

SUBJECT: Request adoption of Board Order ER-35-10, revisions to ch. NR 27, addition of Wisconsin cave bats to the threatened species list

FOR: DECEMBER 2010 BOARD MEETING

TO BE PRESENTED BY: Erin Crain - Section Chief, Dave Redell - Bat Ecologist

SUMMARY:

Request to list four WI cave bat species, including the little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*), eastern pipistrelle (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*), as Threatened due to overall population declines at the national level and the immediate threat of white-nose syndrome (WNS) in WI. The removal of cave bats from the ecosystem will have significant economic, environmental and public health impacts.

White-nose syndrome is a disease responsible for unprecedented mortality in cave hibernating bats, identified by the white fungus (*Geomyces destructans*) that grows on the nose, ears, and muzzle and/or wing membranes of affected bats. Since initial detection in 2006, WNS has been found in 14 states and 2 Canadian provinces, spreading up to 800 miles in the last year. The disease was located last spring within 225 miles of the WI's southern border and 300 miles of WI's northern border. Mortality rates of affected colonies reach 100%. WNS has been linked to the death of over one million bats since 2007 and threatens to cause the extinction of several bat species in the near future. WI has one of the highest concentrations of cave bat hibernacula in the Midwest and large numbers of cave bats from neighboring states hibernate in WI. Consequently, WI's cave bat population, and those of surrounding states, is threatened by this devastating disease.

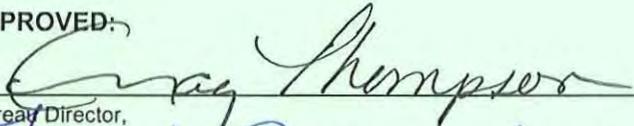
Listing these species before WNS has been detected in WI will allow the department time to work collaboratively with stakeholders to develop minimization measures and produce a conference report containing recommendations for reducing adverse impacts that will be presented to the Natural Resources Board. Many of the potential concerns of affected parties will be addressed through a broad incidental take permit/authorization and voluntary agreements. Affected constituencies include commercial caves/mines, private cave/mine owners, recreational cavers, wildlife rehabilitators, animal control operators, agricultural and forest industries, the conservation community, utilities, WDOT and homeowners.

RECOMMENDATION: Adoption of Board Order ER-35-10 for listing of WI cave bats as threatened species.

LIST OF ATTACHED MATERIALS:

- | | | | | | |
|----|--------------------------|---|-----|-------------------------------------|----------|
| No | <input type="checkbox"/> | Fiscal Estimate Required | Yes | <input checked="" type="checkbox"/> | Attached |
| No | <input type="checkbox"/> | Environmental Assessment or Impact Statement Required | Yes | <input checked="" type="checkbox"/> | Attached |
| No | <input type="checkbox"/> | Background Memo | Yes | <input checked="" type="checkbox"/> | Attached |

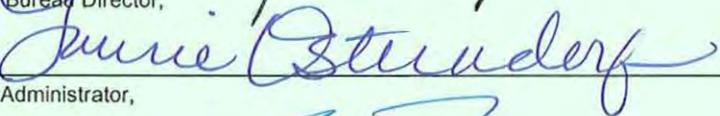
APPROVED:



Bureau Director,

12/3/10

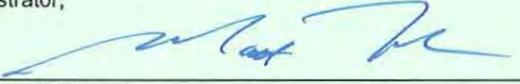
Date



Administrator,

12/3/10

Date



Secretary, Matt Frank

12-3-10

Date

- | | |
|---------------------------|-------------------------|
| cc: Laurie J. Ross - AD/8 | Tara Bergeson - ER/6 |
| Craig Thompson - ER/6 | David Redell - ER/6 |
| Erin Crain - ER/6 | Gregor Schuurman - ER/6 |
| Tim Andryk - LS/8 | Lance Potter - ER/6 |
| Rori Paloski - ER/6 | Linda Haddix - LS/8 |

DATE: December 3, 2010

TO: Natural Resources Board

FROM: Matthew J. Frank *MJF*
Secretary, Department of Natural Resources

SUBJECT: Request adoption of Board Order ER-35-10, revisions to ch. NR 27, addition of Wisconsin cave bats to the threatened species list

Background

Bats affected with white-nose syndrome (WNS) were first observed in 2006 at a single cave near Albany, New York. WNS has since spread across 14 states and 2 Canadian provinces, spreading up to 800 miles each year. WNS has been linked to the death of over one-million bats since 2007 and threatens to cause the extinction of several bat species in the near future. Mortality rates of affected colonies reach 100%. Last spring, the disease was located within 225 miles of Wisconsin's southern border and 300 miles from the northern border. Because the known dispersal distance of the little brown bat is 280 miles, an affected cave is now located within the dispersal range of Wisconsin little brown bats. Based on the current location and known rate of spread of the disease, we anticipate the presence of white-nose syndrome in Wisconsin as early as January 2011.

White-nose syndrome is characterized as a condition of hibernating bats. Those infected tend to show a white fungal growth on their face, arms, legs, wings, and/or tail caused by the newly isolated and named fungus, *Geomyces destructans*. Infected bats exhibit atypical behavior, such as daytime activity during winter hibernation, which rapidly depletes stored energy reserves. Wing damage and emaciation are also common.

Research conducted at the United States Geological Survey (USGS) Wildlife Health Center has shown *G. destructans* to transfer from bat to bat, and from infected site to bat. There is also evidence of human transfer of *G. destructans* from site to site and/or bat via contaminated clothing and gear. At this time, there is no known cure or treatment for WNS.

To date, nine species of cave bats are affected by WNS, including the federally endangered Indiana bat. All Wisconsin cave bats, which includes the little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*), eastern pipistrelle (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*), are among the species fatally affected by the white-nose syndrome. Consequently, Wisconsin's cave bat population as a whole is threatened by this devastating disease. The greatest decline in population has been observed in the little brown bat, which many scientists speculate could become locally extinct in the near future.

Wisconsin has one of the highest concentrations of cave bat hibernacula in the Midwest and large numbers of cave bats from neighboring states hibernate in Wisconsin. Consequently, Wisconsin's cave bat population, and those of surrounding states, is threatened by this devastating disease. Three hibernacula alone house over 300,000 bats, including all four cave bat species. The largest known hibernaculum in the state, Neda Mine, may also be the largest in the Midwest with an estimated population of 150,000. The

little brown bat is the most common species in Wisconsin and given that this species has seen the greatest mortality rate due to WNS, Wisconsin is anticipating significant impacts to its cave bat populations when WNS begins to affect Wisconsin bats.

Bats are a vital part of many ecosystems and white-nose syndrome has significant environmental, economic, and public health impacts. All bats affected by WNS are insectivorous and a single little brown bat can eat up to 1,000 insects per hour, often consuming large numbers of agricultural pests, which cost farmers and foresters billions of dollars per year. As predators of many insects, bats also may play an important role in reducing risk of human disease transmitted by flying insects. Bats play an important role in the unique and fragile cave ecosystems, and their disappearance would have significant impacts. The nutrients bats bring into caves, and upon which other cave species depend, often have no other means of entry. In many cases, only bats regularly move in and out of the cave environment, while other cave species must rely solely on what is found or brought inside. Thus, the disappearance of bats from caves could cause the disappearance of other species as well. Non-cave ecosystems would also be significantly impacted by the disappearance of bats.

Listing these species before WNS has been detected in Wisconsin will allow the department time to work collaboratively with stakeholders to ensure that appropriate conservation measures, such as the protection of refuge hibernacula, are developed and in place in the event that WNS affects Wisconsin.

The department has been establishing volunteer agreements with hibernacula owners, holding stakeholder meetings, working with volunteer monitors, and implementing an education and outreach program.

Rule Summary

Chapter NR 27, Wis. Admin. Code lists Wisconsin's endangered and threatened animals and plants. Due to the immediate threat of white-nose syndrome in Wisconsin, the department proposes to add the following cave bat species to Wisconsin's threatened species list, s. NR 27.03 (3), Wis. Admin. Code: little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*), eastern pipistrelle (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*).

In anticipation of listing, DNR has created a broad incidental take permit and authorization conservation plan (attached) to outline minimization measures for cave bats. The new requirements will primarily affect homeowners and pest control operators. The process for assessing transportation project impacts to listed species and the associated minimization measures will follow existing protocols. No additional actions, above those currently requested by the department, will be required of the wind industry at this time. The department will hold a stakeholder meeting this winter to further develop and refine minimization measures. A meeting report will be presented to the NRB and used to update the broad incidental take permit/authorization as needed.

Rule Development

These rule changes were developed with the assistance of the Bureau of Endangered Resources and Legal Services.

Public Participation

The department held five public hearings on the proposed changes to ch. NR 27, Wis. Admin. Code (Rule Order ER-35-10). Hearings were held on October 26 (Fitchburg) and November 29 (Madison, Green Bay,

Eau Claire, Wausau). The October 26 hearing was held concurrently with a hearing to list the fungus, *Geomyces destructans*, as a prohibited invasive species in s. NR 40.04(2), Wis. Admin. Code (Rule Order IS-41-10). The November 29 hearings were held concurrently with hearings to list the fungus, *Geomyces destructans*, as prohibited invasive species in s. NR 40.04(2), Wis. Admin. Code and hearings to revise ch. NR 40, Wis. Admin. Code related to the management of *Geomyces destructans*, the fungus associated with white-nose syndrome (Rule Order IS-47-10).

Hearing Synopsis and How the Rule Was Revised After Public Hearing

See the attached Public Hearing Synopsis for a summary of significant public comments and the department's responses to those comments. No changes were made to the Rule based on public comments.

Rules Clearinghouse Comments

4. Adequacy of References to Related Statutes, Rules and Forms

a. The order does not mention s. ATCP 30.19 (2), which provides for the issuance of permits authorizing emergency use of pesticides on bat colonies in specified circumstances.

Department Response: Comment accepted. A reference to s. ATCP 30.19 has been added to the "Related Statutes or Rules" section of the Rule Order.

b. The comparison with rules in adjacent states discusses relevant rules in Minnesota, but not in Michigan, Illinois, or Iowa.

Department Response: Comment accepted. The "Comparison of Rules in Adjacent States" section of the Rule Order was amended to include information for Michigan, Illinois and Iowa.

5. Clarity, Grammar, Punctuation and Use of Plain Language

a. "Wis." should be deleted from SECTION 2 of the proposed rule. Also, the reference should be to the first day of the month after publication in the Wisconsin Administrative Register. [See s. 1.02 (4), Manual.]

Department Response: Comments accepted. Changes made as suggested.

b. The department should consider removing the italicized font format, which does not appear in other, similar provisions in s. NR 27.03.

Department Response: Comments rejected. The italicized font format does appear in other, similar provisions in s. NR 27.03, except for the plant listings.

6. Potential Conflicts With, and Comparability to, Related Federal Regulations

a. The department should consider making explicit that the federal threatened and endangered species lists do not currently include any of the four species of bats proposed to be protected under the emergency rule.

Department Response: Comment accepted. The "Summary of, and Comparison with, Existing or Proposed Federal Regulations" section of the Rule Order was amended to state that none of the four cave

bat species currently proposed for listing in Wisconsin are currently on the federal endangered or threatened list.

b. It may be appropriate to mention actions taken this month by the U.S. Fish and Wildlife Service to address the spread of white-nose syndrome in bats. [See http://www.fws.gov/whitenosesyndrome/pdf/NWRS_WNS_Guidance_Final1.pdf]

Department Response: Comments rejected. This information is more pertinent to the related ch. NR 40 revisions.

