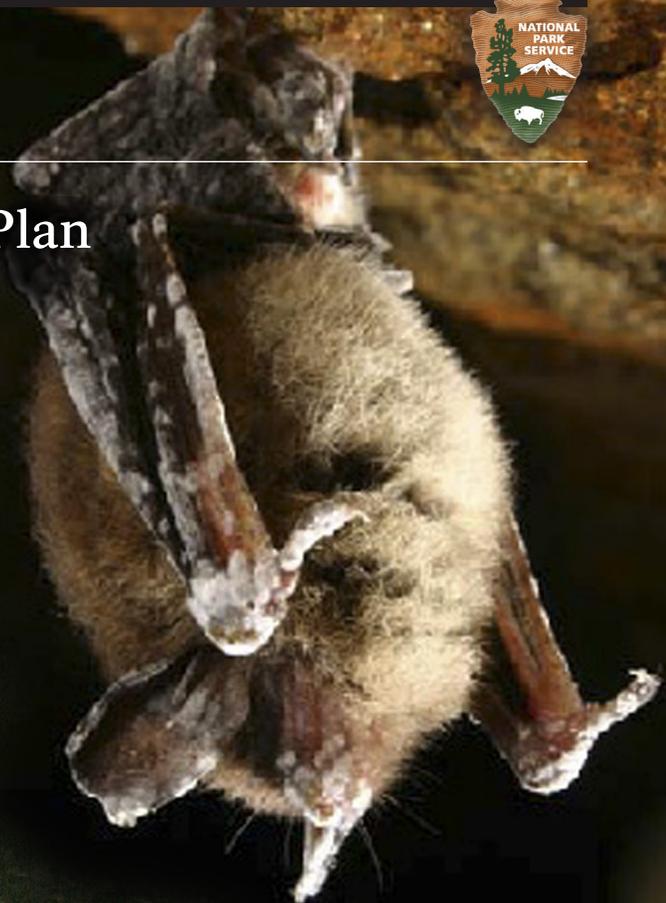




White-Nose Syndrome Response Plan

January 2011





Mammoth Cave National Park is home to many bat species, all of which may face the threat of White-Nose Syndrome.

White-Nose Syndrome Response Plan

Mammoth Cave National Park

January 2011



U.S. Department of the Interior
National Park Service

Recommended by:

Bobby C. Carson

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Acting Chief of Science & Resources Management

12/21/10

Date

Approved:

Patrick H. Reed

Patrick H. Reed
Superintendent

1/3/11

Date

Active monitoring and surveillance of bat populations and adaptive management strategies will be important as the Park responds to the threat of White-Nose Syndrome.



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Acknowledgements

This plan was compiled by Rickard Toomey¹ and Steve Thomas². The compilers thank those who contributed to this document through writing, reviewing, or both. Affiliations of these contributors/reviewers are listed in Appendix I. The body of the plan is based largely on the Kentucky WNS Response Plan. Thanks are offered to the authors of that plan. Discussion with numerous external researchers and cooperating organizations (including NGOs and universities) has helped shape this plan. Although they did not review the plan in its entirety, their comments on specific aspects increased the ability to develop a plan that could be practically applied. Particular recognition is owed to members of the Mammoth Cave National Park WNS Working Group for their guidance.

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Cover photo of WNS-infected bat by Peter Youngbaer

Introduction

Since 2006 White-Nose Syndrome (WNS), a fungal disease, has killed more than one million cave-dwelling bats in the U.S. First found in caves/mines in New York, it has spread south and west, and into Canada. Little is known about the disease; transmission appears to be bat-to-bat, and some evidence indicates the spread of WNS may be linked to human traffic from cave to cave. This disease poses a considerable threat to cave-roosting bats throughout North America. Tree-roosting and building-dwelling bats may also be at risk; however there is no current documentation of WNS infection in tree and building dwelling bats outside of the cave/mine environment. As WNS spreads, the challenges for managing the disease continue to increase.

The plan outlined below details the elements critical to the investigation and management of WNS and protection/use of related park resources at Mammoth Cave National Park (MACA). **The plan includes access restrictions and decontamination requirements that apply to bat research and all human activities in park caves.** It also sets up plans for surveillance (and monitoring) of WNS, and outreach and education. This plan has been in development since February 2010; however a key component of the plan was drafted in April 2009 (Appendix B). The plan borrows heavily from the Kentucky WNS Response Plan (updated January 2010), and includes input from various internal and external agency partners (see list in Appendix I). Several drafts of the plan were subjected to both internal and external review. The plan benefitted from the participation of its compilers in national and local WNS meetings, as well as regular participation in National Park Service (NPS) WNS Working Group and WNS state/federal conference calls. Environmental compliance for this plan was completed and all compliance documents are on file at the park's administrative office. Because the WNS situation is dynamic and may change as new information becomes available, this plan will be re-evaluated at least annually. Actions will be based on the best available science.

Purpose of Plan

This WNS Response Plan was created to offer the maximum protection for bats and other resources located within Mammoth Cave National Park, while at the same time allowing for appropriate research on and public enjoyment of some of these important resources. It formalizes MACA's action plan against WNS, a new infectious disease in bats. This plan is an appendix of the park's Cave Management Plan.

Objectives

The objectives of this plan are to:

- Provide for appropriate science-based management of WNS at the park.
- Provide for monitoring and surveillance of bat populations to detect WNS in area bats, provide data on spread of WNS in the area, and to determine impacts of WNS on area bats.
- Support research on bats and WNS while ensuring appropriate decontamination procedures to protect bat and cave resources.
- Provide for access to cave areas with required decontamination appropriate to the cave area and activity in order to minimize the potential for human spread of the fungus associated with WNS to the park, between park caves, or from the park.
- Provide a framework for cooperation on WNS issues with park partners.
- Aid development of outreach and educational tools to inform park visitors about the threat of WNS and to help prevent them from inadvertently spreading it.

Authorities

There are several laws, regulations, policies and guidelines that apply to the management of natural resources, including bats and cave ecosystems and their use. Several examples include:

- The NPS Organic Act (1916) and the General Authorities Act (1970) prohibit

impairment of park resources and values. The NPS 2006 Management Policies uses the terms "resources and values" to mean the full spectrum of tangible and intangible attributes for which the park was established and is managed, including the Organic Act's fundamental purpose and any additional purposes as stated in the park's establishing legislation. The impairment of park resources and values may not be allowed unless directly and specifically provided by statute. The primary responsibility of the NPS is to ensure that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities to enjoy them.

- Enabling Legislation for MACA: The park was originally authorized in 1926, but Public Law 16 USC, Sec 404 July 1, 1941, established Mammoth Cave National Park "...to protect and preserve for the future the extensive limestone caverns and associated karst topography, scenic riverways, original forests, and other biological resources, evidence of past and contemporary lifeways; to provide for public education and enrichment through scientific study; and to provide for development and sustainable use of recreation resources and opportunities. . ."
- Federal Cave Resources Protection Act of 1988 (FCRPA): The act recognized that caves are invaluable and an irreplaceable part of the nation's natural heritage. The Act has two stated purposes:
 - *To secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people; and*
 - *To foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on Federal lands for scientific, educational, or recreational purposes. The FCRPA also exempts cave information from the Freedom of Information Act by establishing confidentiality of information. Finally, it establishes criminal penalties for violators of the act.*
- 43 CFR, Part 37 - Cave Management, Final Rule: This ruling implements the Federal Cave Resources Protection Act of 1988.

■ Natural Resources Inventory and Monitoring Guideline, NPS-75: Under this guideline, the National Park Service is required to use inventory and monitoring procedures to proactively manage natural resources, based upon knowledge gained from those surveys. This guideline is based upon NEPA's requirement that knowledge of resource conditions be used to direct and evaluate effects of management decisions. It is also a requirement that "NPS employees know the nature and condition of the natural resources under their stewardship and have the means to detect and document changes in those resources, and understand the forces driving the changes, in order to fulfill the NPS mission of conserving parks unimpaired." (NPS75, p.1).

■ Natural Resources Management Guideline, NPS-77: Under this guideline, the NPS is required to manage the natural resources in such a way that they are maintained, restored, and perpetuated in order to preserve their inherent integrity. Visitors are to be allowed to enjoy these resources only when such actions don't threaten these resources or goals.

■ NPS Management Policies 2006 addresses caves in Section 4.8.2.2 "The Service will manage caves in accordance with approved cave management plans to perpetuate the natural systems associated with the caves, such as karst and other drainage patterns, air flows, mineral deposition, and plant and animal communities. Wilderness and cultural resources and values will also be protected." Furthermore "Parks will manage the use of caves when such actions are required for the protection of cave resources or for human safety."

■ 36 CFR, Chapter I, Part 7 – Special Regulations, Area of the National Park System, Sec. 7.36 Mammoth Cave National Park:

(b)(1) Cave entry. Except for those portions of the caves open to the general public, no person shall enter any cave within the boundaries of the park without first obtaining a permit from the Superintendent. Permits will be issued to persons who are qualified and experienced in cave exploration, who possess the needed equipment for safe entry and travel, and who are engaged in scientific research projects

which in the opinion of the Superintendent are compatible with the purpose for which the park was established.

(2) Persons on guided cave tours must stay on the established designated trails and remain with the guides and tour group at all times.

Exploration of side passages, going ahead of the lead guide and tour group or dropping behind the following guide or tour group is prohibited.

(3) Persons on "self-guided" or "semi-guided" cave tours must stay in the established, designated trails at all times. Exploration of side passages or taking alternate routes is prohibited.

■ Endangered Species Act of 1973 [Public Law 93–205, Approved Dec. 28, 1973, 87 Stat. 884] [As Amended Through Public Law 107–136, Jan. 24, 2002]:

(c) Policy—(1) It is further declared to be the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act.

■ 50 CFR, Chapter IV, Part 402 – Interagency Cooperation—Endangered Species Act of 1973, as Amended, Subpart A_General, Sec. 402.01 Scope:

(a) This part interprets and implements sections 7(a)-(d) [16 U.S.C. 1536(a)-(d)] of the Endangered Species Act of 1973, as amended ("Act"). Section 7(a) Federal Agency Actions and Consultations grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical ("critical habitat").

Three species that have been designated as endangered under the ESA occur in caves at Mammoth Cave National Park: the Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*) and the Kentucky cave shrimp (*Palaemonias ganteri*). The two species of bats are of particular concern because of the threat of WNS. However, park managers are also concerned about the potential for broader impacts of either WNS or its control measures to impact cave environments.

Background

There are more than 400 caves within the park; one of those is >630-km (390-mile) Mammoth Cave. This cave system—the longest known in the world—has at least 26 entrances, including at least 7 on private property outside the park. Guided cave tours travel through approximately 12 miles of Mammoth Cave. All park caves are closed to human access, except via ranger-led tours or by permit. The park has not issued permits for recreational caving since circa 1995. The park hosts 9 species of bats generally associated with caves at some time of the year; 4 of these species (and possibly 2 additional species) have colonial roosts in about 30 park caves—including 7 caves that host at least one of 2 federally endangered bat species. All colonial bat roosts are located more than 16 km (10 miles) (subsurface) away from toured areas, although individual bats are occasionally seen along cave tour routes. Since August 2008, human access inside all colonial bat cave roosts has been limited to approved WNS or bat research and monitoring activities—regardless of the presence of bats. In 1981 MACA was designated as a World Heritage Site, and the park has been recognized as the core of an International Biosphere Reserve since 1990. In 2009, more than 400,000 visitors went on cave tours in MACA. Mammoth Cave is the tourism engine for the caveland region of Kentucky. In 2008, the economic impact of tourism in Kentucky's cave region totaled \$467 million (Kentucky state total = \$10.7 billion; the cave region ranks sixth of nine regions). See Appendix A for a summary of the park's cave and bat environment.

Response Plan

Pre-WNS Arrival in Mammoth Cave Area (Barren, Edmonson, Hart and Warren counties)

Baseline Monitoring and Surveillance

1. Reichard Wing Damage Index (WDI) (http://www.fws.gov/northeast/PDF/Reichard_Scarring/index/bat/wings.pdf) and UV screening must be used on all bats captured in the park during the appropriate time (i.e., spring). If a bat scores 2 or higher, or shows significant wing damage with UV light:

- Take pictures of bat's wings following WDI
- Collect wing or tail punch sample of a lesion area for WNS testing
- Contact MACA Point-of-Contact, Fish and Wildlife Service's Kentucky Field Office (USFWS-KYFO), Kentucky Department of Fish and Wildlife Resources (KDFWR), and National Park Service Washington Office-Biological Resource Management Division (NPS WASO-BRMD).

2. Summer Bat Population and Habitat Data Collection:

- Implement acoustic baseline monitoring (driving) transect project on park and adjacent counties using interns (<http://www.fws.gov/northeast/whitenose/PDF/HerzogNYSDECBritzkeUSACEProgressUpdateAcoustic-MonitoringSummerBats.pdf>).
- Continue gray bat and Rafinesque's big-eared bat annual summer emergence monitoring (NPS staff and interns).

- Monitor bat use of Wondering Woods Bat Structure (NPS staff and cooperators).
- Continue baseline data collection to document usage of hibernacula by bats during the summer (NPS staff and interns).
- Continue bat population and habitat data collection research project on Rafinesque's big-eared bat (Mike Lacki). Follow "Bat Handling/Disinfection Protocol for Summer Bat Field Studies in Kentucky" developed May 1, 2009 (<http://fw.ky.gov/pdf/batdisinfection.pdf>).
- Continue predator-prey interactions and habitat use of bats threatened by White-Nose Syndrome research project (Mike Lacki). Follow "Bat Handling/Disinfection Protocol for Summer Bat Field Studies in Kentucky" developed May 1, 2009 (<http://fw.ky.gov/pdf/batdisinfection.pdf>).
- Maintain HOBO data loggers deployed in caves used by colonial roosting bats to document cave microclimate (NPS staff).

Management of Caves

1. Post cave closure signs at entrances to all caves with colonial bat roosts except when such sign might draw attention to an inconspicuous ungated cave. Periodically monitor the condition of each sign.
2. Ensure compliance with access restrictions found in the WNS Cave Access table (Appendix B), and decontamination requirements and certification (Appendix C).

3. Review *all* in-cave activities (in light of developing understanding of the disease and how it spreads) to assess the potential risk of WNS spread and potential costs/benefits of each activity. This review may result in changes to cave access or activities being cancelled or modified.

Ongoing Coordination with Researchers on WNS Projects and Response Planning Efforts

1. Northern Kentucky University (Hazel Barton)
2. USFWS-KYFO (Mike Armstrong), KDFWR (Brooke Slack)
3. Bat Conservation International (BCI) (Michael Baker)
4. Participate on national and regional conference calls with researchers, officials, and managers
5. Collaborate on NPS and national WNS response planning efforts
6. Additional WNS projects that may be initiated

Winter Surveillance and Bat Population Monitoring

1. Conduct biennial monitoring of scheduled hibernacula (Appendix A, Table 1) with annual surveillance of all other hibernacula:
 - Initiate a 3-tier system for Bat Monitoring and WNS Surveillance:
 - Tier 1: Population Monitoring – conduct biennial monitoring (bat count plus digital photography) between January 15 and February 15 of scheduled hibernacula only (Appendix A) to minimize disturbance to bats. Check for the presence of fungus and other signs of WNS while counting bats. Will require decontamination between hibernacula (Appendix C).
 - Tier 2: Spot checks – researchers with experience at the hibernacula will enter selected (in consultation with USFWS-KYFO and KDFWR) non-scheduled hibernacula and

check for the presence of fungus, of bats roosting in abnormal places, etc. (Appendix A). Will be done infrequently to avoid disturbing bats too often during the hibernation season. Will require decontamination between hibernacula (Appendix C).

- Tier 3: Entrance checks - visit several hibernacula and check for bat activity or bats roosting near the cave entrances (Appendix A). Target these visits for days that would normally be too cold (<45°F) for bat activity. Will *not* require decontamination between hibernacula (Appendix C).

