

# **Alabama White-nose Syndrome Management Plan**



*Credit: Nancy Heaslip, New York Dept. of Environmental Conservation*

## **Alabama Bat Working Group**

### **Cooperators**

U.S. Fish and Wildlife Service

U.S. Forest Service

National Park Service

U.S. Department of Agriculture - Wildlife Services

Alabama Department of Conservation and Natural Resources

Tennessee Valley Authority

National Speleological Society- Huntsville, Birmingham and Cullman Grottos

Southeastern Cave Conservancy, Inc.

Alabama Wildlife Federation

Alabama A&M University

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# Alabama White-nose Syndrome Management Plan

## I. INTRODUCTION

In February 2006, a caver photographed an unusual white substance on the muzzles of hibernating bats in a cave west of Albany, New York [U. S. Fish and Wildlife Service (USFWS) 2009a]. Some dead bats were present. Biologists with the New York Department of Environmental Conservation (NYDEC) became aware of this situation the following winter when bats began exhibiting unusual behavior and a few hundred died in the original cave and some caves in the vicinity. In January 2007 they documented the problem and termed it White-nose Syndrome (WNS). By April 2010 WNS had spread as far south as northeast and north central Tennessee and west to Missouri. Some estimate that over a million bats have died since the discovery of WNS.

The white substance on bats affected by WNS was found to be a new species of fungus in the genus *Geomyces* (Blehert et al 2008). It was named *G. destructans* (Gd) (A. Gargas et al. 2009). It has been found on the bare skin of bats in various areas since its original discovery. Although many biologists believe it to be the case, it has not been entirely confirmed whether Gd is a secondary manifestation of another problem that weakens the immune system or is the primary cause of WNS.

WNS kills bats by awakening them more often during the hibernation period which depletes their fat reserves more quickly than normal. Bats die in the caves and also begin to exhibit behaviors that indicate they begin searching for their main food source, insects, earlier than it is available (USFWS 2009b). Affected bats have been observed roosting closer to cave entrances, where it is usually much colder than their normal resting sites, than in previous years; flying around the landscape during winter; and dead in mass on snow covered ground.

The spread of WNS during four hibernation periods has been documented (Figure 1). Mortality of bats occurred in two New York counties during the hibernation season in 2006-2007. The following year it had spread to five states in the northeast. It spread from northeastern states all of the way to southwestern Virginia in 2008-2009. It spread to Tennessee and Missouri in the south and Quebec, Canada in the north in 2009-2010. This year Alabama became a “border state,” meaning that Alabama borders a state with WNS infected bats and additional actions may be warranted to prepare for its entry into the state. In 2007-2008, mortality in bats in certain caves in the northeast ranged from 91-97% (Stilwell and Hicks 2009) (Table 1). Data provided since this information indicates that mortality is as high as 100% in some caves.

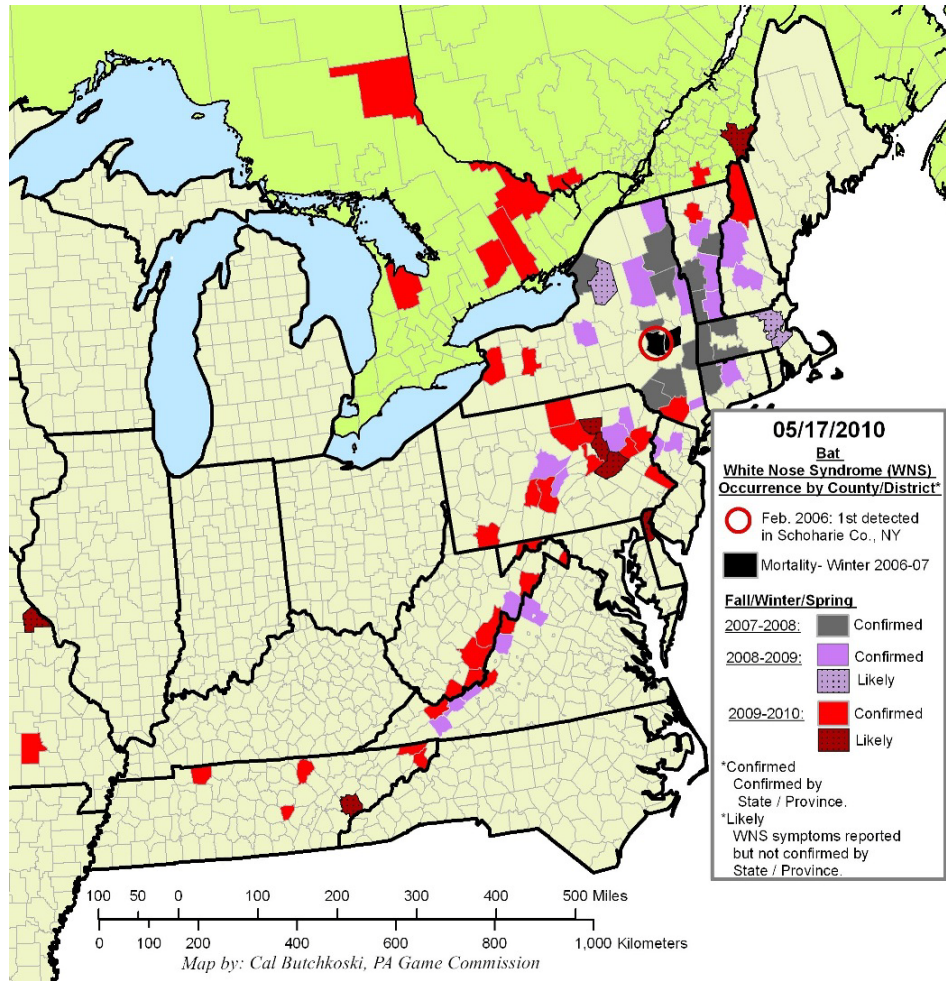


Figure 1. Illustration of the spread of White-nose Syndrome through May 17, 2010 (Credit: Cal Butchkoski, Pennsylvania Game Commission) (This is the latest map but WNS was confirmed in Oklahoma by the time this document was finalized).

Table 1. Bat mortality in caves in the northeastern United States during 2007-2008 (Stillwell and Hicks 2009).