Small Business and Initial Regulatory Flexibility Analysis

Affected constituencies include commercial caves and mines, private cave and mine owners, recreational cavers, wildlife rehabilitators, animal control operators, agricultural and forestry industries, the conservation community, wind utilities, WI Department of Transportation (WDOT) and homeowners. Many of the concerns of these groups will be addressed through a broad incidental take permit/authorization and voluntary agreements so that the listing does not have a significant economic impact on a substantial number of small businesses.

A broad incidental take permit/authorization has been issued, as provided for under s. 29.604, Wis. Stats. The broad incidental take permit/authorization will allow for the incidental taking of state listed cave bats that may occur as a result of specific public health concerns, bat removals, building demolitions, forestry activities, bridge demolitions, miscellaneous building repairs and wind energy development projects (see the "Broad Incidental Take Permit/Authorization for Cave Bats Conservation Plan" attachment for more information). Some take of bats may still occur as a result of these activities, however take will be minimized by following specific minimization measures. The department has concluded that the projects covered under this permit/authorization are not likely to jeopardize the continued existence and recovery of the state population of these bats or the whole plant-animal community of which they are a part; and has benefit to the public health, safety or welfare that justifies the action. This incidental take permit/authorization is only needed when a bat is present or suspected to be present (e.g., Natural Heritage Inventory report of bats in the area, evidence of bat presence).

Environmental Analysis

This is considered a Type IV Action, as defined in s. NR 150.03 (4), and no environmental analysis is required. However, in the interest of providing the public with complete information on this rule change, the department has decided to prepare an environmental assessment (see attached) prior to the public hearings.

Hearing Synopsis
Summary of Public Comments and Department Responses
ER-35-10

The department held five public hearings on the proposed changes to ch. NR 27, Wis. Admin. Code (Rule Order ER-35-10). Hearings were held on October 26 (Fitchburg) and November 29 (Madison, Green Bay, Eau Claire, Wausau). The October 26 hearing was held concurrently with a hearing to list the fungus, *Geomyces destructans*, as a prohibited invasive species in s. NR 40.04(2), Wis. Admin. Code (Rule Order IS-41-10). The November 29 hearings were held concurrently with hearings to list the fungus, *Geomyces destructans*, as prohibited invasive species in s. NR 40.04(2), Wis. Admin. Code and hearings to revise ch. NR 40, Wis. Admin. Code related to the management of *Geomyces destructans*, the fungus associated with white-nose syndrome (Rule Order IS-47-10).

Comments were combined for all three rule orders (ER-35-10, IS-41-10, IS-47-10). A summary of the comments is provided in the table below. In general, those providing testimony did not identify specific rules but rather referred to the whole set of rules that they supported or opposed. Consequently, if comments contained opposition to any portion of the rules, the comments were considered in opposition to the whole group of rules. There were 208 comments (75%) in support of the rules and 71 comments (25%) opposed.

Support	208	(203 Wisconsin residents, 5 nonresidents)
Oppose	71	(40 Wisconsin residents, 31 nonresidents)
Support/Oppose	3	(1 Wisconsin resident, 2 nonresidents)
Total	282	

General Comments

Comment: Public hearings should have been held.

Response: Public hearings were held for the proposed rules. The department held five public hearings on two of the board orders (ER-35-10 and IS-41-10). Hearings were held on October 26 (Fitchburg) and November 29 (Madison, Green Bay, Eau Claire, Wausau). The four November 29 hearings were held concurrently with the remaining board order (IS-47-10).

Comment: Appropriate public comment periods were not held.

Response: The public comment period for board orders ER-35-10 and IS-41-10 was approximately 60 days and the public comment period for board order IS-47-10 was approximately 30 days.

Comment: The DNR should have contacted more stakeholders.

Response: Department staff have provided WNS updates, decontamination protocols, and instructions for public comment on the proposed rules to many stakeholder groups including the caving community, landowners, animal control operators, wildlife rehabilitators, conservation organizations, partner agencies

and the agricultural industry. The department has also posted instructional videos regarding decontamination, the proposed regulation and the science concerning white-nose syndrome. It has also worked directly with stakeholders on changes to the broad incidental take permit and has solicited public comment on a voluntary environmental analysis that has been produced regarding the impact of the proposed rules on the environment. Further, the department has worked on an individual basis with commercial cave and mine owners to develop site specific prevention plans.

Comment: The DNR should wait to take action until WNS has been detected in Wisconsin.

Response: Proposing these three rules before WNS has been detected in Wisconsin will allow the department time to work collaboratively with stakeholders to ensure that appropriate conservation measures, such as the protection of refuge hibernacula, are developed and in place in the event that WNS affects Wisconsin.

Comment: The DNR has stated that based on the current location and known rate of spread of the disease, it is likely that WNS will reach Wisconsin as early as January 2011. Based upon my understanding of the disease, this statement is incorrect. If WNS appears in January 2011, then it is probably already there.

Response: That is correct. We have clarified our language to say that WNS may be *detected* in Wisconsin as early as January 2011.

Comment: The DNR is spending too much (tax) money on this. Money should go to research rather than management.

Response: Approximately 90 percent of DNR WNS activities have been funded through grants and donations. The DNR has been actively involved in both WNS management and WNS research.

Comment: The DNR is not considering how much time they will need to devote to this (e.g., teaching DNR scientists to identify bats, inspecting caves, posting signs, enforcement).

Response: All DNR staff and contractors performing fieldwork have received the necessary training and certifications to carry out the work. Work completed in previous months has narrowed the number of caves identified for early detection, monitoring and inspection, etc. to a number that is manageable. There have been no enforcement actions under the current emergency rules and given the positive responses the department has received from landowners, we do not anticipate a significant increase in enforcement workload.

Comment: A strong bat education program should be in place and/or continue.

Response: The Wisconsin Bat Monitoring Program (WBMP) educates citizens on bat biology and conservation through presentations, trainings, workshops, publicly distributed informational packets (Bat House Handbook, Bat Exclusion Guide, Bat Roost Monitoring Pamphlet), public television appearances,

public radio appearances, newspaper articles and public service announcements. The WBMP will continue to strive to increase public awareness and education.

Comment: Sources should be cited in the background memos.

Response: The background memos that are included in the green sheet package for the Natural Resources Board typically just contain a summary of the issue. The environmental assessment that is attached to all three December 2010 green sheet packages (board orders ER-35-10, IS-41-10, IS-47-10) contains a significant number of citations. We have included additional citations in this document as well.

E/T Listing Comments

Comment: The WDNR should not list the cave bats before the United States Fish and Wildlife Service (USFWS) does so.

Response: Different criteria are used for WDNR and USFWS species listings. The WDNR lists species based on the species' abundance in Wisconsin, while the USFWS lists species based on the species' abundance at a national level. Species are commonly listed at the state level (in Wisconsin and other states) before they become rare enough to warrant listing at the national level. We have approximately 220 species listed in Wisconsin and only 16 of these are listed as endangered or threatened by the USFWS. The northern long-eared bat has been proposed for USFWS listing.

Comment: Cave bats should not be listed now because they are not yet threatened.

Response: Cave bats were assessed for changes in population condition, using the following triggers established by the WDNR's Bureau of Endangered Resources for the purpose of assessing species' populations:

1. Significant change in the Natural Heritage Inventory State Rank since 1997
2. Significant change in the Natural Heritage Inventory Global Rank since 1997
3. Change in United States Endangered Species Act status since 1997
4. Is there a need for immediate protection (i.e., new threat)
5. Change in other statuses, e.g., International Union for Conservation of Nature (IUCN), Convention on International Trade in Endangered Species (CITES)
6. New data on population condition available
7. Recommended for listing/delisting since 1997
8. Taxonomic change
9. For currently listed species, have recovery goals been met

All four cave bat species met triggers #1 and #4, and the little brown bat also met trigger #7 (recommended for listing by stakeholders), therefore indicating the need for the rule change.

Listing these species before WNS has been detected in Wisconsin will allow the department time to work collaboratively with stakeholders to ensure that appropriate conservation measures, such as the protection of refuge hibernacula, are developed and in place in the event that WNS affects Wisconsin.

Fiscal Estimate — 2009 Session

- Original Updated
 Corrected Supplemental

LRB Number	Amendment Number if Applicable
Bill Number	Administrative Rule Number ER-35-10

Subject

Revisions to add cave bats to the Wisconsin endangered and threatened species list.

Fiscal Effect

- State: No State Fiscal Effect
 Indeterminate

Check columns below only if bill makes a direct appropriation or affects a sum sufficient appropriation.

- Increase Existing Appropriation Increase Existing Revenues
 Decrease Existing Appropriation Decrease Existing Revenues
 Create New Appropriation

- Increase Costs — May be possible to absorb within agency's budget.
 Yes No
 Decrease Costs

- Local: No Local Government Costs
 Indeterminate

1. Increase Costs
 Permissive Mandatory
2. Decrease Costs
 Permissive Mandatory

3. Increase Revenues
 Permissive Mandatory
4. Decrease Revenues
 Permissive Mandatory

5. Types of Local Governmental Units Affected:
 Towns Villages Cities
 Counties Others _____
 School Districts WTCS Districts

- Fund Sources Affected
 GPR FED PRO PRS SEG SEG-S

Affected Chapter 20 Appropriations

Assumptions Used in Arriving at Fiscal Estimate

Rule Summary: The proposed rule package amends Ch. NR 27, Wis. Adm. Code to add four species of bats to the endangered and threatened species list. This addition to the invasives list is being proposed as permanent rule ER-35-10.

State Fiscal Estimate:

The proposed rule package will require time by DNR staff to prepare the rule and administer rule hearings. Endangered Resources review staff may see an increase in time associated with the listing of bats. There will be an increase in the time associated with management of the broad incidental take permit. It is assumed there will not be a significant increase in staff time, and that this time can be covered by existing appropriations.

Local Fiscal Estimate:

No Local Government impact.

Long-Range Fiscal Implications

Prepared By: Joe Polasek	Telephone No. 266-2794	Agency Department of Natural Resources
Authorized Signature 	Telephone No. 266-2794	Date (mm/dd/ccyy) 12-05-10

Fiscal Estimate — 2009 Session

**Page 2 Assumptions Narrative
Continued**

LRB Number	Amendment Number if Applicable
Bill Number	Administrative Rule Number ER-35-10

Assumptions Used in Arriving at Fiscal Estimate – Continued

Private Fiscal Impacts – Continued: It is assumed the impact to farmers of this rule change will be positive; especially, in light of the fact that if bat populations in the state were to be devastated, the costs to agriculture from pest destruction and pesticide use would increase.

Fiscal Estimate Worksheet — 2009 Session
 Detailed Estimate of Annual Fiscal Effect

Original Updated
 Corrected Supplemental

LRB Number	Amendment Number if Applicable
Bill Number	Administrative Rule Number ER-35-10

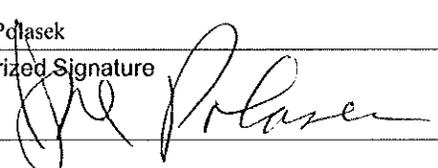
Subject
 Revisions to add cave bats to the Wisconsin endangered and threatened species list.