- Record data using standard data forms and enter into a database (Appendix D).

- All entries to colonial bat roosts, hibernacula in particular, are coordinated through MACA's Chief of Science and Resources Management. Since almost all of the colonial roosts (and all of the roosts which are used by threatened/ endangered bats) are gated and thus require a gate key to be checked out, this is relatively easy to enforce. In addition, for hibernacula with threatened/ endangered bats, MACA consults with the USFWS-KYFO and the KDFWR before allowing winter entry. These measures will insure that visits will not result in significant harassment or increased mortality due to cumulative effects of visits. See Appendix A for a list of colonial bat roosts.

2. Deploy passive Anabat recorder system at entrance to selected hibernacula – coordinated by KDFWR/USFWS-KYFO.
3. Install beam-break system at selected gray and Indiana bat caves – KDFWR or partners to purchase and install.
4. Respond to reports of unusual bat activity, suspicious looking bats, or moribund/ dead bats found by park staff, cooperators, contractors, or visitors. Submit fresh dead (any species), moribund (non-federally listed), and potentially WNS affected bats (non-federally listed) to lab (Southeastern Cooperative Wildlife Disease Study) for WNS testing (Appendix G). Track responses and submissions via spreadsheet (Appendix H).

Outreach and Education

1. Implement WNS Communication Plan (Appendix E)
2. Continue WNS Outreach and Education Program at Visitor Center that was initiated in June 2009 (Appendix F)
 - Continue to staff WNS Station
 - Screen visitors prior to cave tours
 - Disinfect, bag, or disallow all potentially contaminated “gear” prior to tour
 - Collect cave visitation history data and enter into WNS database
 - Display and maintain WNS posters
 - Loop WNS educational video on 42” LCD TV screen
 - Provide WNS information hand-out materials
 - Maintain and update WNS page and announcement on park website
3. Continue to respond to WNS questions from the media, state/federal partners, non-governmental organizations (NGOs), park staff, the public, etc. (see Appendix E).
4. Park WNS team will coordinate with Division Chiefs to provide guidance and training for staff on responding to reports of bats acting unusually or to dead bats on the landscape. Training will include formal lectures during training opportunities, as well as informal meetings with staff that may receive reports from the public. Written guidelines for bat reporting and handling (including Job Hazard Analyses) are under development. All handling of potentially sick bats will be done by staff who have rabies pre-exposure inoculation and specific training handling moribund bats.
5. Encourage local private cave tour operators to implement WNS education steps and attempt to develop a co-operative approach to addressing WNS.

Post-WNS Arrival in Mammoth Cave Area

Baseline Monitoring and Surveillance

1. Continue use of Wing Damage Index and UV screening to assess the extent of damage
2. Continue summer bat population and habitat data collection projects listed above

Cave Access Response to WNS

All cave access will be subject to the requirements for decontamination as set forth in Appendix C, pages 21-24.

1. Continue measures to minimize risk of spread via humans *into* park caves by following the decontamination requirements specified in Appendix C.
 - Activities with *minimal* contact with cave sediments (blue box, ■) (initiated June 2009)
 - Activities with *intimate* cave sediment contact and bat research (gold box, ■)
 - “Wild” cave tours (initiated June 2009)
 - Other activities (initiated May 2009)
 - Bat research (initiated July 2009)
2. Initiate measures to minimize risk of spread via humans *from* park caves.
 - Activities with *minimal* contact with cave sediments (blue box, ■). The NPS is funding research (2010-2011) to develop decontamination measures for walking tour groups (up to 120 visitors per tour). The focus is on mats to decontaminate footwear. Preliminary deployment of mass decontamination mats for visitors exiting caves after tours will be ready by February 15, 2011. Final measures to be deployed depend on outcomes of research.
 - Activities with *intimate* cave sediment contact and bat research
 - “Wild” cave tours (gold box, ■) (initiated May 2010)
 - Other activities (red box, ■) (initiated May 2010)
 - Bat research (red box, ■) (initiated July 2009)

3. Initiate measures to minimize risk of spread via humans *between* park caves.
 - Activities with *minimal* contact with cave sediments (blue box, ■) The NPS is funding research (2010-2011) to develop decontamination measures for walking tour groups (up to 120 visitors per tour). The focus is on mats to decontaminate footwear. Preliminary deployment of mass decontamination mats for visitors exiting caves after tours will be ready by February 15, 2011. Final measures to be deployed depend on outcomes of research.
 - Activities with *intimate* cave sediment contact and bat research
 - “Wild” cave tours (gold box, ■) (initiated May 2010)
 - Other activities (red box, ■) (initiated August 2010)
 - Bat research (red box, ■) (initiated July 2009)
4. Continue reviewing *all* in-cave activities (in light of new information and changing situation) to assess the potential risk of WNS spread and potential risks/benefits of each activity. This review may result in changes to cave access or activities being cancelled or modified.

Ongoing Coordination with Researchers on WNS Projects and Response Planning Efforts

Park staff will continue to coordinate research and planning efforts as described in the Pre-WNS Arrival section.

Field Response to WNS

The best approach for managing MACA’s bat populations and responding to WNS outbreaks on the park will involve discussions with NPS WASO-BRMD, USFWS-KYFO and KDFWR.

1. Continue winter surveillance and bat population monitoring based on the 3-tiered approach described above.
 - Surveillance and Monitoring Data Sheets (Appendix D)
 - Photographs
2. Place WNS affected cave sign outside entrance, as appropriate (obtain some signs from USFWS-KYFO or KDFWR). Periodically monitor the condition of each sign.
3. Additional specific follow-up response at confirmed WNS affected sites will reflect the species present, number of bats, and the type of summer cave roosts and/or hibernacula (i.e., cave or artificial roost).
 - Re-check affected sites not more frequently than every 3 weeks to monitor rate of transmission in bats
 - If feasible, salvage dead (any species) or moribund (non-federally listed) WNS affected bats:
 - Send 2-3 bats to lab (Southeastern Cooperative Wildlife Disease Study) for confirmation – especially species not previously documented to be affected (e.g., Rafinesque’s big-eared bat, “tree bat” species) (see Bat Submission Guidelines in Appendix G).
 - Sample individual dead or moribund bats from clusters for population genetics research (if additional samples are needed) (see Final Draft DNA sample protocols, 20 September 2009).
 - If collection of affected bats is impossible (ceiling too high, etc.) then consider harp trapping in the spring to collect wing or tail punch samples of lesion areas for WNS testing.
4. Continue responding to reports of unusual bat behavior, suspicious looking bats, or moribund/dead bats found by park staff, contractors, cooperators, or visitors. Submit fresh dead (any species), moribund (non-federally listed), and potentially WNS affected bats (non-federally listed) from unconfirmed WNS affected sites to lab for testing (Appendix G) (see item 3, above, for confirmed WNS affected sites). Track responses and submissions via spreadsheet (Appendix H).
5. Document action taken using:
 - Surveillance and Monitoring Data Sheets (Appendix D)
 - Photographs

- Field notebooks – record of what is implemented to assess result of implemented response

Strategy/Follow-up Response to WNS

1. Notify necessary individuals:

- Park Superintendent
- Chief of Science and Resources Management
- NPS WNS Lead (WASO-BRMD) and Southeast Region WNS Lead
- U.S. Fish and Wildlife Service FO supervisor
- KDFWR Commissioner
- Elected officials
- biologists working on WNS in Kentucky
- press/public

2. Coordinate with USFWS-KYFO and KDFWR personnel to focus surveillance (3-tiered approach) on known roosts/hibernacula within a 20-mile radius of a newly confirmed WNS affected site on MACA.

3. Investigate human visitation history at infected site to inform how transmission may have occurred.

4. Keep all meeting and conference call notes as documentation.

Outreach and Education

1. Continue to implement WNS Communication Plan (Appendix E)

2. Continue WNS Outreach and Education program at visitor center (Appendix F) and add:

- Expanded pre-tour screenings (initiated summer 2010)
- Post-tour education/warnings
- Post-tour required decontamination of footwear (began with “wild” cave tours in May 2010 and later add walking tours based on results of on-going research). Preliminary deployment of mass decontamination mats for visitors exiting caves after tours will be ready by February 15, 2011.

- “Wild” cave tour gear dedication/cleaning/decontamination and bus dedication (all initiated May 2010)

3. Continue to respond to WNS questions from the media, state/federal partners, NGOs, park staff, the public, etc. (see list in Appendix E).

4. Park WNS team will continue coordinating with Division Chiefs to provide guidance and training for staff on responding to reports of bats acting unusually or to dead bats on the landscape. Training will continue to include formal lectures during training opportunities, as well as informal meetings with staff that may receive reports from the public. Written guidelines for bat reporting and handling (including Job Hazard Analyses) are under development. All handling of potentially sick bats will continue to be done only by staff who have rabies pre-exposure inoculation and specific training handling moribund bats.

5. Continue to encourage local private cave operators to implement WNS education steps and attempt to develop a co-operative approach to addressing WNS.

Recovery of Cave Bat Populations

1. Investigate techniques for mitigating the population effects of WNS on Park bats.

2. Attempt to determine whether some individuals survive WNS exposure, as this will help gauge the level of necessary intervention (e.g., by marking WNS affected bats in known affected roosts late in the hibernation season and attempting to recapture in subsequent years—as in the Fort Drum, NY study).



Appendix A

Summary of the Caves, Bats, and Human Cave Use at Mammoth Cave National Park

Caves at Mammoth Cave National Park (MACA)

More than 400 caves have been identified at MACA. They range in size from approximately 30 feet long to nearly 400 miles long (Mammoth-Flint Ridge-Roppel Cave System, later referred to as Mammoth Cave System). The Mammoth Cave System is the world's longest known cave system. Caves are spread widely throughout the park. Figure 1 shows the tour trail sections and the extent of the Mammoth Cave System in relationship to MACA's boundary. Although a vast majority of the caves on the park are relatively small (< 1 mile long), there are at least 11 caves in the park that have mapped lengths over one mile. Two large cave systems, other than the Mammoth Cave System, have passages that come into the park. Fisher Ridge Cave (112 miles long, world's seventh longest) and Whigpistle System (34 miles long, world's forty-fifth longest) are partially on park but, neither has a known entrance on the park. The Mammoth Cave System has 26 known entrances. Nineteen of the entrances are on the park; the other seven are on private properties outside the park.

All caves on the park are closed to unauthorized visitation by 36 CFR 736 (b) (1-3).

(b)(1) Cave entry. Except for those portions of the caves open to the general public, no person shall enter any cave within the boundaries of the park without first obtaining a permit from the Superintendent. Permits will be issued to persons who are qualified and experienced in cave exploration, who possess the needed equipment for safe entry and travel, and who are engaged in scientific research projects which in the opinion of the Superintendent are compatible with the purpose for which the park was established.

(2) Persons on guided cave tours must stay on the established designated trails and remain with the guides and tour group at all times. Exploration of side passages, going ahead of the lead guide and tour group or dropping behind the following guide or tour group is prohibited.

(3) Persons on "self-guided" or "semi-guided" cave tours must stay in the established, designated trails at all times. Exploration of side passages or taking alternate routes is prohibited.

These closures are enforced by the Law Enforcement Division at the park. In addition, access to the most significant and sensitive caves is controlled through the use of cave gates and patrols. Gates have been installed on 45 cave entrances in the park. These gated entrances include 18 of the 19 entrances of the Mammoth Cave System that are found on the park (Echo River Spring is not gated). In addition, 27 smaller caves are gated to protect important resources (often biological or cultural). The Law Enforcement Division at Mammoth Cave systematically and regularly checks all gated caves to be sure that the gates are intact and have not been breached. Most of the gates are bat-friendly gates. However, some of the constructed entrances to the Mammoth Cave System purposely have gates that restrict airflow to more closely mimic original conditions.

Ungated caves in the park are protected mainly through obscurity. The park does not advertise the location of caves and restricts access to cave location data. In some case, very obscure caves with significant resources have remained ungated, because the process of gating them would draw significant attention to the cave. In such cases, the additional protection provided by the gate may not justify the resource impact

and additional risk because the cave is now identified as containing significant resources. Some ungated caves receive regular checks for signs of unauthorized visitation. If rangers see people with caving gear in the back-country in the park, they will stop them to be sure they are authorized to visit caves in the area.

Although there is significant focus on the larger caves in the park, due to their significant and varied natural and cultural resources,

even the smaller caves may be important. For instance, one of the primary *Corynorhinus* hibernacula on the park is only about 125 feet long.

Bats at MACA

MACA has 13 confirmed species of bat, plus one species (*Myotis austroriparius*) that has not been recorded since the 1980s but could still be on park.

Bats at Mammoth Cave National Park

Cave Associated (at some point in the year)		Tree-Dwelling	
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-Eared Bat	<i>Lasiurus borealis</i> ²	Red Bat
<i>Eptesicus fuscus</i>	Big Brown Bat	<i>Lasiurus cinereus</i>	Hoary Bat
<i>Lasionycteris noctivagans</i>	Silver-Haired Bat	<i>Lasiurus seminolus</i>	Seminole Bat
<i>Myotis austroriparius</i> ¹	Southeastern Bat	<i>Nycticeius humeralis</i>	Evening bat
<i>Myotis grisescens</i>	Gray Bat		
<i>Myotis leibii</i>	Eastern Small-Footed Bat		
<i>Myotis lucifugus</i>	Little Brown Bat		
<i>Myotis septentrionalis</i>	Northern Bat		
<i>Myotis sodalis</i>	Indiana Bat		
<i>Perimyotis subflavus</i>	Tri-Colored Bat		

¹ Not recorded in the Park since the 1980s, but possibly still extant.

² Though tree-dwelling, sometimes found in cave and often seen swarming in (at least) Historic Entrance.

Roosts of several colonial bats:

Myotis grisescens
(Gray bat, Federal Endangered):

- 2 cave hibernacula (Dixon Cave and Long Cave)
- 5 cave summer roosts (Bat Cave, Dixon Cave, Lee Cave, Long Cave, and Hickory Flat Cave) (probably bachelor roosts, but not assessed in detail)

Myotis sodalis
(Indiana bat, Federal Endangered):

- 5 cave hibernacula [Dixon Cave (Priority 1B), Colossal Cave (Priority 2), Long Cave (Priority 2), Bat Cave (Priority 3), and Wilson Cave (Priority 3)]
- Several summer maternity tree roosts

Corynorhinus rafinesquii
(Rafinesque's big-eared bat, Species of Management Concern):

- 4 primary cave hibernacula (Currie Cave, Haunted Cave, Hickory Flat Cave, and Wildcat Hollow Sink)
- 13 cave nursery sites (Blight Cave, Blood Cave, Cathedral Cave, Luna Cave, Misty Hole, Saucer Cave, Evening Cave, 5 new sites Joe Johnson found during 2009 & 2010, and 1 new site found in Blue Spring Hollow in 2010)
- 4 artificial roost nursery sites (Floyd Collins Ticket Office Attic, Maple Springs Barn, Maple Springs Pump House, and Wondering Woods Bat Structure)
- 20+ cave and rockshelter bachelor sites (possibly including the 3 new sites Joe Johnson found during the summer 2009, and Deceptive Cave)

Myotis lucifugus
(Little brown bat):

- 3 cave hibernacula (Bat Cave, Colossal Cave, and Wilson Cave) There could be additional roosts, since there has been no systematic effort to identify all *M. lucifugus* roosts)
- 2 artificial summer roosts (Floyd Collins Ticket Office Attic and Maple Springs Bat Shack)

Eptesicus fuscus
(Big brown bat):

- Several artificial summer roosts in various structures

Colonial Bat Hibernacula at Mammoth Cave National Park		
Cave	County	Tier 1 Survey Year
Bat Cave	Edmonson	odd
Colossal Cave	Edmonson	odd
Currie Cave	Edmonson	even
Dixon Cave	Edmonson	odd
Haunted Cave	Edmonson	even
Hickory Flat Cave	Edmonson	even
Long Cave	Edmonson	odd
Wildcat Hollow Sink	Edmonson	even
Wilson Cave	Hart	odd

Table 1. A list of the nine colonial bat hibernacula at Mammoth Cave National Park that are scheduled for biennial bat monitoring and white-nose syndrome surveillance based on a 3-tiered system. Tier 1: Population Monitoring – biennial count (plus digital photography) of scheduled hibernacula. These caves are also the suite of caves that are most likely to receive Tier 3 surveillance and Tier 2 follow-up.