2007-2008 Mortality Event					
Percent Decline Based on Winter Survey Counts					
Site	# of Live Bats (year)	# of Carcasses Recovered in 2007	2007 Survey	2008 Survey	% Decline
Hailes	15,584 (2005)	count not yet complete	6,735	1,400?	91%
Gages	968 (1985)	805	NA	88	91%
Knox	1948 (2001)	350	NA	NA	
Schoharie Caverns	1,329 (2006)	125	478	38	97%

Individuals of six species of cave dwelling bats have suffered mortality (USFWS 2009c). These include tri-colored (*Perimyotis subflavus*), little brown (*Myotis lucifigus*), northern long-eared (*M. septentrionalis*), big brown (*Eptesicus fuscus*), small-footed (*M. leibii*) and Indiana bats (*M. sodalis*). Currently, it is not known if bats that roost in hollow trees, under tree bark, in leaf litter, and similar locations (tree bats) are susceptible. Some bats, such as the endangered Indiana bat, use caves part of the time and move to roosting sites also used by tree bats. This may be causing spread of WNS from caves to outside roosting locations. All but the small-footed bat are known to occur in Alabama, although the Indiana and little brown bats are rare (Alabama Department of Natural Resources 2010).

Some species of cave bats are not currently affected by WNS and it is unclear whether they will contract it. Virginia big-eared bats (*Corynorhinus townsendii virginianus*) have remained uninfected in a cave in West Virginia (Hell Hole Cave) containing infected little brown bats. This is the case despite the fact that the little browns fly by the big-eared bats on their way out of the cave. WNS entered the range of the gray bat (*Myotis grisescens*) in 2009-2010 in Tennessee and Missouri but this species has not shown any signs of WNS at this point. Gd has been confirmed in these states for a relatively short time period- since mid-February in Tennessee and mid-April in Missouri- and, thus, gray bats have not been exposed within their range for very long. However, an infected cave found in Virginia in 2008-2009 was only a few miles from a known gray bat cave. Biologist will be watching these species to determine if WNS enters their populations, including gray bats occurring in Alabama. Gray bats roost in large numbers in the state. For example, Fern Cave, a hibernation cave in Jackson County winters about 840,000 gray bats (Tuttle 2003).

The USFWS issued a cave advisory on March 26, 2009 (USFWS 2009d). The advisory recommended (<http://www.fws.gov/northeast/wnscaveadvisory.html>):

1. A voluntary moratorium, effective immediately, on all caving activity in states known to have hibernacula affected by WNS, and all adjoining states, unless conducted as part of an agency-sanctioned research or monitoring project.
2. Cavers in regions outside the WNS-affected and adjacent states should be using clothing and gear that has never been used in caves or mines in the affected or adjacent states, and should thoroughly clean and contain all clothing and gear upon exiting those locations.
3. All scientific activities that involve entry into caves or mines where bats reside should be evaluated to determine if the activity has the potential to facilitate the spread of WNS.
4. For all scientific activity, no equipment or clothing that has been used in any cave or mine in a WNS-affected or adjacent state should be used in a cave or mine in an unaffected state.

Many caves in the areas covered by the advisory have been closed by state and federal agencies. The USFWS is currently working on an update to the original advisory.

Multi-agency personnel working in Alabama met on July 1, 2009 at the Swan Creek Wildlife Management Area office near Decatur, Alabama due to concerns that WNS would soon spread to and have a devastating impact on bats in the state. The group decided to take several proactive actions including, but not limited to:

1. Develop a plan to conserve Alabama's bats in the face of the threat posed by WNS.
2. Conduct another multi-agency meeting in October 2009. Additional agencies would be invited to participate in this meeting.
3. Involve academia, non-government organizations (NGOs), and the public in bat conservation efforts, including input into the resulting plan.
4. Have the newly formed Alabama Bat Working Group (ABWG) guide these efforts.

This management plan fulfills one of the decisions of those present at the July 1, 2009 meeting. The plan contains planned actions both pre- and post-arrival of WNS. Depending on the time of arrival in the state, pre-arrival actions noted below may only be those of the group present at the July 2009 meeting. Key actions that can be initiated before WNS arrival in the state include:

1. Encourage those who own priority bat caves in the state to close them when the danger of WNS infection is high.
2. Implement appropriate decontamination protocol on agency owned lands and encourage private landowners to take part in this effort to slow the spread of WNS.
3. Continue and expand existing hibernation and summer season monitoring programs.
4. Continue and expand existing research efforts related to WNS prevention and cures.
5. Assist others in bat conservation efforts at larger landscape levels when requested and resources are available.
6. Collect genetic material of all bat species occurring in the state and deposit this in appropriate institutions for genetic studies and banking.
7. Locate additional resources to meet the objectives of this plan.
8. Develop a communication effort which allows everyone participating in management efforts to stay informed and expands education and outreach efforts pertaining to WNS and bat conservation. Efforts will be needed both pre- and post-arrival of WNS.

Several actions that were considered but we decided not to implement at this time are as follows:

1. Culling of WNS affected bats.
2. Preventing bats from entering or leaving caves via various types of blockages.
3. Treatment of bats or parts of the cave ecosystem with chemicals.

Treatments are addressed in one of the objectives and strategies below. However, no treatments will be considered until sufficient research shows these will not cause more harm than good to the cave/karst and similar ecosystems in which they may be applied and/or surrounding ecosystems and resources to which these treatments may travel (for example, groundwater).

In August 2009 a meeting was held of various federal and state agency personnel in Pittsburgh, Pennsylvania to plan a national strategy to manage WNS (a similar meeting was held May 25-27, 2010 in Pittsburgh but this plan does not incorporate information from the more recent meeting). The final product was recommendations on how WNS should be dealt with in a number of areas, such as monitoring/surveys, genetics/captive populations, and communications.

The ultimate goal of this effort was development of a national plan to combat this deadly problem. The meeting resulted in the development of key measures including that no actions taken to manage WNS should cause “more harm,” that is, result in spread of the fungus or result in more adverse effects to bats or the karst ecosystem than they solve. Thus, the benefits and costs of actions to be implemented must be carefully weighed. Tasks noted in this plan must be constantly monitored to insure they do not cause more harm than good. The actions will need to be modified or stopped when they begin to cause harm to bats or the karst ecosystem.

On September 8, 2009 a “Draft Framework” for the management of WNS at the national level was published. This team is working on a formal national plan. This management plan incorporates some of the guidance of the Draft Framework. This response plan may need to eventually incorporate more of the national guidance when the final national plan is published.

In October 2009, the USFWS and several states in partnership with the U.S. Geological Service and National Park Service published a document entitled “White-Nose Syndrome: Report on Structured Decision Making Initiative” (Szymanski et al. 2009)(SDM document). The implementation guide that was published in November 2009 stated, “The recommended management strategy calls for various cave closure measures in areas that, although not yet affected by white-nose syndrome (WNS), are susceptible to its arrival and spread within the near future” (USFWS 2009f). This area, entitled Area 3, included all caves and mines further than 250 miles from the closest WNS infected site. Alabama was in Area 3. The recommendations of the SDM document were only applicable to the 2009-2010 “migration (including swarming and emergence) and hibernation season.”