One-time Costs or Revenue Impacts for State and/or Local Government (do not include in annualized fiscal effect):

Annualized Costs:		Annualized Fiscal Impact on State Funds from:	
		Increased Costs	Decreased Costs
A. State Costs by Category			
State Operations — Salaries and Fringes		\$	\$ -
(FTE Position Changes)		(FTE)	(- FTE)
State Operations — Other Costs			-
Local Assistance			-
Aids to Individuals or Organizations			-
Total State Costs by Category		\$	\$ -
B. State Costs by Source of Funds			
GPR		\$	\$ -
FED			-
PRO/PRS			-
SEG/SEG-S			-
State Revenues	Complete this only when proposal will increase or decrease state revenues (e.g., tax increase, decrease in license fee, etc.)	Increased Revenue	Decreased Revenue
GPR Taxes		\$	\$ -
GPR Earned			-
FED			-
PRO/PRS			-
SEG/SEG-S			-
Total State Revenues		\$	\$ -

Net Annualized Fiscal Impact

	<u>State</u>	<u>Local</u>
Net Change in Costs	\$ _____	\$ _____
Net Change in Revenues	\$ _____	\$ _____

Prepared By: Joe Polasek	Telephone No. 266-2794	Agency Department of Natural Resources
Authorized Signature 	Telephone No. 266-2794	Date (mm/dd/yyyy) 12-03-10

**ORDER OF THE STATE OF WISCONSIN NATURAL RESOURCES BOARD
AMENDING AND CREATING RULES**

The Wisconsin Natural Resources Board proposes an order to **create** NR 27.03 (3)(a) relating to adding cave bats to Wisconsin's threatened species list.

ER-35-10

Analysis Prepared by Department of Natural Resources

Statutory Authority: The state statutes that authorize the promulgation of this rule include ss. 29.604 227.11, Wis. Stats.

Explanation of Agency Authority: These sections grant rule-making authority for the establishment of an endangered and threatened species list to the department.

Statutes Interpreted: In promulgating this rule, s. 227.11(2)(a), Wis. Stats., has been interpreted as allowing the department the authority to create and amend rules. Section 29.604 (3)(b), Wis. Stats., has been interpreted as allowing the department the authority to create and amend the list of Wisconsin's endangered and threatened species, NR 27.03, Wis. Admin. Code.

Related Statutes or Rules: Section 29.604 (3), Wis. Stats., requires the Department to establish an endangered and threatened species list. Chapter NR 27, Wis. Admin. Code, provides the list of endangered and threatened species. ATCP 30.19, Wis. Admin. Code, prohibits the use of pesticides to kill bats unless a permit is issued to authorize the emergency use of pesticides on bat colonies in specified circumstances.

Plain Language Analysis: The proposed changes to Ch. NR 27, Wis. Admin. Code, will add the four cave bat species in Wisconsin to the Wisconsin threatened species list. The four species include the little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), northern long-eared bat (*Myotis septentrionalis*), and eastern pipistrelle (*Perimyotis subflavus*).

Summary of, and Comparison with, Existing or Proposed Federal Regulations: Although several species of cave bats are listed federally by the United States Fish and Wildlife Service (USFWS), we are not aware of any listings that have occurred specifically due to white-nose syndrome. The USFWS does not currently list any of the four WI cave bats proposed for listing in Wisconsin. However, USFWS has received a petition to list two cave bat species (northern long-eared bat and eastern small-footed bat) due to white-nose syndrome and is in the process of reviewing the petition.

Comparison with Rules in Adjacent States: Vermont, New York and Massachusetts are in the process of listing several cave bat species due to white-nose syndrome. The Minnesota Department of Natural Resources has recently proposed the little brown bat (*Myotis lucifugus*) and big brown bat (*Eptesicus fuscus*) as species of special concern because of the eminent threat of white-nose syndrome in the state. The other two species of cave bats in Minnesota, northern long-eared bat (*Myotis septentrionalis*) and eastern pipistrelle (*Perimyotis subflavus*) are already listed as species of special concern in Minnesota. We are not aware of similar rules in Michigan, Illinois or Iowa.

Summary of Factual Data and Analytical Methodologies: The proposed rule is related to the addition of Wisconsin's four cave bat species to the state's threatened species list. The four species include the little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), northern long-eared bat (*Myotis septentrionalis*), and eastern pipistrelle (*Perimyotis subflavus*).

The proposed rule change seeks to provide protection to Wisconsin cave bat species, which face the imminent threat of white-nose syndrome. White-nose syndrome has spread across 14 states and 2

Canadian provinces in the last 3 years, spreading up to 800 miles per year. Mortality rates of affected bat colonies reach 100%. The disease was located last spring within 225 miles of Wisconsin's southern border and 300 miles from the northern border. Because the known dispersal distance of the little brown bat is 280 miles, an affected cave is now located within the dispersal range of Wisconsin little brown bats. Based on the current location and known rate of spread of the disease, we anticipate the detection of white-nose syndrome in Wisconsin as early as January 2011.

Wisconsin has one of the highest concentrations of cave bat hibernacula in the Midwest and large numbers of cave bats from neighboring states hibernate in Wisconsin. Consequently, Wisconsin's cave bat population, and those of surrounding states, is threatened by this devastating disease. All Wisconsin bat species are among the species fatally affected by the white-nose syndrome.

Cave bats were assessed for changes in population condition, using the following triggers established by the Bureau of Endangered Resources:

1. Significant change in the Natural Heritage Inventory State Rank since 1997
2. Significant change in the Natural Heritage Inventory Global Rank since 1997
3. Change in United States Endangered Species Act status since 1997
4. Is there a need for immediate protection (i.e., new threat)
5. Change in other statuses, e.g., International Union for Conservation of Nature (IUCN), Convention on International Trade in Endangered Species (CITES)
6. New data on population condition available
7. Recommended for listing/delisting since 1997
8. Taxonomic change
9. For currently listed species, have recovery goals been met

All four cave bat species met triggers #1 and #4, and the little brown bat also met trigger #7 (recommended for listing by stakeholders), therefore indicating the need for the rule change.

Listing these species before WNS has been detected in Wisconsin will allow the Department time to work collaboratively with stakeholders to ensure that appropriate conservation measures, such as the protection of refuge hibernacula, are developed and in place in the event that WNS affects Wisconsin.

These rule changes were developed with the assistance of the Bureau of Endangered Resources and Legal Services.

Analysis and supporting documents used to determine effect on small business or in preparation of economic impact report: None.

Effect on small business: Affected constituencies include commercial caves and mines, private cave and mine owners, recreational cavers, wildlife rehabilitators, animal control operators, agricultural and forestry industries, the conservation community, wind utilities, WI Department of Transportation (WDOT) and homeowners. Many of the concerns of these groups will be addressed through a broad incidental take permit/authorization and voluntary agreements so that the listing does not have a significant economic impact on a substantial number of small businesses.

A broad incidental take permit/authorization has been issued, as provided for under s. 29.604, Wis. Stats. The broad incidental take permit/authorization will allow for the incidental taking of state listed cave bats that may occur as a result of specific public health concerns, bat removals, building demolitions, forestry activities, bridge demolitions, miscellaneous building repairs and wind energy development projects (see the "Broad Incidental Take Permit/Authorization for Cave Bats Conservation Plan" attachment for more information). Some take of bats may still occur as a result of these activities, however take will be minimized by following specific minimization measures. The department has concluded that the projects covered under this permit/authorization are not likely to jeopardize the continued existence and recovery of the state population of these bats or the whole plant-animal community of which they are a part; and has benefit to the public health, safety or welfare that justifies the action. This incidental take

permit/authorization is only needed when a bat is present or suspected to be present (e.g., Natural Heritage Inventory report of bats in the area, evidence of bat presence).

Agency Contact Person: Erin Crain, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921. (608) 267-7479, erin.crain@wisconsin.gov.

Section 1. NR 27.03 (3)(a) is created to read:

NR 27.03 (3)(a) *Mammals*.

1. Little brown bat – *Myotis lucifugus*.
2. Big brown bat – *Eptesicus fuscus*.
3. Northern long-eared bat – *Myotis septentrionalis*.
4. Eastern pipistrelle – *Perimyotis subflavus*.

Section 2. EFFECTIVE DATE. The rule contained herein shall take effect on the first day of the month following publication in the Wisconsin administrative register, as provided in s. 227.22 (2), Stats.

Section 3. BOARD ADOPTION. This rule was approved and adopted by the State of Wisconsin Natural Resources Board on _____.

Dated at Madison, Wisconsin _____.

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

By _____
Matthew J. Frank, Secretary

(SEAL)

Broad Incidental Take Permit and Broad Incidental Take Authorization for Wisconsin Cave Bats Conservation Plan

This Broad Incidental Take Permit and Authorization, as provided for under s. 29.604, Wis. Stats., allow for the incidental taking of state listed cave bats in Wisconsin that may occur as a result of specific public health concerns, bat removals, building demolitions, forestry activities, bridge demolitions, miscellaneous building repairs and wind energy development projects. Take will be minimized by following specific minimization measures and the Department has concluded that the projects covered under this permit or authorization are not likely to jeopardize the continued existence and recovery of the state population of these bats or the whole plant-animal community of which they are a part; and has benefit to the public health, safety or welfare that justifies the action.

These measures must be followed when a bat is present or suspected to be present (e.g., Natural Heritage Inventory report of bats in the area, evidence of bat presence).

Project Location

Statewide

Project Information

This permit and authorization cover specific public health concerns, bat removals, building demolitions, forestry activities, bridge demolitions, miscellaneous building repairs and wind energy development projects as described in *Minimization Measures*.

Species Information

This permit and authorization cover all cave bats currently listed in Wisconsin (NR 27.07, Wis. Admin. Code):

- **Big brown bat (*Eptesicus fuscus*)** – Threatened
The big brown bat is a large insectivorous bat, weighing 15.0-26.0 grams. Fur color is russet to dark brown, and the muzzle is black and hairless. In summer, big brown bats commonly roost in artificial structures such as barns, but these bats will also use crevices in trees and rock faces. Big brown bats migrate short distances to caves and mines where they will hibernate for the winter.
- **Eastern pipistrelle (*Perimyotis subflavus*)** – Threatened
The eastern pipistrelle is Wisconsin's smallest bat weighing 4.0-8.0 grams. Fur color ranges from golden brown to reddish brown, and the wing membrane is black with red forearms which gives the bat a distinct tri-colored appearance. The eastern pipistrelle is an insectivorous bat. In summer, these bats commonly roost in the branches of deciduous trees disguised as a leaf. This species migrates short distances to caves and mines in the fall where they hibernate over the winter.
- **Little brown bat (*Myotis lucifugus*)** – Threatened
The little brown bat is a medium-sized member of the genus *myotis*. This insectivorous bat weighs 5.0-12.5 grams, and has tan, reddish-brown or dark brown fur. This species commonly uses artificial structures such as attics and barns as summer roosting sites, but will also roost in crevices and cavities of trees. In fall, little brown bats make local long-distance migrations of up to 279 miles to caves and mines where they will hibernate for the winter.