Bat Roosts in the Park

Park caves provide both summer and winter habitat for bats at the park. Several species, as noted above, have colonial hibernacula in park caves. Nine of the colonial hibernacula on the park are subject to biennial counts to monitor populations (Table 1). In addition to colonial hibernacula, several species (notably *P. subflavus*, *E. fuscus*, and *M. septentrionalis*) regularly utilize park caves for hibernation individually. Summer colonial cave roosts include both maternity roosts (*C. rafinesquii*) and bachelor roosts (*C. rafinesquii* and *M. grisescens*). Tricolored bats (*P. subflavus*) utilize many park caves as summer roosts, but they roost individually rather than colonially.

One of the notable colonial bat roosts on the park is in a portion of the Mammoth Cave System. That area is part of the Colossal Cave part of the Flint Ridge Caves. It is not near the area of current tours (Figure 1). Although on a Mammoth Cave System map Colossal Cave appears to be one of the closer entrances above ground to the toured sections of Mammoth Cave, it actually requires a 12-15 hour arduous cave trip with complex route-finding to travel from the Colossal Entrance to toured areas. There are probably fewer than 20 people who have the knowledge to reliably lead such a trip (and several now lack the stamina).

All of the notable colonial bat hibernacula have been closed except for emergency or approved bat-related research from Sept. 1 – May 1 for many years. In addition, since

spring 2009 all colonial bat hibernacula and summer cave colonial roosts have been closed except for emergency or approved bat-related research because of WNS concerns. The last non-bat or WNS related human activity in any of the colonial hibernacula was in August 2008.

Two other very significant roosts occur in the immediate vicinity of the park. These sites, Coach Cave and James Cave, are located on the privately-owned Park Mammoth Resort. Both are Priority 1 *M. grisescens* hibernacula. Coach Cave is Priority 1B *M. sodalis* hibernaculum that is also designated Critical Habitat for *M. sodalis*.

Several park cave entrances are known to be fall swarming sites for multiple species of bats. These include Dixon Cave, Long Cave, and the Historic Entrance to Mammoth Cave. The two large *M. grisescens* hibernacula near the park, Coach Cave and James Cave, are also almost certainly fall swarming sites.

Cave Use and Activities at MACA

Activities other than Cave Tours

All caves at Mammoth Cave require either a permit or ranger-led tour to enter (as discussed above). No caves are open for recreational caving (the park does not issue recreational permits—this has been prohibited

Figure 1



Mammoth Cave System and Tour Trails

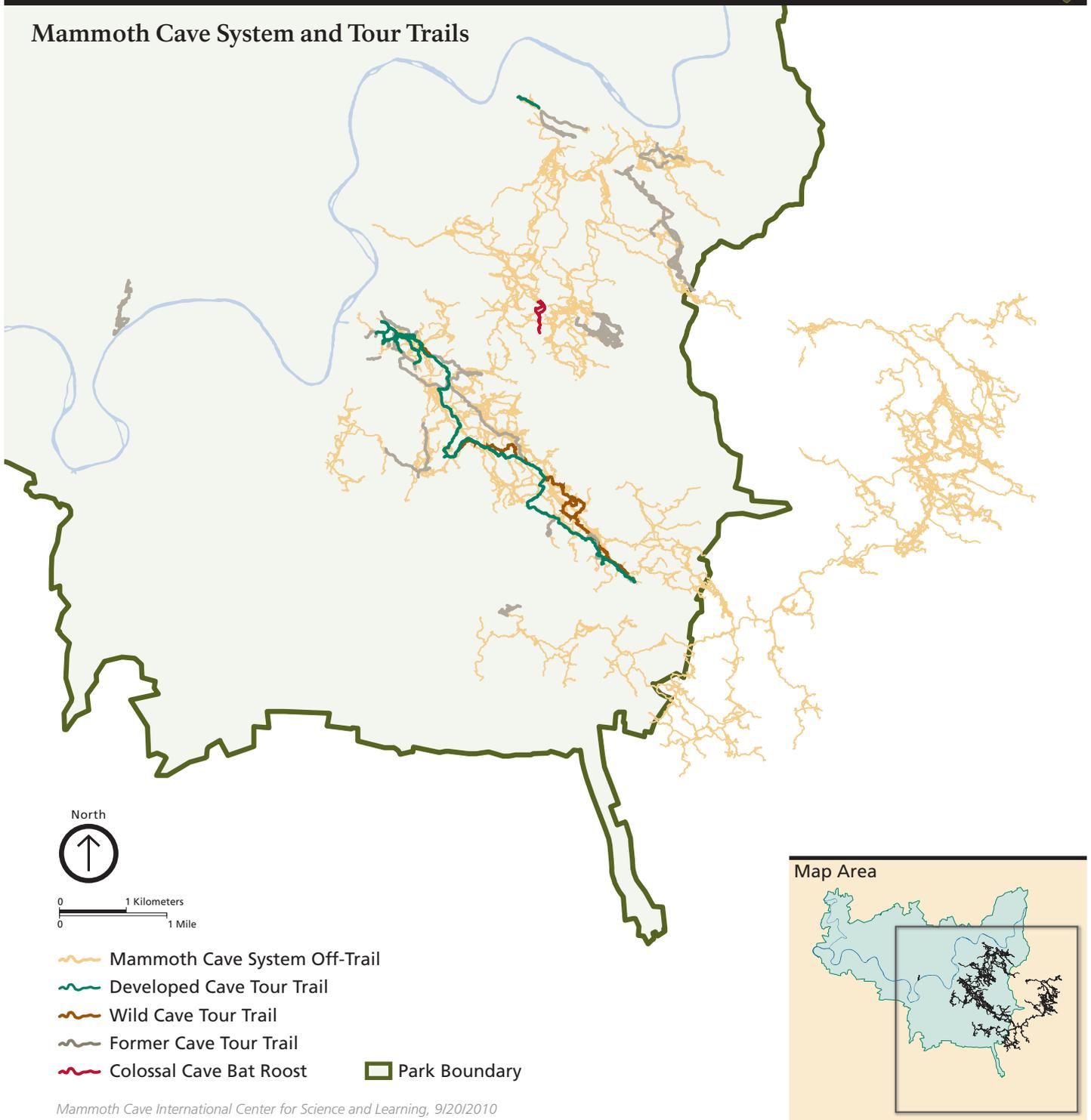


Figure 1. Trail areas used on Mammoth Cave tours and their extent and relationship to the Mammoth Cave System. The Colossal Cave bat roost section is shown (in red) for reference. The small piece of developed tour trail in the northern section of the map is the trail in Great Onyx Cave.

since circa 1995). As previously mentioned, many caves at the park are gated, including all major known roosts for federally listed bats. All non-tour permitted entry to park caves (gated and ungated, including toured sections) is for rescue, research, cave restoration,

educational activities (accompanied by researcher, park staff member, or approved faculty), or maintenance and administrative activities. A non-comprehensive list of people who access non-tour caves and cave areas (and representative activities) includes the following:

- Park Staff (including MACA, Cumberland Piedmont Inventory and Monitoring Network, and the Mammoth Cave International Center for Science and Learning) access purposes include: field trips, Law Enforcement cave checks and Search and Rescue training, Inventory and Monitoring activities, research, and trips for tour guides.
- Cave Research Foundation (cave survey, inventory, and scientific study)
- National Speleological Society Restoration Camps (restoration of impacted cave environments)
- Researchers (various topics including bats, cave biology, water quality, speleogenesis, geology, archaeology, history, etc.)
- Karst Field Studies classes
- Special trips (like WKYU filming, Friends of Mammoth Cave trips, etc.)
- Bat Conservation International workshops
- American Cave Conservation Association cave gating team
- University and professional group field trips

- One or two guides
- Maximum tour size 30-120 visitors depending on tour

Crawling (or “Wild”) Cave Tours

(1.5% of visits)

- Caving, climbing, crawling
- 1 miles – 5 miles
- 2.5 hours – 6.5 hours
- \$14 US – \$48 US
- Headlamps, helmets, pads, coveralls, gloves, packs (MACA-supplied gear only)
- Two guides
- Maximum tour size 12-20 visitors depending on tour

Regularly Scheduled Cave Tours

MACA provides access to some cave areas through regularly scheduled tours. These tours are led by MACA staff and require purchase of a ticket. MACA provides cave tours to about 400,000 visitors a year. Cave tour visitation is highly seasonal with about 75% of annual visits occurring between April 1 and September 30 (Figure 2). The cave tours are of two types:

General Walking Tours

(98.5% of visits)

- Walking, prepared trails
- 0.25 miles – 4 miles
- 1.25 hours – 4.5 hours
- \$3.50 US – \$24 US
- Installed electric lights or hand-held lanterns

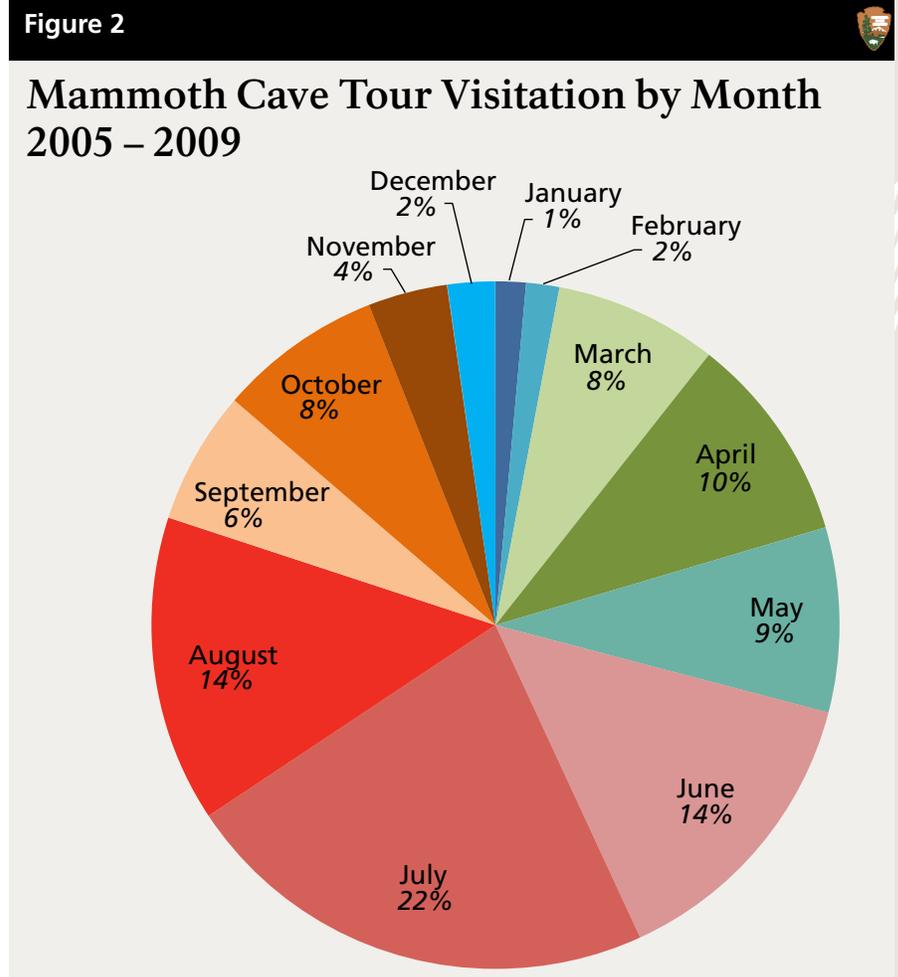


Figure 2. Seasonal distribution of MACA cave tour visitation 2005-2009.

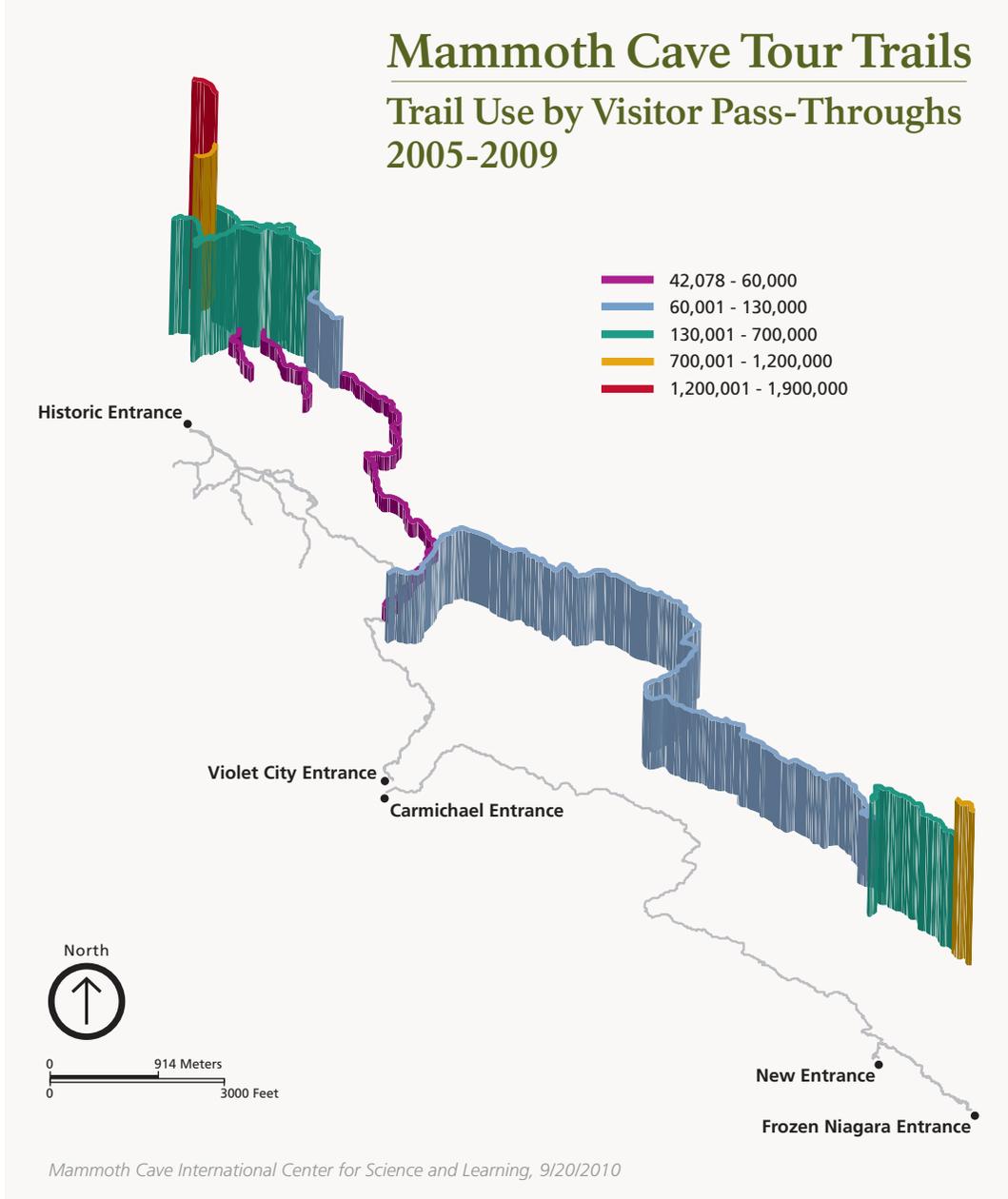


Figure 3. Trail use of different developed tour trail sections of Mammoth Cave. The volume of pass-throughs is greater than the number of visitors because some tours pass over some sections twice on the same tour.