The ABWG’s multi-agency team’s purpose was to develop a draft WNS management plan that could later be finalized by representatives of a larger group of partners. It was decided that a smaller agency team could more quickly develop a draft and the larger group then take this and modify it to include contributions by all partners. The multi-agency team had two meetings in addition to that in July 2009, one on November 13, 2009 and another on the morning of January 22, 2010. A key decision at the November 2009 meeting was to create five subcommittees. Each would be responsible for one of the five objectives of the plan. A note for historical purposes is warranted- the plan was called the Draft Alabama WNS Response Plan when it was first written and was changed to the Draft Alabama WNS Management Plan during the second meeting in November 2009. The multi-agency team had a draft plan to be presented to the larger group of partners by January 22, 2010. The meeting of the multi-agency team on the morning of January 22, 2010 was to finalize plans for presentation of the draft to the larger group of partners that afternoon. The bulk of the discussion at that afternoon’s meeting was about cave closure. By the end of the meeting a general approach to cave closure was developed that is less restrictive than that recommended in the SDM document. Individuals not representing agencies were encouraged to get involved directly in plan development, including serving as Chairs/Co-chairs (Chairs) or members of the existing subcommittees. The final team, now being called the Alabama WNS Management Team (AWMT), is made up of representatives of the following agencies, non-governmental organizations, and a university- U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service, U.S. Department of Agriculture- Wildlife Services, Alabama Department of Conservation and Natural Resources, Tennessee Valley Authority, National Speleological Society- Huntsville and Birmingham Grottos, Southeastern Cave Conservancy, Inc., Alabama Wildlife Federation, and Alabama A&M University. The final names of the five subcommittees along with the current Chairs are as follows:

- I. Disease Management – Dwight Cooley and Ron Miller
- II. Surveillance and Monitoring- Keith Hudson
- III. Genetics- Bill Gates and Dr. Wes Stone
- IV. Communications- Jennifer Pinkley and April Waltz
- V. Permitting and Resources- Jodie Smithem

WNS is a rapidly spreading problem with quickly updated research and management being conducted with relatively little planning time. Alabama is not going to be an exception to this need to evolve swiftly to incorporate new research findings and management recommendations into actions. Adaptive management is the process whereby management actions are implemented, the effectiveness of the management is ascertained, and improvements to future implementation based on this newly acquired information. The pace of adaptive management will have to be brisk if we hope to effectively combat WNS. Thus, this plan must be a living document and we may have to implement the latest management actions prior to the plan's future updates.

## **II. OBJECTIVES, STRATEGIES, AND TASKS**

For the purposes of this plan, objectives are broad statements of what is to be accomplished, strategies are more defined actions designed to fulfill the objectives, and tasks are specific actions to be taken. The objectives are not listed in order of priority and are subject to change as conditions warrant.

### **Objective I. Reduce the possibility of the spread of WNS in Alabama's bat populations and take other actions to conserve the values of the cave/karst ecosystem and similar areas.**

Actions are currently being taken nationally and in the three planning areas defined in the SDM document to slow the spread of WNS. Efforts include treatment of bats with compounds designed to kill Gd, closing caves and mines to people to slow the human transmission of this fungus, use of decontamination protocol for equipment and people when they work in bat habitat, and similar steps. The AWMT is not planning to implement the use of chemicals to treat bats, all or portions of caves or mines, or similar hibernacula/roosts until these treatments can be shown to be effective yet not result in undue harm to these fragile ecosystems. This plan mentions use of these measures but they will only be considered when an appropriate amount of research clearly indicates less harm than good will occur from their use.

Cave closure to reduce the probability of human spread of WNS is controversial and this was no exception during meetings of the AWMT. This plan is not the proper forum for a detailed description of this issue or to provide an explanation for decisions related to it. Our decisions are based on the premise that ultimately our approach will result in more conservation benefits to the cave/karst ecosystems in Alabama than approaches previously recommended or implemented elsewhere. Our approach is based on the designation of "significant bat caves." The Team considers all caves identified as priorities for conservation of listed bat species in recovery plans or those known through years of bat monitoring by the ADCNR to be consistent with the designation as significant bat caves. The Team will have to



develop criteria used to identify other “significant bat caves.” Additional caves will be so designated by the team as more are surveyed and monitored by the AWMT, its partners, and others interested in conservation of bats, caves, the karst ecosystem, and other ecosystems used by bats.

Closures recommended below do not include prevention of necessary surveillance, monitoring, and research related to bat biology, including WNS related matters, and other necessary conservation actions (for example, conservation of other listed species such as the Alabama cavefish (*Speoplatyrhinus poulsoni*)). . However, this may change if evidence indicates that these actions may be adversely affecting bats or other parts of the cave/karst ecosystem. The AWMT will have to monitor this matter closely and separate procedures may be warranted for different caves based on a variety of factors (e.g., ownership, need for and level of surveillance, and bat species present).

*Strategy 1. Recommend closures that protect significant bat caves yet permit appropriate recreational use of other caves.*

Tasks:

- a. Encourage all Federal agencies to close caves on their lands.
- b. Encourage the state to close all caves on its property that are identified as priority caves for the recovery of listed bat species in recovery plans or that have been discovered to contain significant listed species populations since the recovery plans were written and should be designated as priority caves. In addition, request they close caves considered by the AWMT to have significant populations of other bat species.
- c. Work with private landowners who own caves in the categories listed in “b” above and encourage them to close these caves to access.
- d. Recommend that owners of all commercial caves in Alabama take appropriate steps similar to Mammoth Cave National Park to reduce the possible spread of WNS if they fit into categories described in “b” above. No commercial caves in Alabama are currently known to fit this designation. This recommendation may change related to specific caves if their status should change in this regard.

*Strategy 2. Request governments to require and private landowners to voluntarily implement clean caving, to include the use of scientifically accepted decontamination protocols, in caves on their properties Also request that cavers and others implement this type of clean caving when they enter caves.*

Tasks:

- a. Begin to encourage everyone who enters caves to do so “cleanly” (that is, cave cleanly) including outreach and education regarding the processes and reasons for doing so. Clean caving includes properly cleaning and decontaminating oneself and clothing, gear, etc. between cave visits. This is to be encouraged for a number of reasons. Examples include avoiding transfer of

diseases (not just WNS, but other diseases as well) and parasites between caves and moving unique biota and other “foreign substances” from one cave into another.