- Northern long-eared bat (*Myotis septentrionalis*) – Threatened
The northern long-eared bat is dark brown with a gray belly, weighing 5.0-8.0 grams and is insectivorous. In summer this bat roosts in trees close to the trunk. It rarely roosts in artificial structures. Unlike most of the state's bats, this species commonly forages in forest interior. In fall the northern long-eared bat migrates to caves and mines where they will hibernate for the winter.

Likely Impact to Species

Although minimization measures to protect the big brown bat, eastern pipistrelle, little brown bat and northern long-eared bat are incorporated into this broad incidental take permit and authorization, it is not possible to fully avoid incidental take of these species in all situations. Due to the nature of activities covered under this permit and authorization, it is difficult to determine the exact number of individuals that could be taken as a result of the project, however take will be minimized by following specific minimization measures. The Department has concluded that the take allowed for under this permit or authorization is not likely to jeopardize the continued existence and recovery of the state population of these bats or the whole plant-animal community of which they are a part.

Alternative Actions

The following alternatives were considered for this permit and authorization:

Alternative 1: Do not allow for any take of cave bats.

This alternative was determined to not be feasible, due to the large number of affected activities, and is not an appropriate public health decision.

Alternative 2: Do not allow for any take of cave bats during the summer roosting period but allow for some take throughout the remainder of the year.

This alternative was determined to not be feasible, due to the large number of affected activities that occur during the summer roosting period, and is not an appropriate public health decision.

Alternative 3: Allow for some take of cave bats, with minimization measures in place, during the summer roosting period and throughout the remainder of the year.

This option was the preferred alternative because it addresses public health concerns; protects a large number of bats; and allows for most affected activities to continue as planned, or with minimal modifications.

Minimization Measures

This permit and authorization cover the following activities only if the associated minimization measures are followed and reported (where required). For activities not covered under this permit and authorization, contact the Bureau of Endangered Resources for further guidance, including information on individual incidental take permits and authorizations.

These measures must be followed when a bat is present or suspected to be present (e.g., Natural Heritage Inventory report of bats in the area, evidence of bat presence).

Take covered under this permit or authorization must be reported within 5 working days (where required). Take not reported within 5 working days is not legally covered and is in violation of the Wisconsin Endangered Species Law (s. 29.604, Wis. Stats.). Reports can be submitted via email (DNRBats@wi.gov), phone (DNR Bat Hotline: 608-266-5216) or mail (Wisconsin Department of Natural Resources, Bureau of Endangered Resources, Bat Reporting, P.O. Box 7921, Madison, WI 53707-7921).

A. Health Exceptions

Centers for Disease Control and Prevention (CDC) protocols should be followed for all situations where rabies or histoplasmosis is a possibility (see Appendix 1). (report required if a bat is killed)

B. Bat Removal

1. Residence or Place of Work

If individual bats (5 or fewer) enter a residence or place of work, reasonable attempts must first be made to remove the bats alive and unharmed (see Appendix 2). If individual bats cannot realistically be removed unharmed, up to 5 bats may be killed for the purpose of removing them from a residence or place of work. No more than 5 bats may be killed within any 24 hour period and a maximum of 10 bats may be killed from June 1 – August 15. (report required)

Removals from June 1 – August 15 are allowed in hospitals, medical clinics, day cares centers, nursing homes, assisted living facilities and restaurants. The department may also allow removals in similar facilities on a case-by-case basis June 1 – August 15. The department must be contacted at the address above and approval must be granted prior to these case-by-case removals taking place.

The department may also approve removals on a case-by-case basis from June 1- August 15 if it can be shown that the bats being excluded are not part of a maternity colony. The department must be contacted at the address above and approval must be granted prior to these removals taking place.

2. Storage Areas, Attics, Barns, etc.

Bats found in storage areas, attics, barns, etc., may be excluded from the area August 16 – May 31 (see Appendix 2). Exclusion may not occur from June 1 – August 15.

C. Building Demolition

1. Building demolition occurring from June 1 – August 15:

- If there is no evidence of bat presence (see Appendix 3), there are no restrictions.
- If there is evidence of bat presence (see Appendix 3), bats must be excluded from the building 5-7 days prior to demolition. Exclusion is not required if the building is unsafe to enter. (report required for unsafe buildings)

2. Building demolition occurring from August 16 – May 31 does not have any restrictions.

D. Forestry

1. Forestry activities occurring within 1 km of waterbody or wetland:

- No snags or dying trees with a DBH of 10 inches or more may be cut from June 1 – August 15.
- When marking the area, flag all trees with evidence of bat presence (see Appendix 3); flagged trees may not be cut from June 1 – August 15.

2. Forestry activities occurring greater than 1 km from a waterbody or wetland do not have any restrictions.

E. Bridge Projects

The process for assessing transportation project impacts to listed species and the associated minimization measures will follow existing protocols.

1. Bridge repairs or demolition occurring from August 16 – May 31 do not have any restrictions.
2. Emergency bridge repairs or demolition occurring from June 1 – August 15 are covered under this permit or authorization but must be reported within 5 working days. (report required)
3. Non-emergency bridge repairs or demolition may not occur from June 1 - August 15 unless bats are excluded prior to April 1 to prevent bats from using the bridge.

F. Miscellaneous Building Projects (e.g., roofing, painting, siding)

1. Projects occurring from August 16 – May 31 do not have any restrictions.
2. Projects occurring from June 1 – August 15 where there is no evidence of bat presence (see Appendix 3) do not have any restrictions.
3. Projects occurring from June 1 – August 15 where there is evidence of bat presence (see Appendix 3):
 - For roofing projects, bats must be excluded from the building 5-7 days prior to the project. If bats are found during the initial stages of repair, new construction must include suitable open exits until September 1. Beginning September 1, the open exits may be sealed.
 - If painting or siding and bats are found behind shutters or siding, set the shutters or siding down and leave the area, once the bats have left continue with repairs.

G. Wind Energy Development

Wind energy projects typically affect tree bat species (not currently proposed for listing) and only impact cave bat species in certain situations (e.g., projects located near cave bat hibernacula may increase the occurrence of impacts to cave bats during fall migration in August and September). Further, there is not enough data at this time to determine the impact of potential mortality to local bat populations. Because of this uncertainty and the scope of impacts, no additional actions, above those currently requested by the Department, will be required of this industry at this time. The Department will work collaboratively with stakeholders to develop minimization measures and produce a conference report containing recommendations for reducing adverse impacts that will be presented to the Natural Resources Board. These recommendations will be advisory until such time that WNS is discovered in the state.

Mitigation

For every take of a cave bat that occurs, reasonable attempts must be made to prevent future take in the same area (e.g., exclusion of bats from the area, sealing of siding or eaves).

Responsible Parties

Landowners are responsible for all actions and costs incurred as a result of following this Broad Incidental Take Permit or Authorization.

Funding

Landowners are responsible for all costs incurred as a result of following this Broad Incidental Take Permit or Authorization.

Appendix 1: Health Information

Appendix 2: Removing and Excluding Bats

Appendix 3: Determining Bat Presence

Appendix 1: Health Information

The following information was created by the Center for Disease Control and Prevention (CDC): <http://www.cdc.gov/rabies/bats/contact/index.html>. This information should be followed when handling or testing bats for rabies or histoplasmosis.

Recent data suggest that transmission of rabies virus can occur from minor, seemingly unimportant, or unrecognized bites from bats. Human and domestic animal contact with bats should be minimized, and bats should never be handled by untrained and unvaccinated persons or be kept as pets.

In all instances of potential human exposures involving bats, the bat in question should be safely collected, if possible, and submitted for rabies diagnosis. Rabies postexposure prophylaxis is recommended for all persons with bite, scratch, or mucous membrane exposure to a bat, unless the bat is available for testing and is negative for evidence of rabies.

Postexposure prophylaxis should be considered when direct contact between a human and a bat has occurred, unless the exposed person can be certain a bite, scratch, or mucous membrane exposure did not occur.

In instances in which a bat is found indoors and there is no history of bat-human contact, the likely effectiveness of postexposure prophylaxis must be balanced against the low risk such exposures appear to present. Postexposure prophylaxis can be considered for persons who were in the same room as a bat and who might be unaware that a bite or direct contact had occurred (e.g., a sleeping person awakens to find a bat in the room or an adult witnesses a bat in the room with a previously unattended child, mentally disabled person, or intoxicated person) and rabies cannot be ruled out by testing the bat. Postexposure prophylaxis would not be warranted for other household members.

If you woke up because a bat landed on you while you were sleeping or if you awakened and found a bat in your room, you should try to safely capture the bat and have it tested. The same precautions should be used if you see a bat in a room with an unattended child, or see a bat near a mentally impaired or intoxicated person.

The small teeth of the bat can make a bite difficult to find. Be safe and in these situations, try to safely capture the bat, have the bat tested, and seek medical advice.



Appendix 2

Bat Exclusion

Method used by The Wisconsin Bat Program

A PROVEN SOLUTION

Do you have bats that you would like to remove from your living space? The following description is the widely accepted, non-lethal approach for excluding bats from your home. Killing the bats you will find does not solve the root problem which involves locating and sealing the actual access point that the bats are using. The remaining bats and future bats will still find their way into your attic or similar roosting space until you locate and seal all access points. Bats are NOT rodents and therefore will NOT chew their way into your house if you close off the opening. They use only existing openings.

As you may already know, bats are extremely beneficial to have in your neighborhood and many property owners spend a lot of effort trying to attract bats to their area by providing artificial roosts for them. If you have bats in your home you are half-way to experiencing the benefits of these insect-eating mammals without having to share your living space. The first step is already done; you have the bats interested in your location. The second step involves providing these bats with alternative roosting options that allows them to remain on the property without having access to your home. Finally, after a successful exclusion, the bats you saved will have a good chance of staying nearby. Why should you care if they stay? A single bat can eat 1,000 or more mosquito-sized insects in one hour

and the equivalent of the bat's own body weight per night. As that is just a single bat, you can imagine what a colony of 20 to 100 bats can eat in one night.

Bats will NOT attack you while you are enjoying an evening on your porch. Instead, they are enjoyable to view as they capture 100's and 1,000's of insect pests that would normally be interrupting your relaxing night outside. They conduct this service to you for free. You simply need to provide these bats with an alternative place to live that is not in your home. Like bird houses, a bat house is relatively easy to build yourself, inexpensive to purchase, and readily available from a variety of organizations.

Let's get started with the process.

First of all, timing is important when excluding bats from the home. Do not attempt to exclude bats during the summer months when the colony is established and the young are unable to fly. Bat exclusions should not be conducted from May 1st through August 31. Exclusions occurring during this time period will separate mothers from their pups, leaving the pups to die of starvation. Frantic mothers, searching for an opening to reach their pups, may enter your living space and be more difficult to deal with than what you started with. By trapping the flightless young inside, you may also have created another unexpected

problem involving the smell of dead animals.

Step 1: OBSERVE

Where are the bats entering?

At sunset or just before sunrise, have one or more persons located around the house observe where the bats are exiting the building. Observers should be able to see the entire structure without turning their heads; bats can exit and take flight in a matter of seconds. Make observations



Bat Guano

for several nights. This will ensure that all or most exit-points are identified. Pay special attention to areas in which bats commonly find access to your home: corners, eaves, louvers, loose siding, window air conditioners, and loose or damaged screens. Search the building for other various structural defects needing maintenance as the bats may search for alternative openings to their former roosting site after exclusion. It may take a second year of observation to ensure you have located all possible entry points.