Crawling cave tours occur in two, very limited, areas of the Mammoth Cave System: Historic – Lantern Tour Route area and the Grand Avenue – Frozen Niagara – Wild Cave Tour area (Figures 1 and 4). Together these areas have about 8 miles of tour trails for general tours and an additional approximately 4 miles of “wild cave” tour trails. The traffic on various sections of tour trail varies because the number of tours and tour sizes that use

particular areas vary greatly. Figure 3 shows the visitor traffic that has occurred on various developed tour trail segments between 2005 and 2009. Figure 4 shows which tours use which trail sections.

Tours enter or leave the cave through five entrances of the Mammoth Cave System: the Historic Entrance, Violet City Entrance, Carmichael Entrance, New Entrance, and

Frozen Niagara Entrance. Of these, the Historic Entrance is the only one that is a natural entrance. Some support for cave tours also enters the cave through the Elevator, another artificial entrance.

In addition, regularly scheduled cave tours occur in one other cave in the park: Great Onyx Cave (a 4.2 mile long cave). The tours in Great Onyx Cave are walking tours in which the visitors use handheld lanterns and stay on one-quarter mile of developed cave trails.

Figure 4

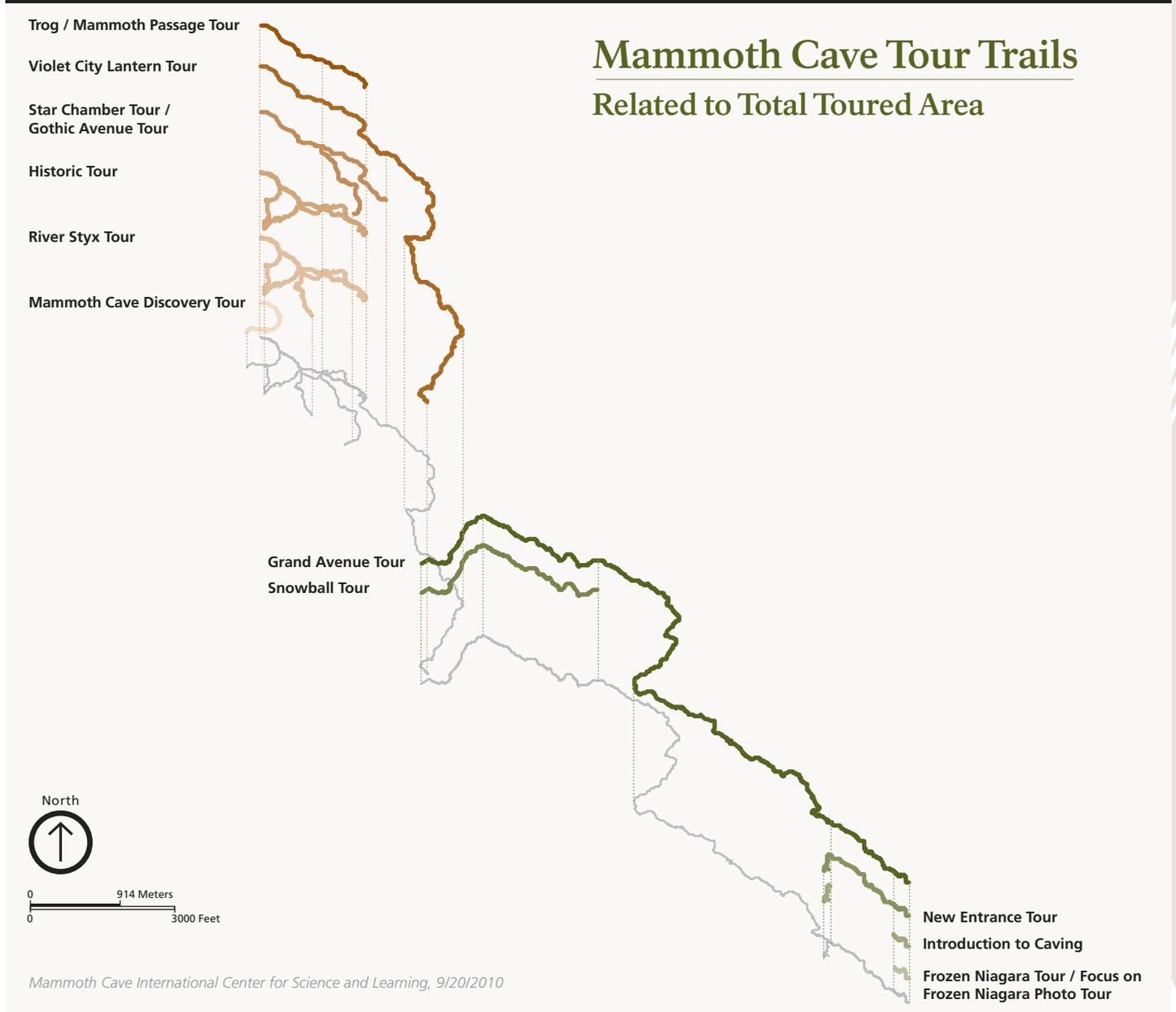


Figure 4. Trail areas used on Mammoth Cave tours.



Appendix B

WNS Cave Access Table Mammoth Cave National Park

Cave Area Classes	Activity Categories									
	On-Trail Tours and Education ¹	"Wild" Cave Tours and Education ²	Off-Trail Education: Non-Caving Groups ³	Off-Trail Education: Caving Groups ³	Facility Management: Maintenance, Construction ⁴	Research and Allied Activities ⁵	Search and Allied Emergency ⁷	WNS and Bat Rescue ⁸	Entrance Only ⁹	
	Pre-WNS	Post-WNS	Pre-WNS	Post-WNS	Pre-WNS	Post-WNS	Pre-WNS	Post-WNS	Pre-WNS	Post-WNS
Current Developed Trails^a	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Current "Wild" Cave Trails^b	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Former Tour Trails^c	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Off-Trail in Mammoth Cave System and Caves Without Colonial Bats^d	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Cave Areas With Colonial Bats^e	Green	Green	Green	Green	Red	Red	Red	Red	Green	Green

Access Restrictions: ■ = Activity allowed in this class of cave area ■ = Activity may be allowed in this class of cave area on a case-by-case basis ■ = Prohibited Activity □ = Activity generally does not occur in this class of cave area

Note: For activities in the ■ and ■ categories, see Appendix C, Figure 1 for decontamination requirements for access.

Notes on Cave Area Classes

- ^a Current developed trails, includes Historic (including Audubon, Gothic and River Styx to end of catwalk), Violet City Lantern, Grand Avenue, New Entrance, and Great Onyx (to benches). **These are shown in green on accompanying map** (Figure 1).
- ^b Currently approved routes in the Mammoth Cave system for Wild Cave, Intro to Caving, and Trog tours. **These are shown in brown on accompanying map** (Figure 1).
- ^c Former tour trails in the Mammoth Cave system, Great Onyx, and former show caves in the park. Examples in Mammoth Cave include El Ghor-Silliman, Welcome-Ganter, Gratz Avenue, Pensicola Avenue, Briggs Avenue, Morrison Avenue, Radio Room, and the New Discovery section. In Great Onyx the Flower and River routes are included. Examples in other show caves include Historic Crystal, Upper Salts, Historic Procter Cave, Ganter Cave, Wondering Woods Cave, Bedquilt Entrance, and White Cave. **These are shown in dark gray on accompanying map** (Figure 1). Historic Colossal and Long Cave would be in this category, except for the fact that they have colonial roosting bats (and are thus covered in the more restrictive category below).
- ^d This category refers to off-trail areas that have never been developed in the Mammoth Cave System and the extensive list of smaller caves in the park which lack colonial bats at any time of year. **The off-trail sections of the Mammoth Cave System are shown in beige on accompanying map** (Figure 1). The approximately 400 smaller caves in this category are spread throughout the park (not shown on the map to protect locations).
- ^e Cave areas and entire extent of smaller caves which house colonial bats at any time of year (see Appendix A). Known hibernacula for Indiana bats, gray bats, little brown bats, or Rafinesque's big-eared bats (also any hibernacula of northern long-eared or eastern small footed bats that are discovered): Colossal Cave (a section of the Mammoth Cave System), Wilson Cave, Haunted Cave, Wildcat Hollow Sink, and Currie Cave. Maternity or summer bachelor roosts for gray bats or Rafinesque's big-eared bats (also any summer roosts for little brown, northern long-eared, or eastern small-footed that may be discovered). These include Lee Cave, Blood Cave, Saucer Cave, Blight Cave, Misty Hole, Luna Cave, Evening Cave, Cathedral Cave, Deceptive Cave, and 6 new unnamed caves found in summers of 2009 and 2010. Cave with winter and summer roosts for colonial bats, including Long Cave, Bat Cave, Dixon Cave and Hickory Flat Cave.

Notes on Activity Categories

- ¹ Includes current walking cave tours that occur on developed trails. Also includes on-trail education trips, as well as any concessions operations, training, etc. activities in support of those tours.
- ² Current "wild" cave tours, including Wild Cave, Introduction to Caving, and Trog tours. Also includes education trips that use the routes approved for these tours, as well as any concessions operations, training, etc. activities needed to support these tours.
- ³ This category includes educational and related activities with groups or individuals who are unlikely to have been in other caves. Examples would include WKYU filming, Friends of Mammoth Cave trips, tours for NPS's Southeast Regional Office (SERO) and Washington Office (WASO) visitors, filming permits, or other similar special use permits. An event like the Collins family reunion visit to Crystal Cave would also be an example of this type of activity.
- ⁴ This category includes educational activities such as Karst Field Studies Classes, Mammoth Cave International Center for Science and Learning (MCICSL) university activities and park staff training trips that utilize previous tour trails in education activities such as classes and field exercises. Some filming permits and field trips associated with the International Congress of Speleology would also fall under this category. The line between this category and the one above is difficult to describe exactly, but is actually fairly clear in practice.
- ⁵ Research and allied activities including research via permits, cooperative agreements, and contracts. Includes cave I&M activities, Lesser Cave Inventory (in-cave activities), and cave survey. Also includes some archaeological site monitoring. This category also includes environmental restoration work (removal of old trash and infrastructure, covering cables, trail repair, fixing broken formations, etc) done by teams of National Speleological Society (NSS) volunteers (or occasionally by contractors or NPS employees). It also includes Search-and-Rescue (SAR) cave mapping and training. **This category does not include specific WNS research or bat research/monitoring activity (see footnote 8).**
- ⁶ Facility management operations/maintenance activities, construction/improvement projects (includes entrance gating and support), associated activities (planning, compliance, inspections, etc), and administrative activities. This also includes similar activities performed by contractors.
- ⁷ SAR emergency response directed by law enforcement teams.
- ⁸ Research activities specifically related to WNS or bats that involves going into a cave. Includes bat monitoring activities.
- ⁹ Entrance only activities are ones that do not require going into the cave (or beyond gates/doors in such cave entrances). These include activities such as Lesser Cave Inventory (obtaining GPS coordinates and mounting a small brass cave ID# cap), gate/lock/cave checks, WNS surveillance at cave gates, some woodrat monitoring, bat emergence counts, etc. Servicing of dataloggers or sensors placed just inside the gate to prevent vandalism is included here.

Figure 1



Mammoth Cave System and Tour Trails

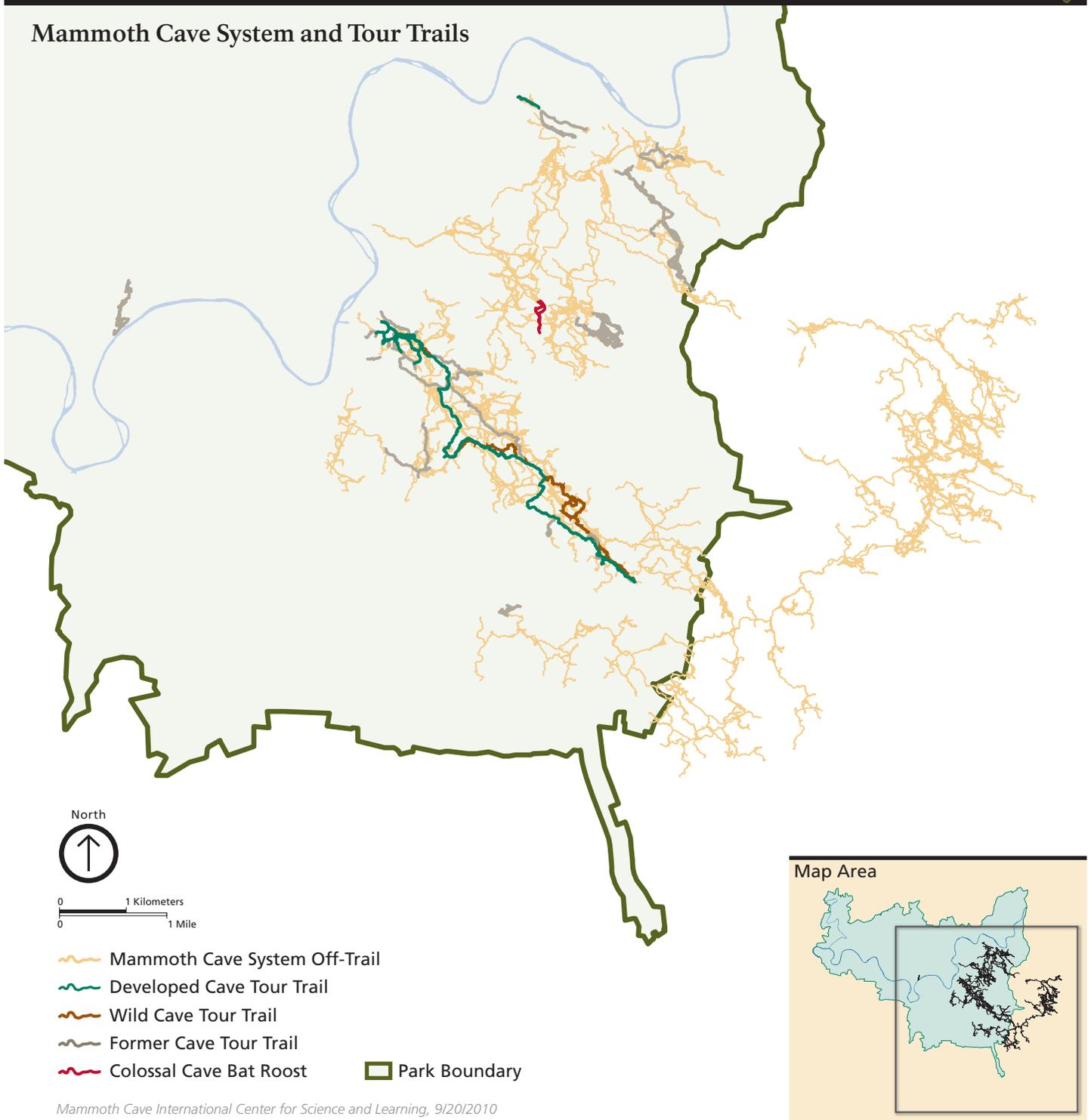


Figure 1. Trail areas used on Mammoth Cave tours and their extent and relationship to the Mammoth Cave System. The Colossal Cave bat roost section is shown (in red) for reference. The small piece of developed tour trail in the northern section of the map is the trail in Great Onyx Cave.

Appendix C

WNS Decontamination Required at Mammoth Cave National Park

General Statement of Decontamination Requirements

These decontamination requirements apply to all human activities in park caves; see Appendix B for examples of such activities. The requirements apply to all people participating in these activities regardless of affiliation or status. Activities that occur only at cave entrances (not inside the cave) do *not* require gear decontamination between caves. Beginning during the summer of 2010 for in-cave activities with *intimate* contact with cave sediments and continuing until the policy is changed, Mammoth Cave National Park (MACA) will require cave-level dedication or decontamination of all caving gear (including everything worn or taken into a cave) and bat research gear (anything that comes in contact with bats) as detailed in this appendix. By February 15, 2011 in anticipation of WNS arrival for in-cave activities with *minimal* contact and continuing until the policy is changed, MACA will require cave-level dedication or limited decontamination of footwear and some caving gear as detailed in this appendix.