- b. Develop a reasonably simple guide to procedures for clean caving that cavers, private landowners, government employees at all levels (local, state, and federal), and the public in general can understand and implement.
- c. Encourage governments at all levels to require and private landowners to voluntarily implement a policy that no one will enter significant bat caves on their properties prior to proper cleaning and decontamination (those currently detailed on the USFWS WNS website at <http://www.fws.gov/WhiteNoseSyndrome/>)(that is, cave cleanly). This includes researchers who will enter caves. Also encourage these government entities to require and private landowners to voluntarily implement clean caving policies for any cave on their properties.
- d. Request that government agencies require commercial caves on their lands (e.g., Cathedral Caverns) use decontamination and other procedures similar to Mammoth Cave National Park (for example, education of the public about WNS, interview visitors to determine if they have been in a WNS infected area, and decontamination prior to cave entrance if they have been in such an area) to reduce the possibility of spread of WNS, other diseases, parasites, unique biota, and movement of foreign substances into these caves.
- e. Request that ADCNR and USFWS, working through their existing technical assistance programs and personal contacts, foster existing relationships and develop new relationships with private landowners, and recommend to those who operate commercial caves on private lands (e.g., Sequoyah Caverns) to voluntarily use decontamination and other procedures similar to Mammoth Cave National Park to reduce the possibility of spread of WNS, other diseases, parasites, unique biota, and movement of foreign substances into these caves.
- f. Ask the ACDNR to implement a permitting process for those who rehabilitate bats and include provisions which will slow the spread of WNS using actions taken by other states, such as Pennsylvania, as a guide.
- g. Request that the USFWS and ACDNR include information about clean caving, including proper decontamination procedures, with all permits that are issued to work with bats, other species occurring in caves and similar habitats and ecosystems, or perform similar activities. In addition, ask them to take other needed steps to reduce the chances that WNS will be spread by permitted individuals. For example, they could restrict permitted individuals from taking gear used in WNS contaminated caves or used to work with infected bats to or on those not infected by WNS.

*Strategy 3. Partner with others who support bat conservation, work with or handle bats, cavers, and the general public to help conserve bats and the natural, cultural, and other unique values of natural or manmade karst formations and similar habitats.*

Tasks:

- a. Invite additional bat conservation groups, general conservation groups, caving organizations, and the public to join our efforts to manage WNS and conserve natural, cultural, and unique values of caves, karst formations, mines, and similar habitats and ecosystems. Encourage the use of “citizen science” whenever possible to help conserve bats, including combating WNS, and the other values of these areas.
- b. Encourage cavers and anyone else who enters caves, mines, and similar karst formations and manmade underground openings to report important findings to the scientific community. Examples of these findings include locations of endangered bats and significant bat numbers, presence of other listed species, observations of anything unusual, important, or unique (for example, bats with WNS, and bats flying around or clustering at cave entrances during winter). Develop a process that makes it relatively easy for these individuals to report this information (for example, provide them with data sheets, tell them where to send the completed sheets, and request a partnering agency receive the information and store it in a computerized database designed for this purpose). Use this information to further conservation of natural and cultural resources and other unique values of these sites and at larger landscape scales. Inform the Alabama Field Office of the USFWS of sites with listed species.
- c. Partner with agencies, organizations, businesses, and individuals who perform animal damage control operations and may handle bats to assist with WNS management efforts.
- d. Develop a strategy to address bat rehabilitation in the state which will help control the spread of WNS and compliment management efforts.
- e. Partner with those who have Section 10 permits to work with bats, bat management experience, and similar education and/or experience to assist with efforts to manage WNS.

*Strategy 4. Develop procedures to reduce the possibility of spread of WNS from infected caves to non-infected caves and other locations (until such time that these measures are no longer needed) and encourage others to implement them.*

Tasks:

- a. Develop procedures to minimize the chance that WNS will spread in the state once it is located here. Use U.S. Fish and Wildlife Service recommendations as guides for these procedures. Examples may include:
  - i. Request landowners to close any caves that are infected with WNS to all but those conducting necessary efforts to manage WNS in the state. Exclusion of even these permitted individuals may prove to be prudent

in the future. This may be needed, for example, if the harm from stressing bats is found to be or is considered greater than the benefits from the activity(ies) being conducted.

- ii. Encouraging all to restrict use of gear and other materials that have been used in a contaminated cave to only that cave or, at most, in caves that are known to be contaminated (that is, don't use possibly infected gear in caves not known to contain WNS).
- iii. Consideration of appropriate measures to minimize the chances that those using gear for bat related research and monitoring, such as harp traps and mist nets, do not spread WNS.
- iv. Inform cavers and others of the websites and other lists of closed caves, like the Dogwood City Grotto's website, so they can avoid entry into these caves. Make special effort to inform those keeping these lists of closed caves in Alabama and, especially, those that are known to be contaminated with WNS.
- v. Take steps to minimize the possibility that specimens sent to labs, museums, and other locations do not spread WNS. Inform anyone accepting specimens that they are suspected to be or are infected or are from infected habitat/areas.

*Strategy 5. Implement safe (will not significantly adversely affect bats, other species, or the cave ecosystem) practical measures discovered via research or other means to treat infected bats, caves, mines, and similar ecosystems.*

Tasks:

- a. Keep apprised of research and other initiatives to treat bats and implement measures to minimize the possibility they will cause harm to treated ecosystems, including wildlife, (for example, examine the toxicity of fungicides to bats and cave invertebrates using published information and other reliable sources) and are practical for large or small scale treatments. This includes such measures as topical treatment or inoculation of individuals or groups of bats.
- b. Prioritize caves or species for treatment and implement appropriate measures.
- c. Monitor the effectiveness of the treatments by using such procedures as banded individuals and damage assessment protocol such as the Reichard Wing Damage Index.

## **Objective II. Continue and expand, as needed, current and future bat and cave/karst ecosystem surveillance, monitoring, and research.**

Surveillance, defined as monitoring bats for the presence of WNS, is important to determine when this fungus will enter the state. Some management efforts will change when WNS arrives. Monitoring of bat populations, meaning determining population size and characteristics through time, is also needed to determine the impacts of Gd on these populations. Surveillance and monitoring should include species not currently known to get WNS, including tree bats, because they may be susceptible. Cave bats seem to be more

susceptible to WNS during the hibernation period, possibly due to their lowered immune response while in torpor. Thus, knowledge of the location of important hibernating sites for these species is critical to efforts to effectively manage WNS. Locations of the important summer roost sites of endangered cave bat species in Alabama are generally known. This will likely prove very important in management of WNS because spread of this fungus is likely during summer. However, summer sites identified with significant bat colonies in the future should also be surveyed and monitored. Locations of important roosting and wintering sites of tree bats may prove just as important if these species prove susceptible to WNS.