Visible signs such as staining and guano (bat droppings) will also help identify openings. The body oils of bats can cause



Bat guano in front of garage

staining on the main access areas of the building, though you will need to look carefully because it is not always obvious. One of the best ways to find an opening is somewhat counter-intuitive: looking down instead of up. Guano found on the ground indicates bat activity from their opening above. When you find a concentration of these small droppings on the ground next to the foundation, you will often have a better chance of finding the access point.

Step 2: INSTALL

Can we still keep the bats here in my yard by putting up a bat house?

YES. Want to provide bats with a home, just not your own? We recommend installing an alternative roost, commonly referred to as a "bat house", in the general vicinity of the entry-points. If you exclude in the fall, installing the bat house a year before the exclusion or during the start of summer, provides the best chance for



Two types of bat houses

success. As bats come and go, they will become familiar with the structure. Upon exclusion, this familiarity will provide the best possible chance for the successful inhabitation of the bat house by the recently excluded bats. If you are interested in purchasing or building bat houses, contact the Wisconsin Bat Monitoring program. The program staff can help you decide on where to purchase the best bat house design with proven success. The Wisconsin Bat Monitoring program can also give you instructions for building your own bat house. Read our information pamphlet titled: "Building a Bat House" to learn how to build and locate your bat house. Location and design are critical pieces as bats are more difficult to attract to a bat house than birds are to a bird house.

Step 3: EXCLUDE

1. One-way doors
2. One-week wait,
3. Seal all of the holes.

After all openings have been discovered, install one-way exits. These exits will allow bats to leave, but will not allow them to re-enter. Keep in mind the time of year as you do not want to trap the flightless young inside. Avoid excluding bats between May 1st and August 31st.

One-way exclusion devices can be created using plastic netting with one-sixth inch (0.4 centimeter) or smaller mesh. Shape the plastic netting so that it covers the opening entirely and extends at least two feet below it. Using staples or duct tape, attach the top and side edges of the



Applying screen for one-way door

plastic netting to the building, leaving the bottom edge open. Be conscious of the netting's tautness; you should be able to slide your hand into the bottom opening though not so loose that the bats may easily crawl back up the opening. At sunset the following night, some of the bats will escape through the open, bottom portion. Leave the netting up for five to seven days; this will ensure that all bats have exited the building. After all bats have been excluded, you may then seal the openings permanently with appropriate construction materials.



Space on bottom for bats to escape

Remember that bats will not chew their way back inside your house. So, after you've found and sealed all of the access points you will have successfully excluded the bats from your living space.

Other materials can be used to create one-way exits, such as plastic sheeting or PVC pipe. Install the plastic sheeting in the exact manner as the plastic netting. A portion of PVC pipe, which should be similar in size to a tube of caulk, can be inserted into the opening. Seal the



PVC one-way door

remaining portion of the opening that surrounds the outer rim of the pipe.

Clean-up

After the bats have been successfully excluded, most people will want to clean the guano out of the building. When cleaning enclosed spaces, there is one simple precaution you should take in protecting yourself from being exposed to a disease known as histoplasmosis. Histoplasmosis is a respiratory disease caused by a fungus that can grow on accumulations of bird and bat guano and may become airborne if disturbed during the cleaning process. The fungus is not necessarily present at your site; however it is best to approach any clean-up with some safety measures. Symptoms of histoplasmosis usually appear within 3 to 17 days after exposure, and may resemble a cold or chronic cough. The risk of histoplasmosis can be reduced and even prevented by wearing a face mask and gloves while working. Wash all clothes and equipment after cleaning out the

previously occupied space. If you want nothing to do with a possible risk to your health there are professional cleaning services that can do this for you. Search online or in your phone directory for a local business. There are also a number of exclusion professionals that deal specifically with bat removal in the State of Wisconsin if you are not comfortable with the do-it-yourself method.

Summary

This is how you conduct widely accepted, non-lethal approach to excluding bats from your living space.

1. Observe your building around sunset or sunrise to detect all locations bats are using for access.
2. Install a bat house prior to conducting exclusion in order to maintain the beneficial insect-eating service of the bats in your back yard.
3. Install a one-way door over the opening(s) and wait a week until all of the bats have left.
4. Permanently seal the access points with appropriate materials.
5. Enjoy a night on your deck or patio and watch your relocated colony of bats eat 100's to 1,000's of mosquito-sized insects.
6. Let us know how it worked out as we would like to hear your success story about relocating bats from your attic to their own bat house.
7. For additional information on bats of Wisconsin check out our bat website.

Wisconsin Bat Monitoring Program

<http://wiatri.net/inventory/bats>

Bat Access points to your living space

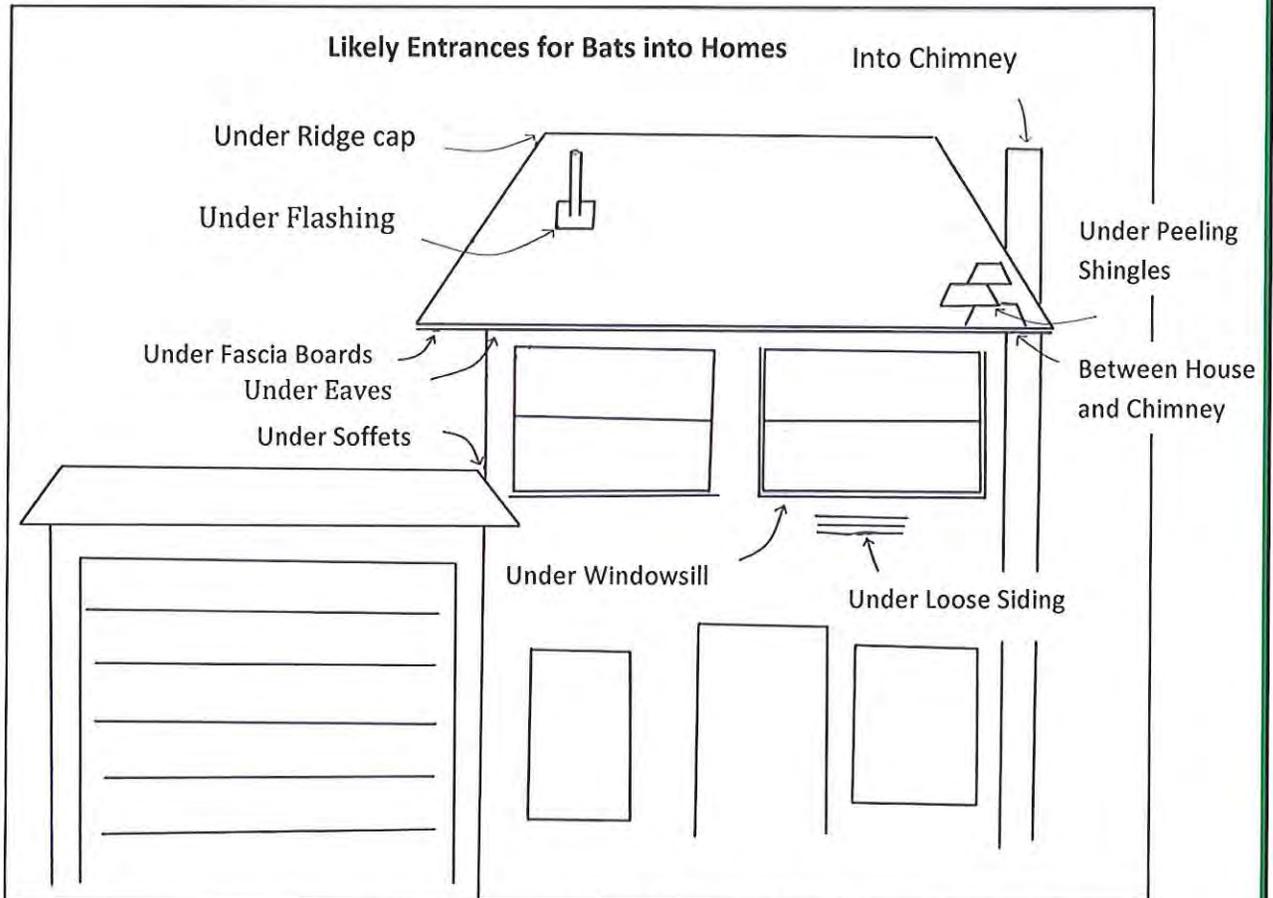


Figure 1: There are several common entry points for bats to find their way into your home. Check for guano piles and stains around these points first in locating the entry points.

Exit Only

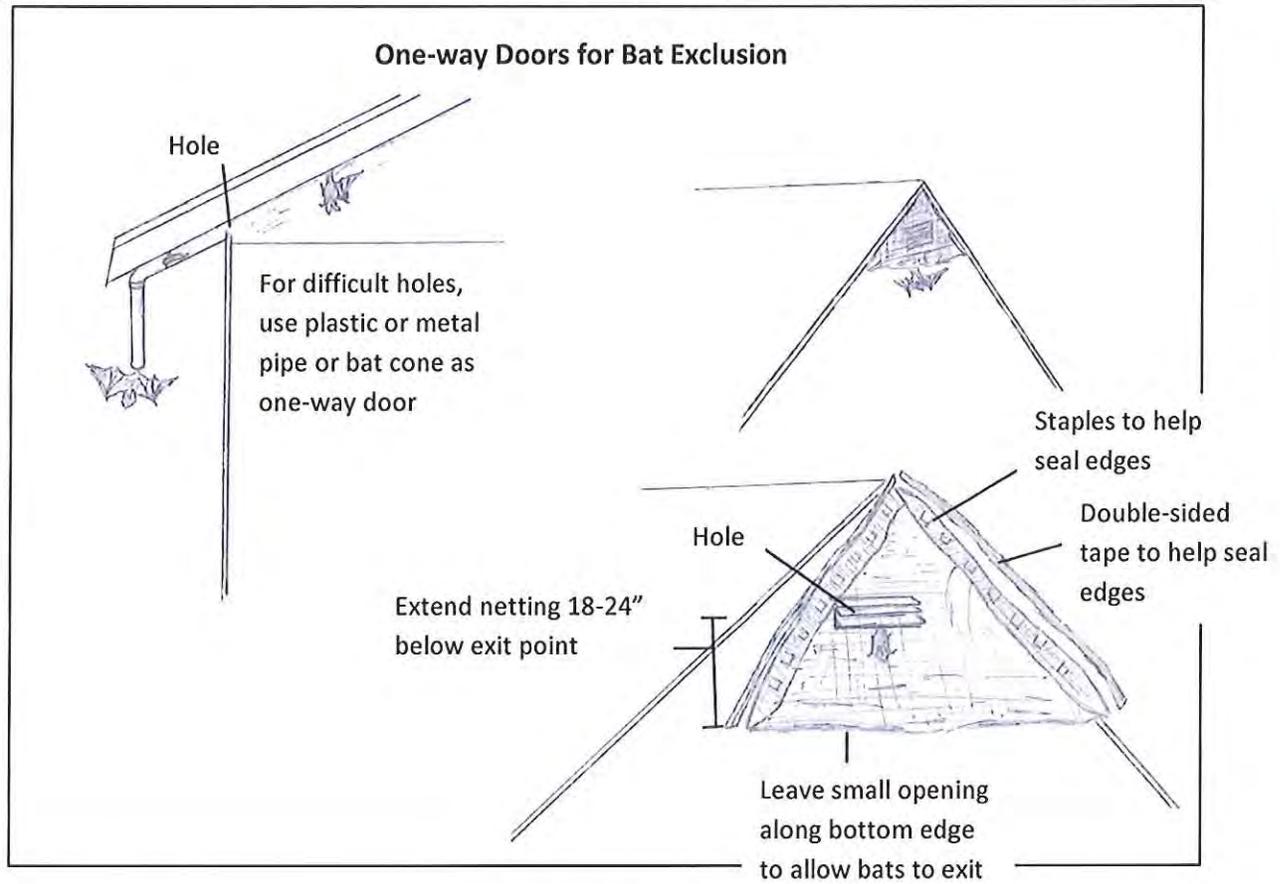


Figure 2: Two common one-way door designs: PVC tube for a small oddly-shaped hole, and netting or mesh for larger holes.