1. Incoming caving gear that has been in a cave/mine and bat research gear will require decontamination or cave-level dedication.
2. Gear will require decontamination for movement *between all caves within the Park*, with the following exceptions:
 - Mammoth Cave System entrances on Mammoth Cave Ridge (Historic, Ventilator Shaft, New, Frozen Niagara, Carmichael, Violet City, Elevator, Cox, New Discovery, and Echo River Spring) are considered as one cave.
 - Mammoth Cave System entrances on Flint Ridge (Salts, Crystal, Austin, Unknown, Woodson-Adair, Bedquilt, and Hazen) are considered as one cave. Note: Colossal Entrance is not considered as the same cave.
3. Incoming and outgoing gear will require decontamination, use of disposable coverings, or cave-level dedicated gear in cave areas and caves with colonial bats (Appendix A) *at any time of year*.
4. Outgoing caving and bat research gear will require decontamination before use in any off-park caves.

Level of decontamination required for movement between caves will be determined by the activity undertaken and sediment exposure in the cave from which the person is coming. Figure 1 below provides a decision tree detailing levels of decontamination required for all in-cave activities.

Acceptable Decontamination Standards

For activities with minimal contact with cave sediments (see Figure 1, blue box ■)

The acceptable standards of pre- and post-activity decontamination for activities that allow for only minimal contact with cave sediment are based on the premise that these activities provide the lowest risk of transmission of *Geomyces destructans*. For more detail see Appendix F.

Activities in this class include those which primarily risk getting cave sediment on the



Decision Tree for Required White-Nose Syndrome Decontamination at Mammoth Cave National Park

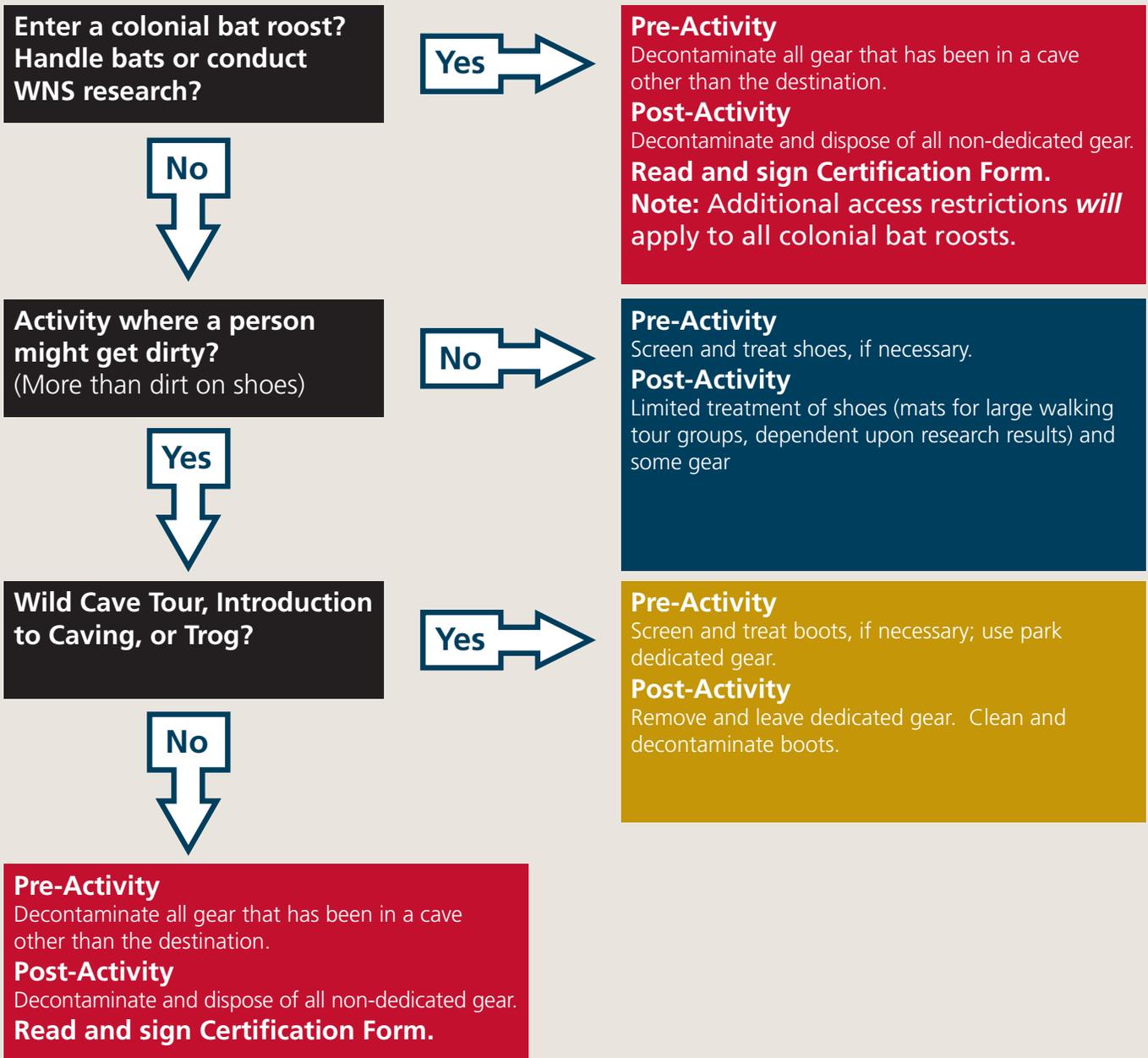


Figure 1. Decision tree for determining required level of decontamination for all in-cave activities at Mammoth Cave National Park. Colors link to more detail descriptions in text of this appendix.

soles of one's footwear only. Some examples include walking tours on current and former cave tour trails, custodial activities along trails, and limited research or other activities in walking cave passages that are not colonial bat roosts. If one of these activities puts gear other than footwear into repeated contact with cave sediments then decontamination of that specific gear is required.

1. Required *pre-activity* decontamination procedures for these activities consist of the following:
 - Screen visitors for previous cave visitation.
 - Require limited decontamination of footwear and gear that has been in caves or mines since 2005. Limited decontamination may include wiping gear, soaking the soles of shoes in decontamination fluid (followed by rinsing with water), or potentially requiring walking over decontamination mats based on results of ongoing research.
2. Required *post-activity* decontamination procedures for these activities consist of the following:
 - Educate visitors on the potential of WNS transport. This will be implemented post-WNS arrival for guided walking tours.
 - Limited decontamination of footwear. Research on decontamination mats for walking tour groups (up to 120 visitors per tour) is ongoing. Preliminary deployment of mass decontamination mats for visitors exiting caves after tours will be ready by February 15, 2011. Final measures to be deployed depend on research findings.

For crawling (or “wild”) cave tours (see Figure 1, gold box ■)

“Wild” cave tours are those that provide visitors with opportunities for crawling, climbing, canyoning, and other activities that may put them in *intimate* contact with cave sediments. At Mammoth Cave National Park these tours include Trog, Introduction to Caving, and Wild Cave Tour, and some educational activities led by the Environmental Education Program or the Mammoth Cave International Center for Science and Learning. Because of the

increased contact with cave sediments, these tours require more intensive decontamination procedures than walking tours. They will be implemented through a combination of dedicated gear and cleaning/decontamination, including a dedicated transportation bus. For more detail see Appendix F.

1. Required *pre-activity* decontamination procedures for these activities consist of the following:
 - Screen visitors for previous cave visitation.
 - Require decontamination of footwear and limited gear that has been in caves or mines since 2005 (followed by rinsing with water).
 - Require use of park-supplied dedicated coveralls, helmets, lights, packs, head scarves, gloves, and pads.
2. Required *post-activity* decontamination procedures for these activities consist of the following:
 - Educate visitors on the potential of WNS transport.
 - Clean and decontaminate footwear (followed by rinsing with water).
 - Leave park-supplied, dedicated gear at park for cleaning.

For activities with intimate cave sediment contact (other than “wild” cave tours) and for bat research (see Figure 1, red boxes ■)

The minimal acceptable decontamination standards for cave work or bat research at Mammoth Cave are the current acceptable standards available from the US Fish and Wildlife Service.

At the time of the preparation of this plan, **standards for cave work** are available at the USFWS main WNS website at:

http://www.fws.gov/WhiteNoseSyndrome/pdf/WNSDecontaminationProtocol_v012511.pdf

and at:

http://www.fws.gov/WhiteNoseSyndrome/pdf/WNSDecon_Cavers_v012511.pdf.

A PowerPoint presentation by Noelle Rayman, and Jeremy Coleman (USFWS) provides a good summary as well. The PowerPoint presentation can be accessed at:

http://www.fws.gov/WhiteNoseSyndrome/ppt/NPS_Decontamination_Protocols_Webinar_June_9_2010.ppt

At the time of the preparation of this plan, those **standards for bat research/monitoring** are available at the USFWS's main WNS at:

http://www.fws.gov/WhiteNoseSyndrome/pdf/WNSDecon_Researchers_v012511.pdf.

The procedures can be summarized as follows: gear should be washed well (with a detergent—Woolite® fabric wash is recommended) to remove mud and other dirt. Then the gear should be soaked in a decontaminating solution (one readily available solution would be a quaternary ammonium compound such as Formula 409® or Lysol® IC with a concentration of active ingredient >0.3%). Gear should be soaked for 10 minutes. The gear can then be thoroughly rinsed and air dried. Particular attention should be given to cleaning and decontaminating boots. As an alternative to chemical products, boiling submersible gear at a fast boil for 15 minutes is an acceptable method, followed by air drying. For gear such as cameras that cannot be submersed, the surfaces should be wiped with a cleaning solution (bleach, quaternary ammonium compounds, or Lysol® Disinfecting Wipes); alternatively, some electronics can be placed in sealed plastic bags (or wrapped) and the plastic bags can be discarded between caves.

Follow manufacturer's recommendations pertaining to Personal Protective Equipment for use with all decontamination chemicals. Material Safety Data Sheets for each product are available in the Science and Resources Management office and at the Visitor Center.

All participants will be required to read and sign the Decontamination Certification Form (see below).

Approaches to Reducing Decontamination Needs

There are several approaches available which will reduce the amount of gear that needs to be decontaminated. They are as follows:

1. Reduce the amount of gear being taken into the cave/field to that needed for safe and effective work.

2. Gear (such as extra lights) which may not be used during a cave trip can be bagged in sealed plastic bags. If the bags are not opened in the cave, the gear inside will not require decontamination. However, the bags themselves will be considered contaminated and will require disposal or decontamination.
3. Clothing coverings, such as disposable rubber booties and disposable coveralls (made of Tyvek® or similar fabrics), may be used to reduce the risk of contamination of clothing and footwear (and thus also the need for decontamination). However, it is important to be sure that coverings do not tear or otherwise allow clothing to be exposed to the cave sediments. Also, boot coverings can affect footing and should only be used when it is clear that they will not compromise safety.
4. Some gear (especially less expensive or difficult to decontaminate gear) could be dedicated for use in only one cave or cave area (such as Dixon Cave or Mammoth Cave Ridge system entrances).
5. In some cases disposable gear (such as latex or rubber gloves for handling bats) provides a preferable alternative to decontamination.
6. The use of submersible rubber boots, such as wellies, may expedite decontamination of footwear and allow for a higher level of decontamination.

Transport and Storage

After gear is decontaminated, people must take care not to let it come in contact with gear that has not been decontaminated or with storage containers, car trunks, etc. that have been used to haul dirty cave gear. Decontaminated gear should be segregated from other cave gear (either by placing in sealed bags or by placing it in clearly marked separate containers to keep it clean). Vehicles that have been used to haul dirty gear not properly stored should also be decontaminated. Careful double bagging of potentially contaminated gear after exiting the cave but before placing it in vehicles is essential to reduce the potential for contaminating vehicles and other gear.



WNS Decontamination Requirements and Certification

General statement of Decontamination Requirements

Beginning August 1, 2010, Mammoth Cave National Park requires cave-level dedication or decontamination of cave gear (including everything worn or taken *into* a cave) as detailed below:

1. Incoming cave gear that has been in a cave/mine will require decontamination or cave-level dedication.
2. Gear will require decontamination *between all caves within the Park*, with the following exceptions:
 - Mammoth Cave System entrances on Mammoth Cave Ridge (Historic, Violet City, New, Frozen Niagara, Carmichael, Elevator, Cox, New Discovery, Echo River Spring, and the Ventilator Shaft) are considered as one cave.
 - Mammoth Cave System entrances on Flint Ridge (Salts, Crystal, Austin, Unknown, Woodson-Adair, Bedquilt, and Hazen) are considered as one cave. Note: Colossal Entrance is not considered as the same cave, due to its further restrictions as a hibernaculum.
 - Mammoth Cave System entrances on Joppa Ridge (Procter, Doyle Valley, Morrison, and Ferguson) are considered as one cave.
 - Mammoth Cave System entrances on Toohey Ridge (Historic Roppel, Daleo, Weller, Kahn, and Hoover) are considered as one cave.
3. Incoming and outgoing gear will require decontamination, use of disposable coverings, or cave-level dedicated gear in cave areas and caves with colonial bats *at any time of year*.
4. Outgoing cave gear will require decontamination before use in any off-Park caves.

Acceptable Standards for Activities With Intimate Cave Sediment Contact

The minimal acceptable decontamination standards for cave work at Mammoth Cave are the current acceptable standards available from the US Fish and Wildlife Service.

At the time of the preparation of this plan, standards for cave work are available at the USFWS's main WNS website at:

http://www.fws.gov/WhiteNoseSyndrome/pdf/WNSDecontaminationProtocol_v012511.pdf

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The procedures can be summarized as follows: Gear should be washed well (with a detergent—Woolite® fabric wash is recommended) to remove mud and other dirt. Then the gear should be soaked in a decontaminating solution (one readily available solution would be a quaternary ammonium compound

such as Formula 409® or Lysol® IC with a concentration of active ingredient >0.3%). Gear should be soaked for 10 minutes. The gear can then be thoroughly rinsed and air dried. Particular attention should be given to cleaning and decontaminating boots. As an alternative to chemical products, boiling submersible gear at a fast boil for 15 minutes is an acceptable method, followed by air drying. For gear such as cameras that cannot be submersed, the surfaces should be wiped with a cleaning solution (bleach, quaternary ammonium compounds, or Lysol® Disinfecting Wipes); alternatively, some electronics can be placed in sealed plastic bags (or wrapped) and the plastic bags can be discarded between caves.

Follow manufacturer's recommendations pertaining to Personal Protective Equipment for use with all decontamination chemicals. Material Safety Data Sheets for each product are available in the Science and Resources Management office and at the Visitor Center.

Approaches to Reducing Decontamination Needs

There are several approaches available which will reduce the amount of gear that needs to be decontaminated. They are as follows:

1. Reduce the amount of gear being taken into the cave/field to that needed for safe and effective work.
2. Gear (such as extra lights) which may not be used during a cave trip can be bagged in sealed plastic bags. If the bags are not opened in the cave, the gear inside will not require decontamination. However, the bags themselves will be considered contaminated and will require disposal or decontamination.
3. Clothing coverings, such as disposable rubber booties and disposable coveralls (made of tyvek® or similar fabrics), may be used to reduce the risk of contamination of clothing and shoes (and thus also the need for decontamination). However, it is important to be sure that coverings do not tear or otherwise allow clothing to be exposed to the cave sediments. Also, boot coverings can affect footing and should only be used when it is clear that they will not compromise safety.
4. Some gear (especially less expensive or difficult to decontaminate gear) could be dedicated for use in only one cave or cave area (such as Mammoth Cave Ridge system entrances or Dixon Cave).
5. In some cases disposable gear (such as latex or rubber gloves for handling bats) provides a preferable alternative to decontamination.
6. The use of submersible rubber boots, such as wellies, may expedite decontamination of footwear.