It will also be important to support various research efforts, such as the impact WNS will have on the cave/karst ecosystem. For example, bats provide a key source of nutrients for the food web in caves/karst ecosystems through the relatively small numbers that die and deposition of guano. WNS may initially benefit cave life due to the nutrient influx created by large numbers of dying bats but may eventually suffer after this source of nutrients quickly disappears and a steep reduction in guano deposition occurs.

The AWMT strongly encourages that only the efforts necessary to gather the appropriate information be expended to minimize disturbance to bats, especially inside any hibernaculum or summer roosting and/or breeding site. We must stress that entering caves to work with bats is to be spent on surveillance, monitoring, and research objectives and not on additional actions not related to efforts to properly manage WNS and the cave/karst ecosystem (for example, sightseeing). We must continue to reassess the needed intensity of these efforts in each cave to insure we minimize harm to biological and other cave resources.

*Strategy 1. Continue existing surveillance and monitoring efforts.*

Tasks:

- a. Continue emergence counts of gray bats at caves surveyed in the past.
- b. As long as there is little threat that it will help spread WNS, utilize the thermal infrared system (TIR) for estimating numbers of gray bats emerging from selected caves and continue to compare the numbers determined using this method with those derived from visual counts.
- c. Sustain current efforts to locate all Indiana bat (I-bat) hibernation sites and count I-bats present.
- d. Continue efforts to determine the presence of WNS as long as they are needed. Examples include monitoring cave entrances and areas around them for dead bats, inspection of bats inside caves for presence of the WNS fungus, and sending any potentially infected bats to an appropriate lab (for example, the NWHC or Southeast Cooperative Wildlife Disease Study) for testing.
- e. Maintain other ongoing efforts to monitor bats, including tree bats.

*Strategy 2. Expand existing surveillance and monitoring efforts.*

Tasks:

- a. Monitor hibernation caves. This will include inspection of bats for the presence of the fungus; documenting where bats are hibernating in the caves; noting any changes in bat behavior, such as bat presence at cave entrances and shifts of bats toward cave entrances where previous roosts are known, bats flying on cold days, unusual mortality of bats both inside and outside of the caves; collection of bats exhibiting classic WNS characteristics and submitting these to labs capable of properly examining them for the problem or freezing these specimens if facilities exist for doing so.

Identifying sites to be surveyed for the presence or spread of WNS should involve several considerations. Caves/mines currently being surveyed for winter populations of bats should continue to be surveyed and checked for WNS. However, consideration should be given to increasing the frequency to *annual* survey. As they are identified, other significant bat caves used as hibernacula should also receive winter survey (summer monitoring should also be conducted on significant bat caves identified in the future that are being used during this season). These caves include those known, potential or historical sites listed on the *Gray Bat Recovery Plan* and the *Indiana Bat Recovery Plan*. Each site should be ranked as to “WNS Survey Priority” to best utilize existing or future survey resources. Ideally, the specific federal or state natural resource agency that owns or manages a cave should conduct the survey. However, to the extent practical, biologists from separate agencies should assist one another at common sites to insure congruity in survey styles, techniques and methods and to index population estimates. In addition, cavers and other volunteers can be utilized for this and similar work if they have the experience or are trained to do so properly. For each cave listed, the best specific type of survey of WNS should be determined, i.e. survey by winter visual ingress, summer emergence counts and/or harp trapping.

Accordingly – with the above criteria in mind – The appendix lists and recommends 41 caves/mines in Alabama to be surveyed for WNS. Finally, whenever any survey is attempted, pre and post survey decontamination procedures should be followed as is recommended by the latest consensus of those biologists dealing with WNS.

- b. Explore the use of swabbing and other techniques for detecting Gd in caves and whether these techniques can be used in seasons in addition to winter.
- c. As resources permit, implement the additional summer monitoring efforts being recommended by the coalition of WNS scientists, including use of the Reichard Wing Damage Index when bats are handled, auditory surveys, determination of reproduction, and inputting bat monitoring data into the Southeastern Bat Diversity Network online database.
- d. Submit bat specimens to the NWHC, according to their procedures, when a bat is suspected of having WNS.
- e. Consider placement of data loggers inside both hibernation and summer caves to determine conditions bats are utilizing pre- and post WNS infection.

- f. Study the feasibility of implementing a region-wide or state-wide auditory survey program, such as that being conducted in Kentucky, to establish baseline data on bat populations.
- g. Help other states with WNS work within the constraints of existing resources.

*Strategy 3. Use the public to help determine presence of WNS.*

Tasks:

- a. Make a website accessible for reporting unusual bat sightings and bat mortality.
- b. Make appropriate phone numbers and contact names or e-mail addresses available if needed.

*Strategy 4. Take actions to determine if tree bats are affected by WNS.*

Tasks:

- a. Survey known roosts and hibernation sites of tree bats for the presence of WNS whenever resources permit it.
- b. Visually check tree bats for WNS whenever they are captured.
- c. Encourage studies to determine if Gd is present on tree bats or in their roosts or hibernacula.
- d. Insure acoustic data gathered on bats is analyzed for population trends of tree bats as well as cave bats.

*Strategy 5. Support research related to WNS and its impacts on bats and the cave/karst ecosystem.*

Tasks:

- a. Support research on the impacts of WNS on cave/karst biota besides bats.
- b. Assist with other needed research.

*Strategy 6. Determine the best means to maintain data collected on bat species.*

Tasks:

- a. Study various options for management of bat data collected in the state which will permit quality control and sharing of pertinent information.
- b. Explore means to provide this data at a national level to help manage WNS at larger landscape scales.

### **Objective III. Conserve the genetic diversity of all bat species.**

In August 2009, at the WNS Conference in Pittsburgh, Pennsylvania, the Genetics Working Group (GWG) provided a summary of their breakout sessions. The GWG developed a draft genetic sampling protocol in September 2009 (GWG 2009). Two broad research priorities for collection of this material were identified in this draft document: “1) Ecological genetics of bats: understanding bat population and community genetic structure and diversity to conserve bat species in perpetuity. This genetic context relative to WNS includes interactions among organisms and between the organisms and their environment, including traits of ecological significance (traits related to fitness, survival and reproduction); and 2) Immunogenetics: understanding the relationship between the immune system and genetics. This genetic context relative to WNS includes identifying potential for adaptation to or development of immunity against *Geomyces destructans* and other pathogens.” This work, especially priority 1, will prove critical should WNS result in a large reduction of bat populations. Once we learn how to control the effects of WNS, the information gained will be needed to propagate bats in captivity. Eventually, restoring the genetic diversity of bat species may be possible. In this case, banking of genetic material will prove crucial. Efforts must be made to properly collect and store both DNA and RNA.