Appendix 3: Determining Bat Presence

1. Take note of places where bats are likely to enter your home. Bats can enter through holes smaller than a quarter in size. Places like fascia boards, where two buildings meet, between the building and a chimney, under loose shingles, under ridge caps, under windows, through vents into attics, under flashing, under eaves and under loose siding are all common places for bats to enter.
2. Look for evidence on the ground. Bats will defecate while they roost, and piles of guano usually indicate where bats are roosting.
3. Look for evidence on the building itself. Places where bats enter and exit often have stains from urine and skin oils on the siding and holes. These can be good indications of where bats are entering.
4. Monitor in the evening. Even if no visible signs occur, bats may still be roosting in a building. Observe the building at dusk to see if any bats fly out of openings. Listening at this time can also alert the observer to the presence of bats. Bats will often become very vocal 5-10 minutes before they take flight to forage. Bats make an audible buzzing and clicking while they are roosting.

**Environmental Assessment on Rules to Protect Wisconsin
Cave Bats and Manage *Geomyces destructans*, the Fungus
Associated with White-Nose Syndrome**

Wisconsin Department of Natural Resources

This Environmental Assessment is out for
public comment through December 7, 2010
after which it will be reconciled with the
proposed rules.

**Nicole Munkwitz
David Redell
Erin Crain
Gregor Schuurman
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November 2010

Introduction

White-nose syndrome (WNS) is a disease causing unprecedented mortality in cave bats. The fungus *Geomyces destructans*, the putative pathogen, is associated with WNS (Gargas et al. 2009, Frick et al. 2010). Since initial detection in 2006 in Howe cave, New York, WNS has been documented in fourteen states and two Canadian provinces, spreading rapidly in all directions from the first affected site. The Wisconsin Department of Natural Resources (WDNR) is responding to the threat of WNS to Wisconsin bats by creating management guidelines in a ‘Surveillance and Response Implementation Strategy’. The Natural Resources Board adopted emergency rules in September 2010 listing the four cave bat species of Wisconsin as state threatened and listing the fungus *Geomyces destructans* as a prohibited invasive species. Additional authorities and tools were provided to help prevent the spread through anthropogenic means with an emergency rule adopted in October 2010. The underlying strategies embodied in this emergency rule are to allow for early detection of WNS in Wisconsin and outline preventative measures to slow the anthropogenic spread of the disease to and within Wisconsin. These three emergency rules are also proposed as permanent rules. This voluntary Environmental Assessment (EA) assesses these rules.

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Background

Bats affected with white-nose syndrome (WNS) were first observed in 2006 at a single cave near Albany, New York. WNS has since been found in 14 states and 2 Canadian provinces, spreading up to 800 miles in 2009 (Turner and Reeder 2009). Mortality rates of affected colonies reach 100%. WNS has been linked to the death of over one-million bats since 2007 and threatens to cause the extinction of several bat species in the near future. According to a Consensus Statement issued at the WNS Emergency Science Strategy Meeting in May 2009, white-nose syndrome "... has caused the most precipitous decline of North American wildlife in recorded history." Last spring, the disease was detected within 225 miles of Wisconsin's southern border and 300 miles from the northern border. That means a WNS-infected cave is now located within the 280-mile dispersal range of Wisconsin little brown bats (Humphrey and Cope, 1976). Based on the disease's current location and known rate of spread, we anticipate the detection of WNS in Wisconsin as early as January 2011 as surveillance commences.

Hibernating bats are susceptible to WNS. Those infected tend to show a white fungal growth on their face, arms, legs, wings, and/or tail caused by the newly isolated and named fungus, *Geomyces destructans*. Infected bats exhibit atypical behavior such as daytime activity during winter hibernation, which rapidly depletes stored energy reserves. Wing damage and emaciation are also common.

To date, nine species of cave bats are affected by WNS, including the federally endangered Indiana bat, which historically was found in Wisconsin. All Wisconsin cave bats, which include the little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*), eastern pipistrelle (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*), are among the species fatally affected by WNS. Consequently, Wisconsin's cave bat population as a whole is threatened by this devastating disease. The little brown bat is Wisconsin's most common bat species and because this species has seen the greatest mortality rate due to WNS, Wisconsin anticipates significant impacts to its cave bat populations when WNS begins to affect Wisconsin bats. Research published in the journal *Science* (Frick et al. 2010) states "...we expect a 99% chance of regional extinction of little brown myotis within the next 16 years."

Wisconsin has one of the highest concentrations of cave bat populations in the Midwest and large numbers of cave bats from neighboring states hibernate in Wisconsin. Consequently, Wisconsin's cave bat population, and those of surrounding states, is threatened by this devastating disease. Three hibernacula alone house over 300,000 bats, including all four cave bat species. The largest known hibernaculum in the state, Neda Mine, may also be the largest in the Midwest with a recorded population of 143,000. The little brown bat is the most common species in Wisconsin and given that this species has seen the greatest mortality rate due to WNS, Wisconsin is anticipating significant impacts to its cave bat populations when WNS begins to affect Wisconsin bats.

Bats are a vital part of many ecosystems and white-nose syndrome has significant environmental, economic, and public health impacts. All bats affected by WNS are insectivorous and a single little brown bat can eat up to 1,000 insects per night, often consuming large numbers of agricultural pests, which cost farmers and foresters billions of dollars per year. As predators of many insects, bats also may play an important role in reducing risk of human disease transmitted by flying insects. Bats play an important role in the unique and fragile cave ecosystems, and their disappearance would have significant impacts. The nutrients bats bring into caves, and upon which other cave species depend, often have no other means of entry. In many cases, only bats regularly move in and out of the cave environment, while other cave species must rely solely on

what is found or brought inside. Thus, the disappearance of bats from caves could affect the status of other species as well.

Research conducted at the United States Geological Survey (USGS) Wildlife Health Center has shown that *G. destructans* is transferred from bat to bat, and a multi-agency project demonstrated bats can develop WNS through infection directly from an affected cave environment, in the absence of infected bats.

There is also evidence of human transfer of *G. destructans* from site to site and/or bat via contaminated equipment, gear or clothing. The New York Department of Environmental Conservation, Wildlife Pathology Unit has isolated *G. destructans* fungal spores on equipment and clothing after exiting an affected cave. There have been long-distance jumps in the spread of WNS, beyond the distance bats move. These “jump” sites have been frequently-visited caves, often with small bat populations (Turner and Reeder 2009). The U.S. Geological Survey, National Wildlife Health Center has detected *G. destructans* fungal spores in cave sediment in the absence of bats, demonstrating persistence of the fungus (Lindner et al. *In Press*).

Even in the face of incomplete information, general epidemiological principles should be used to inform the WNS investigation and response. All available evidence indicates that WNS is caused by an infectious agent and can therefore potentially be spread by all known modes of disease transmission, including direct contact, inhalation, ingestion, inanimate objects, and human or animal vectors. Wildlife diseases such as WNS spread rapidly when there is high prevalence of pathogen(s), efficient chains of transmission, abundant susceptible hosts, and/or environments that allow pathogen persistence without a host. Regardless of the infectious agent (fungus, bacterium, or virus), universal precautions should be implemented. Universal precautions are procedures and guidelines designed to reduce incidence of disease by both preventing infections and breaking chains of transmission.

Bat Ecology as it Relates to WNS

Movements As WNS can be transferred from bat-to-bat, the potential distance an infected bat can travel becomes relevant to WNS management decision making. From coarse empirical data of within-season spread of WNS in Virginia from 2008 to 2009, potential seasonal bat movement could be inferred as a distance of 75 miles (Rick Reynolds, VA Dept. of Game and Inland Fisheries, pers. comm.). All four Wisconsin cave bat species are present in Virginia. Other studies of bat movement include both published and unpublished information on band recapture data of dispersed and migratory bats. There is a range of distances travelled among individual bats, bat species, and within different time frames (e.g., male dispersal distance in late summer and migration distance to/from winter grounds). Band recoveries or band resights found migration distance for little brown bat up to 280 miles (Humphrey and Cope, 1976) and dispersal distance up to 105 miles (Gerda Nordquist, MN DNR, pers. comm.). Kurta and Murray (2002) recaptured migrant Indiana bats (*Myotis sodalis*) an average of 286 miles from their summer location in Michigan. Distance travelled by Wisconsin bats is now greater than the distance WNS is detected from the state.

Mortality Hibernacula surveyed before and after WNS appeared have documented bat declines of more than 75%, and 90% to 100% in some cases (Blehert et al. 2009). Possible underlying conditions that cause bat susceptibility to fungal infection are unknown and for now the exact process by which infection leads to death remains undetermined. It is known that chronic disturbance of hibernating bats can lead to high winter mortality rates due to depleted fat reserves when food is scarce (Speakman et al 1991). WNS infected bats display aberrant behaviors, such

as daytime flights and roosting near cave and mine entrances with rapidly fluctuating temperatures or in colder areas, which in turn may lead to higher mortality of the infected bats. Scientific evidence also suggests that skin infection by *G. destructans* may be a primary cause of the mortality associated with WNS.

Predators Bats are major consumers of agricultural and forest pests, as well as mosquitoes which transfer West Nile Virus. These bats eat millions of insects every year and if their numbers are significantly reduced by WNS, the economic impact of increased crop damage could prove severe. One study estimated that bat control of a single agricultural pest in Texas alone was worth as much as \$1.7 million dollars per year (Cleveland et al. 2009). Already, the U.S. Forest Service estimates that 2.4 million pounds of insects will go uneaten due to WNS. Bats reduce the necessity of insecticide applications, saving farmers up to hundreds of thousands of dollars annually. Bats are also a critical component of fragile cave ecosystems and their absence could lead to a cascade of impacts to rare invertebrate cave species.

Wildlife Disease Control

General goals for managing wildlife diseases include: 1) preventing introduction of disease; 2) controlling spread of existing disease; or 3) eradication of disease (Wobeser 2006). Disease control is in the prevention stage while management options continue to be developed and assessed. Prevention, slowing and controlling spread of WNS is a priority in Wisconsin at this stage in the progression of the disease. Although the natural movement of bats cannot be easily managed, it is possible to manage human-assisted transfer of *Geomyces destructans* and WNS. Measures to help prevent introduction of *Geomyces destructans* to hibernacula include measures of decontamination and/ or physical exclusion of bats or humans from hibernacula, and early detection of any infected sites to control further spread of the disease. In choosing disease management actions for prevention, or in response to a specific WNS detection event, specifics of each unique situation must be considered. This includes but is not limited to: the species and number of bats at risk or judged infected or exposed, the seasonal timing of WNS or *Geomyces destructans* detection, the characteristics of the cave/mine (including but not limited to ownership, access, physical features, other cave biota), the potential for implementing various control treatments at the site, as well as the geographic area and proximity to other hibernacula.