Transport and Storage

After gear is decontaminated, people must take care not to let it come in contact with gear that has not been decontaminated or to storage containers, car trunks, etc. that have been used to haul dirty cave gear. Decontaminated gear should be segregated from other cave gear (either by placing in sealed bags or by placing it in separate containers to keep it clean). Vehicles that have been used to haul dirty gear not properly stored should also be decontaminated. Careful double bagging of potentially contaminated gear after exiting the cave but before placing it in vehicles is essential to reduce the potential for contaminating vehicles and other gear.



Please read the following and provide certifications regarding the decontamination status of your gear (includes clothing, footwear, and all caving gear).

Incoming Gear

Gear that has been used in a cave other than the one you will be entering on the current trip since being last decontaminated, must be decontaminated and thoroughly rinsed with water (to reduce potential for transmission of chemicals into the cave environment) before entering the cave.

Decontamination of Gear Between Park Caves

Gear that has been used in any cave on the park must be decontaminated before being used in any other cave on the park (with the exceptions noted above).

Decontamination of Outgoing Gear

Gear (including clothes, footwear, and caving gear) that has come in substantial contact (more intimate contact than normal walking tours on trails) with the sediments of a park cave must be decontaminated before use in any other cave. Footwear must be decontaminated even if it comes into only minimal contact with the cave.

We expect that our cooperators and researchers will comply with park decontamination requirements. Our relationship with researchers and cooperators is built on a shared desire to understand and protect cave resources. We would hope that there would not be a need for park personnel to individually examine each participant for signs of appropriate decontamination. We expect groups to police themselves. However, park personnel working with groups will be watching for signs of potentially contaminated gear. If we find evidence that groups or individuals are not complying with gear restrictions and decontamination procedures, we would immediately need to re-evaluate our decisions to allow certain activities to continue because our assumptions about our ability continue them in a biologically responsible manner would potentially be invalid.

Certifications

I, _____, certify that I have read and understand the Mammoth Cave National Park procedures for preventing the spread of WNS to, from, and among the caves of Mammoth Cave National Park, and that all clothing, footwear and gear I will be using during cave activities in which I am participating is:

- 1) In compliance with the Incoming Gear statement above,
- 2) Will be decontaminated between caves as above (if applicable), and
- 3) Will be decontaminated before use in any other cave as above.

Signature: _____ **Date:** _____

Appendix D

Winter Bat Hibernacula/Landscape White-Nose Syndrome Surveillance and Internal Survey Data Forms

The forms included in this Appendix are to be used to document winter bat hibernacula and landscape surveillance data and internal White-Nose Syndrome surveys in Mammoth Cave National Park.



Winter Bat Hibernacula/Landscape White Nose Syndrome Surveillance Data Form

SITE NAME or No.: _____

SURVEYOR: _____

(Lead Surveyor who is responsible for reporting)

LAT: _____ ° - _____ ' _____ " (N) **LON:** _____ ° - _____ ' - _____ " (W) **DATUM** (circle): WGS84 – NAD83 – NAD27

Lat/Lon Precision (circle): GPS – From Map – County. Resolution – Not Mapped – Other (specify) _____
 (circle- "GPS" if GPS unit used; "From Map" if plotted from map; "County Resolution" if coordinates are only County specific)

COUNTY: _____ **STATE** _____

TYPE of SURVEY/MONITORING (circle all that apply)

Internal Survey -- External/Entrance Survey --

Hibernacula -- Maternity Roost -- General Landscape --

Video Monitoring -- Beam Break -- Acoustic Monitoring

DATE: _____

WNS ASSESSMENT

White-Nose Syndrome Signs	Present (1) Unknown/Absent (0)
Increased mortality in colony in/near hibernaculum, maternity roost site, or clustered on the landscape	
Observed outside in cold temperatures or consistently during daylight hours	
Roosting near hibernaculum entrance in winter	
Fungus observed on body	
Originate from/detected in hibernaculum previously labeled as a positive WNS affected site	
Muzzle, ear, and/or wing membrane lesions (active or chronic)	
Dehydrated appearance	
Thin, low body weight/arm length index	
Difficult to rouse with disturbance	
Found sick or dead at location where historic population size is diminished	
Alive, but found on ground	
TOTAL	

ENTRANCE SURVEY

Weather:

Temp		Conditions (rain, windy, etc.)	
-------------	--	---------------------------------------	--

OBSERVATIONS AT ENTRANCE (take 15 minutes for entrance observation)

Flying bats # observed/1 minute:		Moribund bats # observed:	
Dead bats # observed:		Bats clustering # of clusters observed:	
Photo documentation Photo #(s)			

Specimen/sample sent to lab? YES / NO What lab were samples sent to?

Type and Quantity of Specimen or Sample Type: Whole Carcass _____ Biopsy _____ Fungus _____ Soil _____

COMMENTS (Description of effort, summary of methods etc...):

Winter Bat Hibernacula White Nose Syndrome Internal Survey Data Form

SITE NAME or No.: _____

SURVEYOR: _____

(Lead Surveyor who is responsible for reporting)

LAT: _____ ° - _____ ' _____ " (N) **LON:** _____ ° - _____ ' - _____ " (W) **DATUM** (circle): WGS84– NAD83 – NAD27

Lat/Lon Precision (circle): GPS – From Map – County. Resolution – Not Mapped – Other (specify) _____
 (circle- "GPS" if GPS unit used; "From Map" if plotted from map; "County Resolution" if coordinates are only County specific)

COUNTY: _____ **STATE** _____

TYPE of SURVEY/MONITORING (circle)

Internal Survey -- External/Entrance Survey --

DATE: _____

Hibernacula -- Maternity Roost -- General Landscape --

Video Monitoring -- Beam Break -- Acoustic Monitoring

NUMBERS OF BATS OBSERVED INFECTED (Visible White Fungus) or DECEASED by SPECIES

Species	Total # per spp	# Infect	% Inf	# Dead	Species	Total # per spp	# Infect	% Inf	# Dead	Species	Total # per spp	# Infect	% Inf	# Dead
CORA					COTO					EPFU				
LANO					MYAU					MYGR				
MYLE					MYLU					MYSE				
MYSO					PESU					UNK				

Photo documentation: _____

Specimen/sample Sent to Lab? YES / NO **What lab were samples sent to?**

Type and Quantity of Specimen or Sample Type: Whole Carcass _____ Biopsy _____ Fungus _____ Soil _____

Specimen / Sample(s) taken by Species:

CORA		COTO		EPFU		LANO	
MYAU		MYGR		MYLE		MYLU	
MYSE		MYSO		PESU		Other	

COMMENTS (Description of effort, summary of methods etc...):

PLEASE ATTACH A CAVE/SITE MAP WITH LOCATIONS OF BATS MARKED

Appendix E

White-Nose Syndrome Communications Plan for Mammoth Cave National Park

The WNS Communications Plan (MACA) is a general guide for park managers. It outlines an overall goal and how that goal will be presented to each of the pertinent park publics, following the format of the Public Relations Society of America.

Situational Analysis

Background

Since 2006 WNS, a fungal disease, has killed more than 1 million cave-dwelling bats in the United States. First found in caves and mines in New York, WNS has since spread north (into Canada) and south (to northeastern Tennessee). The genetic signature of the fungus has been recovered from bats in Missouri and as far west as Oklahoma.

There are more than 400 caves within the park, one of those is Mammoth Cave. Mammoth Cave alone is over 390 miles long and has at least 25 entrances (including at least 7 on private property outside the park). Cave tours travel through 12 miles of Mammoth Cave.

Mammoth Cave was established as a national park in 1941, a World Heritage Site in 1981, and the core area of an International Biosphere Reserve in 1990.

All park caves are closed to human access, except via NPS cave tour, research permit or special use permit, by regulation:

- 36 CFR, Chapter I, Part 7 – Special Regulations, Area of the National Park System, Sec. 7.36 Mammoth Cave National Park:

(b)(1) Cave entry. Except for those portions of the caves open to the general public, no person shall enter any cave within the boundaries of the park without first obtaining a permit from the Superintendent. Permits will be issued to

persons who are qualified and experienced in cave exploration, who possess the needed equipment for safe entry and travel, and who are engaged in scientific research projects which in the opinion of the Superintendent are compatible with the purpose for which the park was established.

The park issues about 30 research permits/year and conducts other research with partner universities and organizations. Many require entry into Mammoth Cave or the lesser caves in the park. Special Use Permits and filming permits may request cave entry, varying from tourist trail to remote caves.

In spring 2009, the park stopped issuing permits for access to colonial bat hibernacula and summer roosts except for limited WNS or bat research/monitoring during 2009 and thereafter.

Research in cave areas that are not colonial bat roosts is restricted to scholars with approved research permits. Since May 2009 researchers have been required to comply with approved decontamination procedures available at:

<http://www.fws.gov/WhiteNoseSyndrome/>.

A March 2009 USFWS Cave Advisory related to bats and WNS states in part: “. . .At this time, the evidence is lacking to recommend the closure of commercial sites that offer cave tours to the general public. . .we will be working with the owners and operators of commercial caves to help them employ methods to minimize the potential for contaminated materials from entering or leaving their sites.”

In April 2009 the NPS WASO Acting Deputy Director issued a memo with interim guidance on WNS in bats that included the introductory statement: “The guidance does not apply to closure of caves that support large commercial tours.”

In June 2009, in order to assist with the nationwide effort to slow down or prevent the spread of WNS, Mammoth Cave initiated a WNS Education and Outreach program for visitors and researchers that includes appropriate decontamination measures available from the USFWS. Support funding was provided by NPS WASO-BRMD and USFWS.

It is not fully understood how WNS is transmitted. There is strong evidence that it spreads primarily by bat-to-bat and cave-to-bat contact. Evidence also suggests that potential exists for humans traveling between caves to inadvertently contribute to the spread of the fungus.

In the environment, bats play a role in insect control, and their guano inside the cave is an energy source for animals that never leave the cave.

Bats are wild animals. The NPS has made no attempt to control the movement of bats from one location to another.

Individual bats are occasionally seen along the cave tour routes. Currently there are no colonial bat hibernacula in toured sections of the cave, but there may be a few individual bats which hibernate in these sections (such as tri-colored bats). Prior to 1900, areas in the Historic section of Mammoth Cave were colonial bat hibernacula, as evidenced by stains on the cave walls, layers of bat bones, and visitor accounts. Some bats continue to utilize the toured sections to roost during the summer. There are no maternity roosts in the toured sections.

There are no currently known direct human risks caused by the fungus linked to WNS.

Recreational caving was allowed in one Park cave (Ganter Cave) by permit for a few years, but all recreational caving has been prohibited at Mammoth Cave National Park since circa 1995.

Mammoth Cave NP is the tourism engine for the caveland area of Kentucky. In 2009, 403,095 people toured Mammoth

Cave. The Park partners with other area commercial caves in cross-selling tickets, and works closely with local chambers, tourism commissions, and the Kentucky Department of Tourism. Many area businesses derive their livelihood from people traveling to the park. In 2008, the economic impact of tourism in Kentucky’s cave region totaled \$467 million (Kentucky state total = \$10.7 billion; cave region ranks sixth of nine regions).

Bat hibernation ends around April 30; swarming occurs in September to October; hibernation begins in November.

Current Status

On September 7, 2010, NPS Deputy Director Dan Wenk issued *Revised Guidance on White-Nose Syndrome in Bats and Impact on Cave Use* memorandum.

Tours and research in MACA continue at this time and are accompanied by extensive education and outreach on WNS, and adherence to protocols available from the USFWS regarding decontamination and gear dedication.

To date, WNS has not been found in Mammoth Cave National Park or Kentucky. In March 2010, the genetic signature of the fungus was recovered from a bat in Dunbar Cave, near Clarksville, Tennessee, approximately 80 miles from MACA; and it was confirmed in Canada. The genetic signature of the fungus was recovered from bats in Missouri in April and from bats in Oklahoma in May. MACA will increase WNS surveillance, bat monitoring, and response to reports of unusual bat behavior, as outlined in the draft Response Plan.

The park has completed a WNS response plan addressing continued operation of cave tours and research, visitor education regarding spread of the disease to other caves, and review of all in-cave activities to assess potential benefits vs. risks of WNS spread.

Assuming the arrival of WNS at MACA may be imminent, the Park WNS Response Plan addresses both pre-arrival and post-arrival strategies. The Park will begin to implement post-arrival strategies in May 2010, attempting to minimize the spread of WNS to MACA, as well as the spread of WNS from MACA.

Park managers are working closely with NPS Regional, Cumberland Piedmont Network, and Natural Resource Stewardship and Science Directorate personnel, as well as USFWS regional and Kentucky state resource managers.

At the request of the USFWS, on April 1-2, 2010, the park evaluated two of its remote hibernacula caves; a few bats were found with an unidentified white substance resembling the WNS fungus. Bats were also tested in 2009. All results have returned negative.

Problem / Opportunity Statement

The arrival of WNS at MACA appears to be imminent. Park managers are using the best-available science and adaptive management to formulate a prudent course of action that may minimize the arrival and spread of WMS without completely closing Mammoth Cave to the public and researchers.

Program Goal

Help park employees, partners, constituents and the public understand, accept and support the park's course of action regarding WNS.

Publics

Internal

1. Park employees
2. In-park workers (Hotel, Eastern National, liveries, Post Office, contractors, recreation.gov workers, Friends, volunteers)
3. SERO
4. WASO
5. NPS areas that manage caves (RUCA, CUGA, GRSM, CAVE, WICA, JECA, TICA, ORCA, SEKI etc.)
6. DOI (Secretary's office and other DOI agencies)

External

7. Researchers (universities)
8. Cave constituents (CRF, NSS, grottos)
9. Tourism constituents (show caves, chambers, tourism commissions, CMA, Ky. Dept of Tourism)
- 10a. In-park visitors (people in the park, people going on cave tours, Junior Rangers)
- 10b. In-park visitors (Wild Cave, Intro to Caving, Trog participants)
11. General public
12. Elected officials (US Congress, Ky. Legislature, Governor, Judge Execs, BRADD, mayors)
13. Virtual visitors (people planning to visit the park, online visitors)
14. Other agencies (Ky. Dept of Fish/ Wildlife, USFWS, USFS, BLM, state and local Health Depts.)
15. Media (news media, filmers, photographers)

Objectives and Strategies for Publics

Park employees(1) and In-park workers(2)

Objective: By May 10, park employees and in-park workers will understand/accept/support/ take action on the park's efforts to minimize the arrival and spread of WNS. Post and print copies of the WNS Response Plan when approved.

Action strategy: Park managers will brief their divisions and Hotel managers; all employee meeting(s); in-park workers attend all employee meeting(s); all employee and in-park worker email message; email message content is posted on employee bulletin boards; managers should formally and informally discuss the Response Plan with employees; provide WNS text to recreation.gov employees. As the WNS situation changes, communicate new information.

Communication strategy: in-person briefings and meetings; email message from the superintendent; communication between Tickets and recreation.gov

Implementation plan: Park managers will conduct all meetings before May 10; PIO draft email message by May 1; provide WNS text to recreation.gov employees by May 1.

Cost: manager and employee time

SERO(3), WASO(4), DOI(6), NPS areas that manage caves(5), Other agencies(14)

Objective: By May 28, SERO, WASO, DOI, and other agencies will understand/accept/support the park's efforts to minimize arrival and spread of WNS. Share the WNS Response Plan when it is complete.

Action strategy: schedule meetings or calls; draft briefing statements and 3-week out reports. Send or post final Response Plan on MACA's website to share with other NPS areas. As the WNS situation changes, communicate new information.

Communications strategy: conference calls; briefing statements; in-person meetings when possible; web pages; posters.

Implementation plan: Park managers will establish and maintain communications between the park and SERO, WASO, NPS, DOI, and other agencies.