The genetic sampling protocol prioritized types of samples to collect and identified the ease with which they can be obtained. For example, wing tissue, which yields a larger amount of DNA, is more valuable when sampling live bats than hair (must contain follicle) or fecal material. However, fecal material can be obtained without capturing bats. Thus, the best means to obtain material must be used within the context of current restrictions for getting it. Fecal material may have to be collected when WNS arrives if restrictions on handling bats are required to slow its spread. In addition, care must be used to insure those collecting genetic material do not spread the fungus once it arrives by sending contaminated samples to various locations for storage. It will be much easier to collect the right type of genetic samples and minimize the possibility of spread of WNS if these samples are collected prior to the arrival of WNS. The GWG is encouraging collection prior to the arrival of WNS in areas where it does not occur and notes that sample collection may have to be facilitated due to the rapid spread of this fungal pathogen.

*Strategy 1. Take immediate actions to insure adequate bat genetic materials are collected for long-term viability of all bat species in the state and at larger landscape scales whenever possible, conducting WNS research, and related actions.*

#### Tasks:

- a. Determine where and how much bat genetic material of each species is already available from previously collected specimens that are housed in museums, academic institutions, and similar areas in the state.
- b. Perform a literature search to determine what is known about bat genetic diversity, especially in Alabama, to help us better understand what issues need to be addressed. For example, we need to know the number of individuals from which genetic samples are needed during die-offs of numerous bats in one cave or general location. Also see “c.” below.



- c. Whenever possible, rely on the work of the GWG to determine the type, location, number, and other requirements of genetic samples needed to properly manage and preserve genetic diversity.
- d. Encourage all agencies and properly permitted individuals to collect a wing punch (preferred), hair, and/or fecal samples from all species of live bats and appropriate samples (usually some muscle tissue if it is intact) from dead bats prior to the arrival of WNS. Wing (preferable) and/or hair samples should be collected from all bats that are captured in the state and samples obtained from dead bats whenever they are encountered until an adequate number and diversity of samples are obtained. Samples should be deposited in the genetic collection of the American Museum of Natural History (AMNH), according to procedures on their website.
- e. Encourage others who handle bats and can be properly trained, such as those who perform animal damage control and county health department staff, to also submit samples. These individuals must be capable of distinguishing species or learning to do so and have the appropriate permits if protected species will be involved.
- f. Obtain training in the proper collection of genetic materials and train others in the state to do so, including proper identification of bat species.
- g. Adopt or develop protocol to insure the spread of WNS does not occur when collecting and shipping genetic samples after WNS arrives in Alabama.
- h. Assist with captive propagation programs whenever practical. Seek partners in this effort, such as qualified zoos.
- i. Encourage funding of research in the ecological study of bats, immunogenetics, use of banked materials to restore individuals, and similar efforts.
- j. Whenever resources are available, assist with efforts to collect genetic material to insure the long-term survival of bat species in general. This includes regional, national, and international efforts to conserve bats. Collection of genetic material from many parts of a species range, not just in the parts of Alabama where each species occurs, will likely be necessary to insure adequate genetic material of appropriate diversity is obtained for long-term survival of the various species.
- k. Insure efforts are made to collect the appropriate data with all samples and to enter this information into a centralized database. Results of analysis of the genes and similar material for each sample should be included with the sample collection data whenever this is feasible.
- l. Develop at least one repository for dead bats until genetic samples can be obtained by individuals trained to gather specimens and ship them with appropriate data to the AMNH.

**Objective IV. Develop a communications strategy that will keep the WNS management community up-to-date and increase education and outreach efforts to teach the public, media, state, and county health departments, and others about bats and the impacts of WNS.**

Our primary purpose is to educate our partners, stakeholders, media outlets, legislators, and the public about bats, the cave/karst ecosystem, and the impact of WNS on them and

seek the assistance of these individuals and groups with conservation of these resources. We hope to instill an appreciation for bats and the cave/karst ecosystem in Alabama citizens who will then assist us in numerous ways in the effort to manage WNS in the state and elsewhere. A wide variety of methods to educate a large number of constituencies will be needed, only a few of which are noted below.

Many types of individuals will be needed to help with this monumental task. Examples include professionals who work with bats who can provide technical assistance as well as directly educate others; cavers who are familiar with bats who can help educate fellow cavers; educators, such as school teachers and park outreach and education staff, who are capable of reaching large numbers of individuals; the media because of their ability to help spread messages to audiences throughout the state; and commercial cave owners who are willing to educate the visiting public. Our intention is to work with others trained in communications, especially related to the outdoors, who can assist with these efforts. For example, the national level WNS communications task group and the outreach and education specialist being hired by the USFWS to assist with WNS related issues will be valuable resources.

*Strategy 1. Insure that the WNS management community is kept current on WNS information and management efforts.*

Tasks:

- a. Designate a person(s) responsible for tracking and reporting up-to-date WNS information and management efforts to the Communications Subcommittee who will then disseminate it to others. At least one person would participate in WNS related conference calls and other efforts of state, regional, and national groups leading management efforts.
- b. Insure the Communications Subcommittee disseminates updates to the community in an effective and timely manner.
- c. Conduct a workshop(s) with our partners and stakeholders so everyone will be familiar with bats, the cave/karst ecosystem, and WNS issues.
- d. Conduct a training session(s) for those who will directly help with efforts to manage WNS in the state. Technical assistance by experienced individuals will be provided by AWMT members and sought elsewhere when needed.

*Strategy 2. Keep the media informed about WNS and request their assistance in education of the public.*

Tasks:

- a. Develop list of state media contacts/environmental reporters.
- b. Develop protocol for media interview requests and cave entries.
- c. Provide updated information, photos, and other needed resources on a website or similar electronic vehicles which could be downloaded and used by the media. Inform them of the existence of this material.
- d. Develop a press release template and provide pertinent press releases.
- e. Have FAQ sheets readily available for use by the media.

- f. Have brochures readily available.

*Strategy 3. Involve staff of state and county health departments.*

Tasks:

- a. Educate the director of the rabies program about WNS issues and advise him that the county health departments may receive reports of dead bats from the public.
- b. Teach him and the county health departments about the need to assist in the collection of information relating to the presence and spread of WNS, collection of genetic material, and other ways they can help with WNS management.
- c. Request that the director or his representative serve as a member of the team planning and implementing WNS management in the state.

*Strategy 4. Educate federal and state legislators about WNS and needs for proper management of Gd in the state.*

Tasks:

- a. Designate a contact(s) to educate legislators about WNS.
- b. Keep legislators up-to-date on WNS issues.
- c. Request funding assistance for WNS management efforts.