Current WNS Management Plans

National

Before a WNS management plan was completed, the United States Fish and Wildlife Service (USFWS) published a cave advisory in March 2009, which recommends suspending activities in caves to protect bats from white-nose syndrome (Appendix A). The Structured Decision Making (SDM) Initiative for WNS management, a collaborative of USFWS and several state natural resources agencies including the Wisconsin Department of Natural Resources (WDNR), was published in October 2009 (Szymanski et al.). The SDM reports on an analysis evaluating 23 management alternatives against six objectives in an attempt to determine how best to control the spread and minimize the effects of WNS on hibernating bats at the individual and population level. The highest scoring alternative action for areas greater than 75 miles away from WNS restricts cave and mine access, with appropriate decontamination and gear dedication procedures implemented, to commercial and research uses only.

In October 2010 the USFWS released a draft ‘National Plan for Assisting States, Federal Agencies, and Tribes in Managing WNS in Bats’ (Appendix B). The Plan’s general recommendations for preventing infections and breaking chains of transmission include: avoid contact with bats, wear barriers (gloves, coveralls, etc.) if contact with bats is necessary and disinfect potentially contaminated items. Furthermore it recommends adhering to basic hygiene practices promoting personal surveillance as well as oversight of research, wildlife management and caving activities. Web-based links to the science based, and routinely updated, decontamination protocols for field researchers and cavers are provided (Appendix C, D and E).

Federal public land cave closures include: United States Forest Service (USFS) caves and mines in the 20 states of Region 9 (CT, DE, IL, IN, IA, ME, MD, MA, MI, MN, MO, NH, NJ, NY, OH, PA, RI, VT, WV, WI); the 13 states of Region 8 (KY, VA, TN, NC, SC, GA, FL, MS, AL, AR, LA, OK, TX); the five states of Region 2 (CO, KS, NE, SD, WY); Wayne National Forest, OH; Ottawa National Forest, MI; and Monongahela National Forest, WV. The National Park Service (NPS) has closed and mines in: Buffalo National River, AK and Great Smokey National Park TN/NC. The USFWS has a caving moratorium in 17 states (NH, MA, CT, VT, NY, PA, WV, VA, ME, RI, DE, MD, OH, NC, TN, KY) and closed caves in Wheeler National Wildlife Refuge, AL.

Regional

The USFWS is drafting a Region 3 (Midwestern states) WNS Contingency Plan similar to the national plan but it is not yet available. The WDNR continues to participate in the now USFWS Midwest region bi-monthly Midwest Bat Working Group conference call for state agencies and cooperators of Midwestern states. The purpose of the Working Group is to communicate and collaborate on WNS research, surveillance and management actions within the Region.

States and Provinces

ALABAMA: The first objective of the Alabama WNS Management Plan (Appendix F) is to “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”. The Plan recommends the following strategies to accomplish this goal: 1) closures that protect significant bat caves yet permit appropriate recreational use of other caves, 2) request governments to require and private landowners to voluntarily implement, and cavers to use decontamination protocols, 3) partner with others who are affected by or work with bats or their habitat for conservation and early detection surveillance, 4) develop procedures to reduce the possibility of WNS spread from

infected caves, and 5) implement safe treatments of infected bats, caves, mines, and similar ecosystems.

GEORGIA: All people visiting caves and/or working with bats, including wildlife rehabilitators, are asked to follow USFWS disinfection protocols, reduce caving activities and respect public and private cave closure advisories. Disinfection protocols must be instituted in order to retain a GA DNR scientific research permit. No WNS positive bat may be released from rehabilitation. (Appendix G).

KENTUCKY: The Kentucky Department of Fish and Wildlife Services has released the “Bat Handling/Disinfection Protocol for Summer Bat Field Studies in Kentucky” for consultants and researchers to follow while working in bat sites during the summer months. (Appendix H)

MICHIGAN: Plan will be available soon.

MISSOURI: The Department of Conservation’s (MDC) White-Nose Syndrome Action Plan requires that staff and permittees follow disinfection protocols when entering MDC caves and encourages the use at other caves. Wildlife Collector Permit holders are not allowed to bring any equipment into Missouri that has contacted bats in WNS-affected states and to disinfect any gear that has come into contact with bats in non-affected states before use in Missouri. Since WNS has been detected in Missouri hibernacula, MDC has closed entry to all MDC bat caves. (Appendix I).

NEW MEXICO: Cooperating agencies of NM released a WNS Response Plan with the primary objective of preventing potential human transmission and containing any novel occurrence of *Geomyces destructans* in the state. Access to public caves or mines with significant bat roosts has been restricted and access to other caves or mines requires decontamination protocol adherence. (Appendix J).

TENNESSEE: A Cooperative Monitoring and Response Plan (Arnold Air Force Base et al. 2009) aims to minimize potential for monitoring and research to contribute to the spread of WNS by implementing disinfection protocols, establishing a monitoring framework for early detection of WNS, and devising a response strategy for a WNS outbreak. The plan restricts public access to caves and mines on state owned lands including state parks, natural areas, forests, and wildlife management areas for the winter of 2009/2010. Exceptions to the cave closures were allowed with methods to limit the spread of WNS including designated gear or gear and clothing decontamination.

State owned public land cave closures or restrictions have been instituted in the nearby states of IL, IN, and MO as well as in the states of WV, VA, AR, TN, PA, NM, TX.

Federal Environmental Assessments N/A

Tribal Involvement The Great Lakes Indian Fish and Wildlife Commission was approach by the Department during the creation of this E.A. and will be sent a final version.

Non-Regulatory Actions Taken by Wisconsin DNR

Bat Population Monitoring. The Wisconsin Bat Conservation & Management Plan currently implements long term monitoring at several important hibernacula with surveys recording bat use and data loggers recording environmental conditions. In an effort to fill existing gaps of possible

sites used as bat hibernacula, WDNR started cataloguing cave and mine locations in Wisconsin in the spring of 2010. Further efforts are ongoing to determine if the caves and mines are suitable for bat use and will ultimately include collecting data on bat use. The resulting dataset will include: location of hibernacula, species of bats that use them and how many, distance from other hibernacula, bat movement among sites, site accessibility, and available survey resources. These data will allow managers to make the most informed decisions when setting priorities in WNS surveillance.

An effort to monitor the summer bat population of Wisconsin involves the Wisconsin Citizen-based Monitoring Network, which was started in 2007. Volunteers collect data at summer roost sites, including in some cases an index of breeding females at the maternity roost, as well as conduct mobile acoustic surveys on designated routes. This work provides valuable, multi-year data on Wisconsin's bat populations to determine species distribution, seasonal movements and species status and trends.

WNS Surveillance All techniques for monitoring Wisconsin bat populations allow for WNS surveillance opportunities hence the two goals are integrated into a single effort. WDNR also continues to track or investigate all public reporting of bats displaying unusual behaviors and sick, dead or dying bats through an online submission form. As was found in eastern states during the initial spread of WNS, unexplained increases in submissions of bat reports may provide anecdotal evidence about the onset of WNS. Such data or reports may also assist in locating previously unidentified hibernacula by mapping bat reports or result in a survey of nearby hibernacula or other bat roosts.

WNS Research WDNR has been and will continue to be involved in multi-agency collaborative white-nose syndrome research.

Communications Outreach to stakeholders and public is ongoing. The Department has been contacting stakeholders potentially impacted by the rule and working to get information to the public. Stakeholders include commercial caves and mines, active underground mines, private cave and mine owners, recreational cavers, agriculture and forest industries, animal control operators, wildlife rehabilitators, and conservation organizations. General WNS information and links to other WNS pages can be found on the WDNR Bureau of Endangered Resources web site.

Disease Control Disease control is in the prevention stage while management options continue to be developed and assessed. Department activities have centered on determining the size of our cave bat population, identifying potential hibernacula, decontamination, and developing voluntary agreements with cave and mine owners.

Regulatory Actions Taken by Wisconsin DNR to Control WNS

Wisconsin bats, notably the little brown bat, migrate up to 280 miles between their summer and winter habitat. When WNS was found within 280 miles of the Wisconsin border (~225 miles from the southern border) in April 2010, Wisconsin increased its WNS disease management efforts. Knowing the potential for WNS to be found in Wisconsin as early as winter 2011, the department put into place tools needed, via emergency rules and permanent rule proposals, to both slow the arrival of the disease to the state, and slow the spread of the disease once in the state.

In September 2010 the Natural Resources Board approved two emergency rules and gave permission to go to public hearings for identical proposed permanent rules. The first emergency

rule lists the four native cave bat species of Wisconsin as threatened species under NR 19. Listing cave bats as threatened prohibits disturbance of the bats during hibernation, prohibits the possession or transfer of the animals, and decreases the overall number of bats taken through minimization efforts from alternative sources of mortality. The effects of WNS on the cave bat community in the Northeastern states are devastating and it's already predicted that the little brown bat has a 99% chance of being regionally extirpated within the next sixteen years. Cave bats of Wisconsin met three criteria for assessed changes in population condition indicating the need for the rule change. First is the need for immediate protection (from a new threat, in this case WNS). The second and third criteria points are unrelated to this emerging disease: there has been a significant change in the Natural Heritage Inventory State Rank for these species since 1997, and the little brown bat has been recommended for listing since 1997.

While emergency listing the cave bat species in WI as threatened provides protection to the animals, it does not affect the spread of the fungus. The second emergency rule adds the fungus *Geomyces destructans* to the list of prohibited invasive species in NR 40. This listing gives the Department regulatory authority to limit human transport of the fungus.

Geomyces destructans meets the definition of invasive species as it is nonnative to the state, never having been found in soil samples here. Recent peer-reviewed journal articles have found and described the same fungus in six European countries (Wibbelt et al. 2010, Martinkova et al. 2010) adding support to the hypothesis that it is of European origin. There are no bat species that travel between continents and it is not known how it may have arrived in North America.

Furthermore *Geomyces destructans* meets the definition of a prohibited invasive species in the following ways:

- 1) Based on evidence from the states where WNS has been found, the fungus has the potential of greatly reducing or extirpating four of WI's eight bat species. Bats are primary predators of night flying insects, many of which are agricultural, forest, and human health pests. Indirect and direct economic impacts are tied to likely increases in chemical pesticides needed to combat the agriculture and forest insect pests when the ecosystem services of the insectivorous bat species populations decline.
- 2) The species has not been found in soil samples and winter surveillance in WI for the fungus during the 2009/2010 hibernacula counts, indicated no current signs of the fungus present. Neighboring states surveillance for the disease shows the fungus as close as 225 miles south of our border in Missouri and 300 miles north of our border in Ontario Canada.
- 3) A study last year using WI bats transported to two hibernation sites in VT showed that the fungus remains present in the environment after all of the bats within a cave are eradicated. Given the spread and continued establishment in all of the states it has entered, it shows that spread continues throughout each location. There is evidence to support the ability of *Geomyces destructans* to establish itself in Wisconsin caves and mines.
- 4) There are several options for controlling the species' spread within the state. Current decontamination protocols are relatively inexpensive and effective at preventing transfer from site to site through human spread. On-site cave and mine management includes closure to unauthorized human access through signage and bat-compatible cave gates. There are a limited number of hibernacula in the state making it feasible to implement control efforts having long-term protection benefits. Environmental control methods and treatment of bats once the fungus is present at a site is currently being researched. There

are actions presently available to help slow the spread while additional treatment options become available at a future time.