Cost: manager time; conference calls; possibly travel.

Researchers(7), Cave constituents(8)

Objective: By May 10, researchers and cave constituents will understand/accept/take action on the park's expanded decontamination protocols. Park will provide the park's WNS Response Plan to interested parties when the plan is complete.

Actions strategy: S&RM staff will discuss expanded decontamination protocols with all holders of research permits and cave constituents; draft materials to be used in discussions; finalize WNS Response Plan and disseminate. As the WNS situation changes, communicate new information.

Communications strategy: telephone calls; conference calls; letters; in-person meetings; web pages.

Implementation plan: S&RM staff will discuss WNS initiatives with researchers and share copies of the Response Plan via MACA's website when it is complete.

Cost: staff time; printing costs

Tourism constituents (show caves, cross-selling partners, chambers, tourism commissions, Caveland Marketing Assn, Ky. Dept of Tourism)(9)

Objective: Help tourism constituents understand/accept/support the park's WNS initiatives; managers will present cross-selling proposal to partners.

Action strategy: schedule meetings with groups or individuals; prepare briefing materials. As the WNS situation changes, communicate new information.

Communications strategy: telephone calls; in-person meetings with individuals or groups.

Implementation plan: Park managers will make presentations or discuss the park's WNS initiatives with tourism constituents individually or in group meetings.

Cost: staff time

In-park visitors (people in the park, people going on cave tours, Junior Rangers)(10a)

Objective: By May 29, in-park visitors will understand/accept/take action on tour initiatives and the park's efforts to minimize arrival and spread of WNS.

Action strategy: continue the WNS station.

Communications strategy: tour warning talks; posters/bulletin board; site bulletin; tear-sheet; schedule brochure; Implementation plan: include a WNS message in pertinent park information materials; update WNS station; update posters/bulletin board;

Costs: staff time; printing

In-park visitors (Wild Cave, Intro to Caving, Trog participants)(10b)

Objective: By May 10, in-park visitors will understand/accept/take action on caving-tour initiatives and the park's efforts to minimize arrival and spread of WNS.

Action strategy: include the park's WNS initiatives in warning talks; continue the WNS station.

Communications strategy: tour warning talks; posters/bulletin board; site bulletin; tear-sheet; schedule brochure.

Implementation plan: include a WNS message in all park information materials; update WNS station; update posters/bulletin boardpost info at campgrounds;

Costs: staff time; printing

General public(11)

Objective: Help the general public become aware of the park's efforts to minimize the arrival and spread of WNS.

Action strategy: As the WNS situation changes, use media and the park website to disseminate the message.

Communications strategy: news releases; radio interviews; website; links

Implementation plan: prepare news releases; schedule radio interviews; update the park website; encourage partners to link to the park's WNS webpage.

Cost: staff time

Elected officials (US Congress, Kentucky Legislature, Governor, Judge Execs, fiscal courts, BRADD, mayors)(12)

Objective: Keep elected officials aware and informed of the park's efforts to minimize the arrival and spread of WNS.

Action strategy: As the WNS situation changes, schedule meetings with groups or individuals; prepare briefing materials.

Communications strategy: telephone calls; in-person meetings with individuals or groups; briefing statement or handouts.

Implementation plan: Park managers will make presentations or discuss the park's WNS initiatives with elected officials individually or in group meetings.

Cost: staff time

Virtual visitors (people planning to visit the park, online visitors)(13)

Objective: Keep virtual visitors aware of the park's efforts to minimize the arrival and spread of WNS.

Actions strategy: include a WNS message in pertinent park information, printed materials, online, and telephone conversations; update park's WNS pages. As the WNS situation changes, communicate new information.

Communications plan: printed materials that are mailed to potential visitors; telephone conversations with potential visitors; email answers to visitor requests; park web pages; photos; **Implementation plan:** prepare message to be included in printed materials; update park WNS web pages; prepare message to be used by phone room workers; prepare message to be included in response to visitor email.

Cost: staff time; printing

Media (news media, filmers, photographers)(15)

Objective: Keep news media aware of the park's efforts to minimize the arrival and spread of WNS.

Action strategy: As the WNS situation changes, issue news release about changes in cave tour operations and research; update the Commercial Filming Guideline for decontamination

Communications plan: media alert; news release; interviews; telephone calls; web pages.

Implementation plan: draft news release and media alert; schedule interviews; update park WNS web pages.

Cost: staff time

Evaluation

Spot checks with visitors, researchers, tourism partners, elected officials, media.

The White-Nose Syndrome Station in operation at the Mammoth Cave National Park Visitor Center.



Appendix F

White-Nose Syndrome Outreach and Education Program at the Visitor Center Mammoth Cave National Park, Kentucky

The purpose of the White-Nose Syndrome Education and Outreach program introduced in the summer of 2009 was to inform visitors about White-Nose Syndrome (WNS), attempt to prevent the spread of WNS, disinfect items as needed, and foster active stewardship for visitors touring additional caves. The program continued to operate in 2010 with some modifications in logistics based on the 2009 experience as well as to update the program with the most current scientific evidence base.

Background

Below is a description of regularly scheduled cave tours in Mammoth Cave National Park (MACA). For more detail see Appendix A of MACA’s WNS Response Plan.

Most of the over 390-mile long Mammoth Cave system—longest known in the world—lies within MACA. The park provides visitors year-round access to some cave areas through regularly scheduled cave tours. These tours are led by MACA staff and require purchase of a ticket. MACA provides cave tours to about 400,000 visitors a year. In low season (mid-September to mid-March) visitors are able to select from up to 10 tours and in high season (mid-March to mid-September) from up to 15 tours. The daily number of visitors on cave tours can range from a few dozen in January to almost six thousand in July. Cave tour visitation is highly seasonal with about 75% of annual visits occurring between April 1 and September 30 (Figure 1).

The majority of cave visitors tour caves in which they will have minimal contact with cave sediments and less than 2 percent of visitors participate on the crawling (or “wild”) cave tours in which they can have considerable contact with sediment. General descriptions of the two cave tour types follow below.

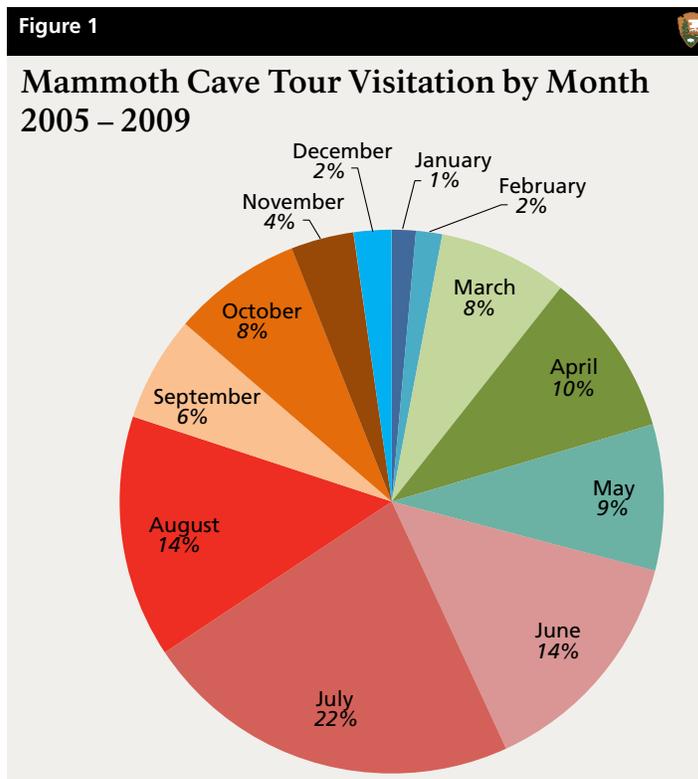


Figure 1. Seasonal distribution of MACA cave tour visitation 2005-2009.

General Walking Tours (98.5% of visits)

The walking lengths of these cave tours range from one-quarter of a mile to four miles.

The prepared trails wind through a range of large passages, confining spaces and heights, and up and down metal, stone or concrete stairways. Walking tours last from 1.25 to 4.5 hours, illuminated the entire time by either installed electric lights or hand-held lanterns. These tours are led by one or two guides and have a maximum tour size of 30 to 120 visitors, depending on the tour.

Crawling (or “Wild”) Cave Tours (1.5% of visits)

The lengths of these tours range from one to five miles and involve intimate contact with cave sediments via walking, crawling, climbing, and canyoning over hard-pack, through mud and water. These tours last from 2.5 to 6.5 hours, are led by two guides, and have a maximum tour size of 12 to 20 visitors, depending on the tour. Participants use dedicated coveralls, headlamps, helmets, gloves, pads, packs, and head scarves (MACA-supplied gear only).

There about 8 miles of tour trails for general walking tours and an additional approximately 4 miles of “wild cave” tour trails. The traffic on various sections of tour trail varies because the number of tours and tour sizes that use particular areas vary greatly. Tours enter or leave the cave through five entrances of the Mammoth Cave System. Of these, only one is a natural entrance. Some support for cave tours also enters the cave through the Elevator, another artificial entrance. In addition, regularly scheduled general walking tours occur in one other cave in the park: Great Onyx Cave (a 4.2 mile long cave). The tours in Great Onyx Cave are walking tours in which the visitors use handheld lanterns and stay on one-quarter mile of developed cave trails.

Visitor Screening, Gear Decontamination, and WNS Education

As stated in Appendix C the level of gear (including footwear) decontamination required for visitors entering and exiting the cave depends on the activity and sediment exposure experienced before arriving in the park as well as undertaken in the cave from which the visitors exit. The sections below describe the outreach, decontamination, and education activities for both tour types. Because some of the intervention methods involve the use of potentially hazardous chemicals, employees will be trained in accordance with OSHA’s Hazard Communication Standards (29CFR1910.1200).

Pre-tour screening and intervention

Participants on both tour types are screened before entry in the cave. Cave visitation history data are collected by WNS park rangers and entered into a database. The amount of potentially contaminated gear to be screened is reduced because, for security-related reasons (not WNS), the **following items are *not permitted* on cave tours:**

- Camera Bags and Tripods
- Strollers
- Luggage (suitcases, duffel bags, etc.)
- Backpacks
- Bags of any type (including purses and diaper bags).

General Walking Tours

For visitors on these tours with minimal contact with cave sediments, pre-entry screening is conducted by park rangers staffing the White-Nose Syndrome Station (i.e., outreach desk). These rangers rove and speak with visitors inside the visitor center and under shelters before tours and entire groups before tours depart, and make WNS announcements over the public address system 15 minutes prior to all cave tour departures. If a visitor had been in a cave or mine *anywhere* since 2005, the following intervention measures are taken:

- Taking potentially contaminated item/s to vehicle/room/tent before start of tour or securing in lockers provided at visitor center
- Placing potentially contaminated item/s in sealable plastic bag(s) (Ziploc®-type) and keeping with them inside given bag/s throughout the cave tour
- An acceptable alternative to sealable plastic bags is to sanitize potentially contaminated watches, glasses, jewelry with Lysol® wipes. Cameras considered a risk may be cleaned with Lysol® wipes.
- Changing potentially contaminated footwear for clean footwear or sanitizing the soles of footwear for 5 minutes in “boot bath” with a 0.6 percent solution of a quaternary ammonia disinfectant, Lysol® IC Disinfectant Cleaner (2oz Lysol® IC : 1 gal water)

Crawling (or “Wild”) Cave Tours

For visitors on the crawling (or “wild”) cave tours, pre-entry screening is conducted in a slightly different manner but with the same aim. All participants use dedicated gear (coveralls, knee pads, helmet, headlamp, head scarves, packs, and gloves) provided and maintained by the park and participants use their own boots. Rangers pre-screen participants regarding their prior cave exposure and will decontaminate the boots in the same solution boot bath described above before the tour begins.

Environmental Education (EE) and Mammoth Cave International Center for Science and Learning (MCICSL) Groups

The Mammoth Cave EE program and the MCICSL lead groups on cave tours as part of education activities. These activities are usually walking tours that lead to minimal contact with sediments (like the general walking tours above). These groups are always organized in advance and are usually school groups. As a step in the organizing of the educational trips, the EE program or the MCICSL sends the leaders in charge of the group basic information on WNS and information on the restrictions on things that

can go into the cave. In particular they inform the teachers to be sure that all members of the group (students and chaperones) must wear shoes that have never been in any cave or mine other than Mammoth Cave or they must be prepared to decontaminate shoes at the park before going into the cave. When decontamination is needed it is performed either by the EE staff, MCICSL staff, or at the park WNS Station.

When the EE program or MCICSL leads trips that are similar to the “wild” cave tours, they use the same procedures as are used for the “wild” cave tours.

Post-tour education and decontamination

General Walking tours (to be implemented post-WNS arrival)

At the end of each tour visitors will be educated on the potential of WNS transport and encouraged not to take anything they are wearing/carrying into another cave unless properly decontaminated.

To disinfect the footwear of all participants going through the minimal sediment contact tours, disinfection mats would be placed at the bus loading area, Mammoth Cave Historic Entrance, and Great Onyx Cave Entrance. These mats may contain a solution of a quaternary ammonia disinfectant and all tour visitors would be asked to walk across the mat after their tour. Research on decontamination mats for walking tour groups (up to 120 visitors per tour) is ongoing. Preliminary deployment of mass decontamination mats for visitors exiting caves after tours will be ready by February 15, 2011. Final measures to be deployed depend on research findings.

Crawling (or “Wild”) Cave Tours (implemented May 2010)

“Wild” cave tour participants are transported by a bus dedicated to transport “wild” cave tour participants only to the separate staging area where participants received their gear. The following is the sequence of cleaning and removing gear for disinfection:

- Remove and brush any mud off of boot soles, seams, and uppers with provided high pressure hoses and brushes

- Remove boots and place in 0.6 percent Lysol® IC solution baths for a minimum of five minutes to soak soles
- Spray boot uppers with Formula 409®, Lysol® IC, or Lysol® Professional
- Remove outerwear (kneepads, coveralls, gloves, packs, head scarves, chin straps from helmets) and place in laundry basket for washing
- Remove helmet with headlamp and give to the WNS ranger at the staging area for cleaning.
- Each night coveralls, kneepads, gloves, etc. are washed by concession staff. Helmets and lights are sprayed and wiped down with the 0.6 percent Lysol® IC solution, rinsed and left to dry.

Environmental Education (EE) and Mammoth Cave International Center for Science and Learning (MCICSL) Groups

The post-tour education and decontamination of EE and MCICSL groups follows the procedures above. The type of intervention depends on whether the trips are minimal contact general walking tours or “wild” cave type experiences.

Informational displays:

The following informational items are displayed in the visitor center, at the White-Nose Station, or on the park’s website as additional WNS education/pre-screening:

- Decision tree poster (Figure 2)
- WNS poster (Figure 3)
- WNS video looped on 42” LCD TV screen at visitors’ center
- Provide various WNS information hand-out materials (e.g., WNS fact sheets)
- Maintain and update WNS page and announcement on park website at:

<http://www.nps.gov/macawhitenose.htm>.

Protocol for Operating the White-Nose Syndrome Station

Safety precautions:

All decontamination chemicals should be used following manufacturer’s recommendations

pertaining to Personal Protective Equipment. Material Safety Data Sheets for each product are available in the Visitor Center and via the following websites:

LYSOL® IC™ - Quaternary Disinfectant Cleaner Concentrate:

<http://www.rbnainfo.com/MSDS/US/LYSOL-%20IC-Quaternary-Disinfectant-Cleaner-Concentrate-US-English.pdf>

LYSOL® Brand II Antibacterial Kitchen Cleaner:

<http://www.rbnainfo.com/MSDS/US/LYSOL-Brand-II-Antibacterial-Kitchen-Cleaner-Complete-Clean-US-English.pdf>

Lysol Brand® Disinfecting Wipes, All Scents:

<http://www.rbnainfo.com/MSDS/US/Lysol-Brand-Disinfecting-Wipes-US-English.pdf>

FORMULA 409® Antibacterial All Purpose Cleaner:

<http://www.thecloroxcompany.com/products/msds/409products/formula409antibacallpurposecleaner807.pdf>

WOOLITE - Complete Care:

<http://www.rbnainfo.com/MSDS/US/WOOLITE-Complete-Care-US-English.pdf>

Initiating visitor contacts:

Announcements via intercom system should be made 15 minutes prior to all cave tour departures. These announcements should be kept as short and concise as possible to minimize impact on bus/shelter talks. Script is as follows:

Welcome to Mammoth Cave National Park. We are trying to prevent the spread of White-Nose Syndrome, a disease that kills bats and may be transmitted by people. Therefore we ask that if you have been inside a cave or mine since 2005, please visit the White-Nose Syndrome station before entering Mammoth Cave today. We have a few questions we need to ask you and you will be helping to protect our bats.