*Strategy 5. Inform others who may assist with management efforts about WNS.*

- a. Determine and inform other groups or individuals who may need to be educated about WNS and who may assist us in our outreach and education efforts (for example, science teachers), including volunteers.

*Strategy 6. Keep apprised of additional possibilities for education and outreach of our various constituents about WNS and implement those that are appropriate for Alabama.*

Tasks:

- a. Keep in contact with those at various levels of government who are attempting to educate others about WNS and implement appropriate strategies they have developed.
- b. Monitor the types of information reaching our constituents in order to target additional outreach efforts.
- c. Keep apprised of use of websites and other electronic methods of outreach and education to inform constituents about WNS management in Alabama. Implement these whenever possible.

**Objective V. Obtain the permits, resources, and other items needed to accomplish the objectives of this plan.**

Appropriate steps are needed to ensure the objectives of this plan are accomplished in a responsible manner. These steps include making sure individuals working with listed bats are properly trained, have the necessary permits, and understand the plan's goals and objectives.

When implementation of this plan will likely affect Indiana bats or gray bats (two federally endangered bat species), authorization to conduct the previously-outlined activities must be permitted through an Endangered Species Act section 10(a)(1)(A) recovery permit (note: 50 CFR 17.21 and 17.31 exempt federal and state conservation agency employees from certain activities). On April 2, 2009, the USFWS' Southeast Regional Office notified individuals who are authorized, or who have applied for authorization, for recovery-related take of Indiana bats, gray bats, Ozark big-eared bats (*Corynorhinus townsendii ingens*), or Virginia big-eared bats (*C. t. virginianus*) about a new cave advisory. Others authorized to work with species in caves where bats hibernate were also contacted. The recipients of this notification were apprised of the Service's March 26, 2009, advisory which recommended closure of caves in WNS-affected states and adjoining states to avoid spreading WNS and issued instructions to recipients to restrict access to all caves in Kentucky, Tennessee, and North Carolina. Because this advisory allows cave entry for WNS research and in other circumstances, the letter from the Southeast Region instructed recipients to coordinate with the FWS contact office on the permit.

All research conducted with federally listed species in caves/mines in Alabama should therefore be coordinated with the Service's Alabama Field Office via the following email address: [jodie\\_smithem@fws.gov](mailto:jodie_smithem@fws.gov) or by telephone (office): 251-441-5842.

Research conducted with any other species should be coordinated with the Alabama Department of Conservation and Natural Resources by visiting the following website: <https://heritage.dcnr.alabama.gov>.

All biologists conducting bat surveys in Alabama must also adhere to guidance presented in the document “Disinfection Protocol for Bat Field Research/Monitoring” (USFWS 2009e). Updates to these protocols can be found at: [http://www.fws.gov/northeast/white\\_nose.html#](http://www.fws.gov/northeast/white_nose.html#).

*Strategy 1. Determine the best strategy to permit involvement of all interested, qualified parties in the fulfillment of this plan.*

Tasks:

- a. Determine who will be responsible for implementing the objectives of the plan (i.e., state biologists, federal biologists, researchers, etc).
- b.
- c. Insure everyone involved has the appropriate level of training necessary to carry out plan activities in a responsible manner. Developing a training protocol may be necessary.
- d. Explore the various options for permitting the responsible individuals and select the most effective and efficient solution. Current options include: 1) allow individuals to obtain their own Section 10(a) (1) (A) permit from the USFWS Southeast Regional Office, 2) amend the USFWS Alabama Ecological Services Field Office’s permit to include the responsible parties as subpermittees, or 3) permit all responsible individuals for the activities listed in the plan through an Incidental Take Statement of a Biological Opinion.

*Strategy 2. Obtain the permits and resources needed to accomplish plan objectives.*

Tasks:

- a. Work with the USFWS Southeast Regional Office and Alabama Ecological Services Field Office to obtain the permits necessary to allow all qualified individuals interested in implementation of this plan, both now and in the future, to participate in conservation of listed species. Some interested individuals may have to work under the guidance of those with permits.
- b. Coordinate with the Alabama Department of Conservation and Natural Resources (ADCNR) to obtain the necessary permits to allow all interested individuals to be involved in these efforts.
- c. Identify the resources needed for plan implementation. Begin with the highest priority activities and those that must be accomplished right away.

*Strategy 3. Determine the best strategy to accomplish plan objectives.*

Tasks:

- a. Request that all who are interested in the goals of this plan join the Alabama Bat Working Group, which will oversee implementation of this plan. This will facilitate accomplishment of plan goals in a number of ways including, but not limited to, sharing of information and better coordination of the various actions needed to accomplish plan tasks.

- b. Determine the best method to coordinate the implementation effort so tasks can be accomplished effectively and efficiently. A subcommittee or similar structure may be necessary to oversee the planning and achievement of the various objectives of the plan. Plan tasks will likely have to be implemented prior to the development of any formal method to coordinate plan activities.

### **III. CONCLUSION**

This plan to manage WNS in the State of Alabama is meant to be a living document, changing as situations warrant it. Changes to planned actions and implementation of actions not explicitly stated in this plan will likely be necessary due to the high rate of spread of WNS and the rapidity of changes in our knowledge of this deadly bat syndrome. The AWMT hopes to update the plan twice each year, with future updates being indicated by different version numbers and the introduction of each version including a summary of changes to the previous one. The Alabama community managing this issue will have to be adaptive in order to deal with WNS's rapidly changing nature and our ability to understand it.

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## **APPENDIX**

### **ALABAMA CAVES RECOMMENDED FOR WHITE-NOSE SYNDROME SURVEILLANCE DURING THE HIBERNATION SEASON**



No.	Cave Name	County	<sup>1</sup> Owner-ship: Agency/Private	Recovery Plan(s) Priority 1-4	WNS Survey Priority 1-3	<sup>2</sup> Known Cave Type	Primary Species Present	<sup>3</sup> Type of Survey Needed	<sup>1</sup> Proposed Agency/ Organization(s) Charged with Survey	Extensive Ingress Required	Recommended Frequency of Survey
1	Sauta Cave	Jackson	USFWS	1	1	H,R	M. grisescens, M. sodalis	WV, SE, HT	ADCNR, USFWS	Yes	Annual
2	Cave Springs Cave	Morgan	USFWS	1	1	R	M. grisescens	WV, SE, HT	ADCNR, USFWS	Yes	Annual
3	Fern Cave	Jackson	USFWS	1	1	H	M. grisescens	WV	ADCNR, USFWS	Yes	Annual
4	Georgetown Cave	Lauderdale	NPS	1	2	R – intermittent	M. grisescens	WV, SE	ADCNR, NPS	Yes	Annual
5	Hambrick	Marshall	TVA	1	1	R	M. grisescens	SE, HT	ADCNR, TVA	No	Annual
6	Key Cave	Lauderdale	USFWS, TVA	1	1	R	M. grisescens	WV, SE, HT	ADCNR, USFWS, TVA	Yes	Annual
7	Sanders	Conecuh	Private	1	1	R	M. austroriparius	WV, SE, HT	ADCNR, AGP	Yes	Annual
8	Anderson Cave	Shelby	City Birmingham	2	1	R	M. grisescens	WV, SE, HT	ADCNR, USFWS	Yes	Annual
9	Baker Cave	Colbert	Private	2	1	R	M. grisescens	WV, SE, HT	ADCNR, AGP	Yes	Annual
10	Blowing Spring Cave	Lauderdale	ADCNR	2	1	R	M. grisescens	WV, SE, HT	ADCNR	Yes	Annual
11	Dunham Cave	Marshall	Private	2	3	Historical R	M. grisescens	SE	AGP	No	3 year
12	Gross Skeleton	Jackson	TVA	2	2	Historical R	M. grisescens	SE	TVA, AGP	No	3 year
13	Hope Cave	Dekalb	Private	2	2	R	M. grisescens	WV, SE, HT	ADCNR, AGP	Yes	2 year
14	Indian Cave	Limestone	Elk River Dev. Auth	2	1	R	M. grisescens	WV, SE, HT	ADCNR	No	Annual
15	Kings School Cave	Marshall	ADCNR	2	2	R	M. grisescens	SE, HT	ADCNR, AGP	No	2 year
16	Old Blowing Cave	Marshall	Private	1	1	R	M. grisescens	WV, SE, HT	ADCNR, AGP	Yes	Annual
17	Nitre (Saltpeter) Cave	Jackson	ADCNR	2	1	R	M. grisescens	WV, SE, HT	ADCNR, AGP	Yes	2 year
18	Shelta Cave	Madison	Private – NSS	2	1	R	?	WV, SE, HT	ADCNR, NSS	Yes	3 year
19	Bishop Cave	Marshall	Private	3	1	R	M. grisescens	SE	AGP	Yes	2 year
20	Collier Cave	Lauderdale	TVA	3	1	R	M. grisescens	WV, SE, HT	ADCNR, TVA	Yes	Annual
21	Herring Cave	Madison	Private	3	2	Historical R	?	WV, SE, HT	ADCNR, AGP	Yes	3 year
22	AL Bat Cave 1 (Hollyberry)	Lauderdale	Private	3	1	R	M. grisescens	WV, SE, HT	ADCNR	No	Annual

No.	Cave Name	County	<sup>1</sup> Owner-ship: Agency/Private	Recovery Plan(s) Priority 1-4	WNS Survey Priority 1-3	<sup>2</sup> Known Cave Type	Primary Species Present	<sup>3</sup> Type of Survey Needed	<sup>1</sup> Proposed Agency/ Organization(s) Charged with Survey	Extensive Ingress Required	Recommended Frequency of Survey
23	Honeycomb Cave	Marshall	TVA	3	3	Historical R	M. grisescens	SE	ADCNR, TVA	No	2 year
24	Horse Skull Cave	Jackson	Private	3	3	Historical R	M. grisescens	SE	AGP	?	3 year
25	Hughes Cave	Morgan	Private	3	1	R	Mixed species	WV, SE, HT	AGP	Yes	2 year
26	Kings Spring Cave	Marshall	Private	3	2	?	?		AGP	Yes	3 year
27	Ledbetter Cave	Marshall	Private	3	3	?	?	SE	NSS, AGP	No	3 year
28	McKinney Pit #2)	Colbert	Private	3	2	?	Mixes species	SE	ADCNR, AGP	Yes	2 year
29	Stanley-Carden	Dekalb	Private	3	1	R	M. grisescens	WV, SE, HT	ADCNR, AGP	Yes	2 year
30	Talucah	Morgan	Private	3	2	Historical R	Mixed species	WV, SE	ADCNR, AGP	Yes	3 year
31	Armstrong Cave	Lawrence	USFS	n/a	1	R	M. grisescens, M. sodalis, M. septentrionalis	WV, SE, HT	ADCNR, USFS	Yes	Annual
32	Cathedral Caverns	Marshall	ADCNR	n/a	1	H	M. sodalis	WV	ADCNR	Yes	Annual
33	Honeycomb Mine	Marshall	TVA	n/a	2	R	M. grisescens	WV, SE, HT	ADCNR, TVA	Yes	Annual
34	Sublett Springs Cave	Madison	Private	n/a	1	R	M. grisescens	SE, HT	ADCNR	No	Annual
35	Mountain Springs Cave	Lawrence	USFS	n/a	3	R	Mixed species	WV, SE, HT	USFS, AGP	Yes	3 year
36	Yellow River Cave (Rock House Cave)	Covington	Private	n/a	2	R	M. austroriparius	WV, SE, HT	USFWS, AGP	Yes	Annual
37	Davis Bat Cave	Lauderdale	ADCNR	n/a	1	R	M. grisescens	WV, SE, HT	ADCNR, AGP	No	Annual
38	Russell Cave N.M.	Jackson	NPS	n/a	3	R	M. grisescens	SE, HT	NPS, AGP	Yes	3 year
39	Backward/Confusion	Lawrence	USFS	n/a	1	H	M. grisescens	WV	ADCNR, USFS	No	Annual
40	Flutter Putter Cave	Jackson	Private	n/a	2	R	M. grisescens	WV, SE, HT	AGP	Yes	2 year
41	Six-mile Creek Cave	Bibb	Private	n/a	1	R	M. grisescens	WV, SE, HT	USFWS, AGP	No	Annual

<sup>1</sup>ADCNR- Alabama Department of Conservation and Natural Resources, USFWS- U.S. Fish and Wildlife Service, USFS- U.S. Forest Service, NPS- National Park Service, TVA- Tennessee Valley Authority, NSS- National Speleological Society, CB- City of Birmingham, ERDA- Elk River Development Authority, AGP- Additional Grant Personnel.

<sup>2</sup>H- hibernaculum, R- roost.

<sup>3</sup>WV- winter visual [The first year- complete entry to check for bats, complete count where a small number (about 250- 300) of bats are present, and an estimate where larger numbers are present- this may be modified in future years depending on what is found], SE- summer emergence, HT- harp trap (Harp traps may not be used if the possibility of WNS transmission in the traps is of concern).