Announcements in person should be given under the shelter areas 10 minutes prior to cave tour departure (Hist, MP & VC Lantern - Shelter A; NE, Frozen Niagara, GRAV & Snowball - Shelter B). These announcements may be a bit longer and more personalized if you wish. Sample as follows:

Attention!

Help protect our bats



You can help us slow or stop the advance of White-Nose Syndrome, a disease deadly to bats, by following the simple flowchart below.

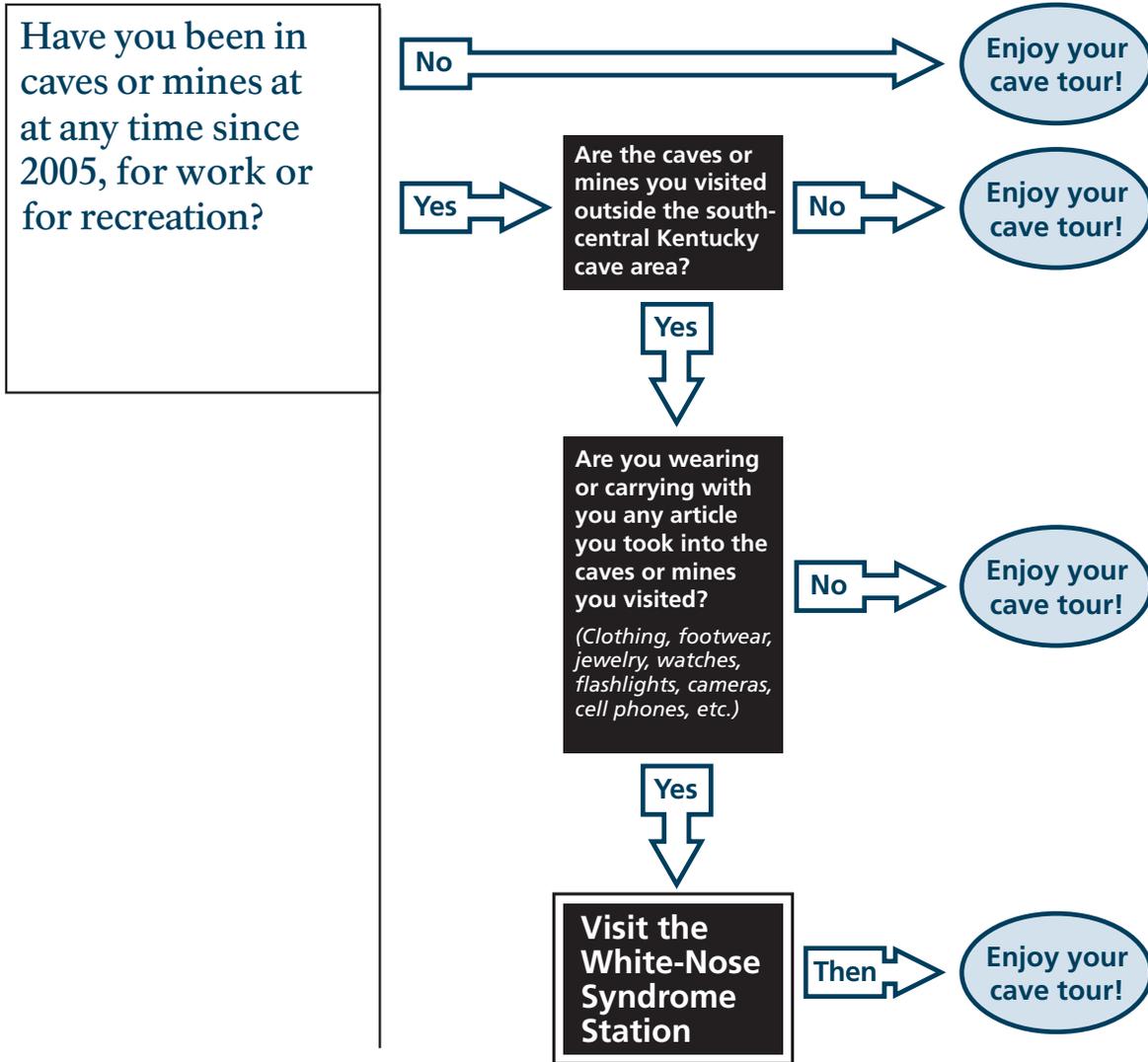


Figure 2. Decision Tree Poster used in the Visitor Center as an additional White-Nose Syndrome screening tool.

Hello, and welcome to Mammoth Cave. My name is _____ and I'm operating our White-Nose Syndrome Station. White-Nose Syndrome is a disease that has been killing bats throughout the eastern U.S. It is possible this disease is spread by humans. Thus far, White-Nose Syndrome hasn't been found inside Mammoth Cave and we're trying to keep it that way! So we ask if you've been inside a cave or mine since 2005, please visit me at the White-Nose Syndrome Station. I just need to ask a few questions and you'll be helping us to protect our bats from this deadly disease. Thank you and have a great tour!

Do not, in any capacity, say that the decontamination procedures will not affect their cave tours. This is not the case. The possibility exists that, if the potential risk of contamination cannot be adequately mitigated, someone may not be allowed inside the cave wearing his or her current clothing or footwear.

When visitors approach the WNS Station:

- Ask which caves they have been in since 2005 (cave name & state located). If action is taken, record this information on the Stats sheet in the boxes indicated.
- Were they wearing any of the same articles of clothing? Shoes? Accessories? Camera?
 - If *no*—no further action is necessary. (if visitors HAVE been in a cave but no action is taken, record which cave they have entered and check the slot marked “No intervention required”)
 - If *yes*—have clothes/shoes been laundered? If shoes are considered a risk, they may change shoes (if they have extra) or disinfect shoe soles. If clothing is considered a risk, they may change before entering Mammoth Cave. Watches, glasses, jewelry can be sanitized with Lysol® wipes or put inside Ziploc® bags for the duration of the tour. Cameras considered a risk may be cleaned or put into Ziploc® bags.
- *If a hat is worn in a religious or medical capacity, do not insist upon its removal.* Hats are considered low-risk at this point so we will allow them in if the situation is either religious or medical (i.e., cancer).
- To disinfect shoes: Soak entire shoe sole (and only the sole) in 0.6 percent Lysol®



IC solution for 5 minutes. Visitors may sit and soak their shoes while wearing them or may remove them to leave them in the Lysol® solution. After 5 minutes, rise soles of shoes in water.

- To disinfect jewelry, glasses, cameras: Wipe thoroughly with Lysol® wipes.
- If any potentially contaminated item cannot be changed or decontaminated, the visitor will not be allowed to enter Mammoth Cave.
- Record ALL visitor contacts (anyone you speak to about WNS, whether action was taken or not) on the clicker to keep an accurate count of visitors informed about WNS daily.
- Record any action taken in the appropriate slots on the Stat sheet (tabs at the top of the sheet indicate what info should be gathered from each contact)

At close of business each day:

- At the end of the day, enter the total number of WNS contacts (all people spoken to and/or actions taken upon) in the slot furthest right on the Stats sheet.
- Replace any informational materials needed at the WNS station (brochures, maps, handouts, etc.)
- Empty disinfectant bins that are visibly dirty. Replace with fresh Lysol® IC solution. Mixture should be prepared as follows:
 - Pour 1 gallon of water into green bucket found beneath WNS station.
 - Add 2 oz Lysol® IC concentrate to water. Mix lightly.
- Pour mixture equally into all four containers. Make sure each container has enough liquid to adequately cover shoe soles. Use additional solution if necessary.
- Re-fill rinse bins with clean water.

Bats Are Dying. Help Us Protect Them.



White-Nose Syndrome (WNS) is a disease that has killed more than one million bats in the eastern United States. Affected bats often have white fungus growing around their nose, mouth and ears—the “white nose” that gives the disease its name.

What causes it, and why do bats die from it?

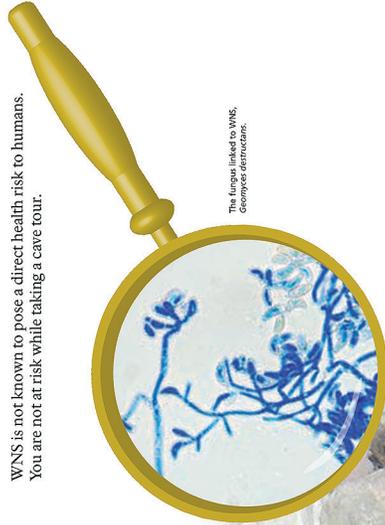
Scientists are still uncertain what causes WNS, but the disease has been linked to a skin infection in bats caused by a cold-loving fungus. They often move to cold parts of their hibernacula, fly during the day and during cold winter weather when their insect prey is not available, and use up the body fat they stored during the fall—long before spring arrives. Without their fat reserves, they soon starve, or die of exposure.

What is at risk?

Eight of the park’s bat species use caves, including 2 species that are Federally listed as endangered. Although many people misunderstand them, bats are something we *can’t* do without—they are the only major predator of night-flying insects. One bat can eat between 600 and 1,000 mosquitoes and other insect pests in just one hour; if bats disappear, the insect population may boom, causing crop failure, economic damage and human illness.

Is White-Nose Syndrome harmful to people?

WNS is not known to pose a direct health risk to humans. You are not at risk while taking a cave tour.



The fungus linked to WNS, *Geomyces destructans*.

Have you visited a cave or mine since 2005?

If your answer is Yes, think carefully whether you are wearing any clothing, footwear, or jewelry, or carrying any object that is a potential source of contamination to the cave or mine. Please choose an alternative garment or footwear, and please secure other items in your vehicle before taking your tour of Mammoth Cave.

If you are unsure what to do, or if you have questions about WNS, please visit the White-Nose Syndrome Station under the covered shelter in front of the Visitor Center. A ranger is on duty there to assist you.

In caves and mines, more than one million bats have suffered mortality from White-Nose Syndrome, at an average rate of 95-100%.

How can I help?

Scientists from many organizations and agencies, including the National Park Service, have been working to uncover the cause of WNS, and to find ways of helping infected bats and preventing new infections. That work continues, but in the meantime you can help save bats today.

Bats appear to be primarily responsible for spreading the fungus, but it is possible the fungus can also be spread by humans who have visited a cave or mine and come into contact with fungus spores. If someone whose clothing, shoes or gear becomes contaminated in this way, the fungus can be carried into the next cave or mine that person visits. Have you been in a cave or mine, for work or recreation, since 2005? If so, **do not wear or bring with you anything that has been in a cave or mine previously when you tour Mammoth Cave.** This includes not only caving gear, but regular clothes, footwear and everyday items like jewelry, watches, cameras, flashlights and cell phones—anything you may have taken into another cave or mine.

Taking these precautions may help slow or stop the spread of WNS into the Mammoth Cave area.



To learn more about White-Nose Syndrome Station located in the covered shelter outside the Visitor Center.

Caving gear poses a special risk if it has been in contact with WNS. Please do not bring your personal gear into Mammoth Cave. If you are taking one of the cave tours, gear will be provided for you.

Figure 3. White-Nose Syndrome poster used in the Visitor Center, large bulletin board format



Appendix G

Bat Submission Guidelines for White-Nose Syndrome Testing

Testing of Park bats suspected of carrying White-Nose Syndrome will be conducted at the Southeastern Cooperative Wildlife Disease Study at the College of Veterinary Medicine, University of Georgia at Athens. Specimens will be prepared and shipped in conformance with the White-Nose Syndrome Bat Submission Form and the following instructions (see below).

Bats should not be submitted if decomposed—ship only freshly dead bats. Approximately 10 animals from each site should be sufficient for evaluation. Place bats in individual water-tight bags with the species written on each bag. Then seal the individual bags in a second water-tight bag and ship overnight with sufficient ice packs to keep them cold for the duration of shipping. Ship in plastic coolers or styrofoam coolers designed for shipping. Please ensure that samples shipped overnight will arrive on a week day; receipt is not available on weekends. Prior to shipping, please notify Dr. Kevin Keel by email at mkkeel@uga.edu.

Ship properly prepared bats, along with completed Submission Form, to:

Dr. Kevin Keel
589 D.W. Brooks Drive
Southeastern Cooperative Wildlife Disease Study
College of Veterinary Medicine
University of Georgia
Athens, Georgia 30602-4393



White-Nose Syndrome Bat Submission Form

State ID Number: _____ SCWDS ID Number: _____

Date Collected: ____/____/____ Date Shipped for testing: ____/____/____
*Ship for Next Day Delivery - receipt is not available on weekends***Person Completing This Form:**

Name: _____ Date: ____/____/____

Agency: _____

Phone: _____ Fax: _____ Email: _____

Date of initial report: ____/____/____ Date bat(s) were discovered: ____/____/____

Name of initial observer: _____

Phone: _____

Number of sick or dead bats seen: _____ Total number of bats submitted: _____

Species of bats: _____
*If multiple species are present please provide a label on the bats with their appropriate species. Please provide the number of each species.*Brief History: _____

_____**Location of Bat(s):**Name of the cave: _____ UTM Coordinates: _____

Address (if available): _____

City: _____ County: _____ Zip code: _____

Bats should not be submitted if decomposed—ship only freshly dead bats. Approximately 10 animals from each site should be sufficient for evaluation. Place bats in individual water-tight bags with the species written on each bag. Then seal the individual bags in a second water-tight bag and ship **overnight** with sufficient ice packs to keep them cold for the duration of shipping. Ship in plastic coolers or styrofoam coolers designed for shipping. **Please ensure that samples shipped overnight will arrive on a week day; receipt is not available on weekends.** Prior to shipping, please notify Dr. Kevin Keel by email at mkkeel@uga.edu.

Ship Bats To:Dr. Kevin Keel
589 D.W. Brooks Drive
Southeastern Cooperative Wildlife Disease Study
College of Veterinary Medicine, University of Georgia
Athens, Georgia 30602-4393

Appendix H

Bat Tracking Sheet—Unusual Activity Reports and Submissions for White-Nose Syndrome Testing

The form included in this Appendix is to be used as a spreadsheet for tracking reports of unusual bat activity in Mammoth Cave National Park, and submissions of samples for White-Nose Syndrome testing.



Appendix I

List of Contributors and Reviewers*

White-Nose Syndrome Response Plan Mammoth Cave National Park

Internal (National Park Service)

Washington Office-Biological Resource Management
Southeast Regional Office
Mammoth Cave National Park WNS Working Group
Cumberland Piedmont Inventory and Monitoring Network
Mammoth Cave International Center for Science and Learning
Office of Public Health
Northeast Regional Office
Great Smoky Mountains National Park
Cumberland Gap National Historical Park
Ozark National Scenic Riverways



External (federal and state agency partners)

U.S. Fish and Wildlife Service Kentucky Field Office
U.S. Fish and Wildlife Service Southeast Regional Office
U.S. Fish and Wildlife Service Arkansas Field Office
Kentucky Department of Fish and Wildlife Resources

**Please note that contribution to or review of Mammoth Cave National Park's White-Nose Syndrome Response Plan should not necessarily be viewed as an endorsement of the plan and its contents.*



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www.nps.gov/maca

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