5) There is no recognized or likely beneficial use or commercial value to the fungus *Geomyces destructans*. The negative socio-economic impacts are related to reduced recreational opportunities for cavers, increased agricultural and forestry expenses for combating additional insect pests, and reduced production at organic farms. Wildlife viewing areas to watch fall swarming behavior at hibernacula would no longer be an option for citizens interested in experiencing the night-time flight emergence of one of Wisconsin's natural resources.

In October 2010 the Natural Resources Board approved a third emergency rule and gave permission to go to public hearings for additions to NR 40 dealing with the management of white-nose syndrome. These rule changes gave the Department regulatory authority to access caves and mines for monitoring and surveillance and to enact management actions at sites where WNS may become introduced thereby providing reasonable and feasible means of slowing or stopping the spread. The rule changes define how and under what circumstances the department will implement management actions needed to be in place for this winter's hibernation season.

The three rule changes on their own are justifiable, but potential results of doing nothing appear grave to many resources in Wisconsin. All bat species in Wisconsin are insectivorous and provide an ecosystem service that cannot be easily replaced once they have declined or have been lost from system. To do nothing is an option that would have long-lasting impacts to the agricultural and forestry industry economics. Organic farmers do not have the option of increasing use of pesticides because they rely on alternative forms of pest reduction using integrated pest management. Losing bats as their natural ally of the primary predator of night flying insects, organic and small family farmers are likely to undergo an economic impact reducing production of their marketable goods.

Bats of Wisconsin travel large distances, sometimes hundreds of miles, from their summer roosting areas to their overwintering grounds to hibernate. Wisconsin has some of the Midwestern United States largest populations of cave bat species, it is also known that Wisconsin share bats with its neighboring states. Doing nothing impacts not just the residents and ecosystems of WI, but also impacts our surrounding states natural resources. There is the potential of losing not a single species of bat, but an entire taxonomic group from the region if this invasive species of fungus is allowed spread unchecked.

Actions Taken by Other Wisconsin State Agencies to Control WNS N/A

Rule Review

1. Threatened Species Listing

Rule Description

Due to the immediate threat of white-nose syndrome in Wisconsin, the Department proposes to add the following cave bat species to Wisconsin's threatened species list, NR 27.03 (3), Wis. Admin. Code: little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*), eastern pipistrelle (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*). In anticipation of listing, DNR will issue broad incidental take guidelines.

Rule Summary

The proposed rule change seeks to provide protection to Wisconsin's cave bat species, whose populations have declined at a national level due to white-nose syndrome and are imminently threatened by the disease in the state. Listing will prohibit the transport, possession and disturbance and decrease mortality of four WI cave bats species: little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*), eastern pipistrelle (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*). Listing these species before WNS has been detected in Wisconsin will allow the Department time to work collaboratively with stakeholders to ensure that appropriate conservation measures, such as the protection of refuge hibernacula, are developed and in place in the event that WNS arrives in Wisconsin. The disappearance of cave bats from the ecosystem will have significant economic, environmental and public health impacts.

A broad incidental take permit/authorization would be created, as provided for under s. 29.604, Wis. Stats. The broad incidental take permit/authorization would allow for the incidental taking of state listed cave bats that may occur as a result of specific public health concerns, bat removals, building demolitions, forestry activities, bridge demolitions, miscellaneous building repairs and wind energy development projects. Some take of bats may still occur as a result of these activities, however take will be minimized by following specific minimization measures. The department has concluded that the projects covered under this permit are not likely to jeopardize the continued existence and recovery of the state population of these bats or the whole plant-animal community of which they are a part; and has benefit to the public health, safety or welfare that justifies the action. This incidental take permit/authorization is only needed when a bat is present or suspected to be present (e.g., Natural Heritage Inventory report of bats in the area, evidence of bat presence).

Rule Authority

DNR authority for these rules is granted in state statutes 29.604, 227.11, and 227.24 Wis. Stats.

Estimated Cost and Funding Source

The department will be issuing a broad incidental take permit/authorization associated with the listing that will cover take caused by many private companies and organizations such as pest control operators, construction companies, and wind energy development. It is assumed the impact to farmers of this rule change will be positive; especially in light of the fact that if bat populations in the state were to be devastated, the costs to agriculture from pest destruction of crops and pesticide use would increase.

Proposed Action

Listing the little brown bat, big brown bat, northern long-eared bat and eastern pipistrelle as threatened species in Wisconsin.

Effects

Listing the cave bats as threatened species will allow the department to effectively regulate the take, transport, possession or disturbance of these four species.

Affected constituencies include commercial caves and mines, private cave and mine owners, recreational cavers, wildlife rehabilitators, animal control operators, the agricultural industry, the conservation community, wind utilities, WI Department of Transportation (WDOT) and homeowners. Concerns will likely include how listing the bats will affect current activities. Many of these potential concerns will be addressed through a broad incidental take permit/authorization and voluntary agreements so that the listing does not have a significant economic impact on a substantial number of small businesses.

A broad incidental take permit/authorization would be created, as provided for under s. 29.604, Wis. Stats. The broad incidental take permit/authorization would allow for the incidental taking of state listed cave bats that may occur as a result of specific public health concerns, bat removals, building demolitions, forestry activities, bridge demolitions, miscellaneous building repairs and wind energy development projects (see the “Broad Incidental Take Permit/Authorization for Cave Bats” attachment for more information). Some take of bats may still occur as a result of these activities, however take will be minimized by following specific minimization measures and the department has concluded that the projects covered under this permit are not likely to jeopardize the continued existence and recovery of the state population of these bats or the whole plant-animal community of which they are a part; and has benefit to the public health, safety or welfare that justifies the action. This incidental take permit/authorization is only needed when a bat is present or suspected to be present (e.g., Natural Heritage Inventory report of bats in the area, evidence of bat presence).

Analysis of Alternatives

No Action Under the ‘no action’ alternative the four cave bat species would not be listed as threatened and there would therefore be no additional regulation of take, transport, possession or disturbance related to these species.

2. Prohibited Invasive Species Listing

Rule Description

The proposed changes to ch. NR 40, Wis. Adm. Code, will add the fungus, *Geomyces destructans*, to the list of prohibited invasive species, allowing the department to effectively manage its spread and limit human transport.

Existing rules ban the transportation (including importation), possession, transfer (including sale) and introduction of invasive species that are listed or identified as “prohibited”, with certain exceptions. Transportation, possession, transfer and introduction without a permit are exempt if the department determines that the transportation, possession, transfer or introduction was incidental or unknowing, and was not due to the person’s failure to take reasonable precautions. Existing rules authorize the department to enter property with the permission of the owner or person in control of the property and, if permission cannot be obtained, to seek an inspection warrant from the Circuit Court. Entry is only for the purpose of inspection, sampling or control of prohibited invasive species.

The current rules also allow the department to enter into consent orders with persons who own, control or manage property where prohibited invasive species are present to implement approved control measures, and to issue unilateral orders for control purposes unless the person was not responsible for the presence of the prohibited invasive species. If a control order is not complied with and the department undertakes control measures, the current rules allow for cost-recovery by the department for the expenses it incurred.

Rule Summary

Due to the immediate threat of white-nose syndrome in Wisconsin, the department proposes to add *Geomyces destructans*, the fungus that causes white-nose syndrome, as a prohibited invasive species under NR 40.04, Wis. Admin. Code, via emergency rule. Chapter NR 40, Wis. Admin. Code establishes a classification system for invasive species and regulates those in the prohibited and restricted categories. It also establishes preventive measures that when followed, will help minimize the spread of invasive species into or around the state. To ensure long-term regulatory authority for this species the department will propose adding it to Ch. NR 40, Wis. Admin. Code through a permanent rule change in the near future.

While the need to act immediately on white-nose syndrome is clear, 2009 Wis. Act 55, Invasive Species Bill, authorizes the department to promulgate emergency rules to identify, classify or control an invasive species, without a finding of emergency. Such emergency rules can remain in effect for as long as two years or when it is replaced by a permanent rule if earlier.

Existing rules ban the transportation (including importation), possession, transfer (including sale) and introduction of invasive species that are listed or identified as “prohibited”, with certain exceptions. Transportation, possession, transfer and introduction without a permit are exempt if the department determines that the transportation, possession, transfer or introduction was incidental or unknowing, and was not due to the person’s failure to take reasonable precautions. Existing rules authorize the department to enter property with the permission of the owner or person in control of the property and, if permission cannot be obtained, to seek an inspection warrant from the Circuit Court. Entry is only for the purpose of inspection, sampling or control of prohibited invasive species. The listing of the fungus that causes WNS may result in the need for cavers to decontaminate caving equipment or avoid environmentally sensitive areas.

The current rules also allow the department to enter into consent orders with persons who own, control or manage property where prohibited invasive species are present to implement approved control measures, and to issue unilateral orders for control purposes unless the person was not responsible for the presence of the prohibited invasive species. If a control order is not complied with and the department undertakes control measures, the current rules allow for cost-recovery by the department for the expenses it incurred.

Rule Authority

DNR authority for these rules is granted in Sections 23.09 (2) (intro.), 23.091, 23.11 (1), 23.22 (2) (a) and (b) and (2t) (a), 23.28 (3), 27.01 (2) (j), 29.039 (1), 227.11(2)(a), and 227.24 (1) (a), Stats.

Estimated Cost and Funding Source

Many potential stakeholder concerns may be addressed through cost-sharing, technical support, and education provided by the department. Examples include: reviewing proposed research proposals and issuance of scientific research licenses, cost-sharing for installation of bat gates and other conservation actions, providing cave/mine closure signage and decontamination protocols, and providing locations of caves that may be used for recreational caving activities (where bats are known to have been excluded).

Proposed Action

Adding the fungus that causes white-nose syndrome, *Geomyces destructans*, to the list of prohibited invasive species in Wisconsin.

Effect

Listing *Geomyces destructans* as a prohibited invasive species will allow the department to effectively manage its spread and limit human transport by regulating its possession, transportation, transfer and introduction.

Affected constituencies include commercial caves and mines, private cave and mine owners, recreational cavers, property owners, the agricultural industry, and the conservation community. Concerns will likely include how listing the fungus will affect current activities. Many of these potential concerns may be addressed through cost-sharing, technical support, and education provided by the department. Examples include: reviewing proposed research proposals and issuance of scientific research licenses, cost-sharing for installation of bat gates and other conservation actions, providing cave closure signage and decontamination protocols, and providing locations of caves that may be used for recreational caving activities (where bats are known to have been excluded).

Under NR 40, the department may ask any person who owns, controls, or manages property where a prohibited species is present to control the prohibited species in accordance with a plan approved by the department. While a person who owns, controls or manages property where a prohibited species is present is responsible for controlling the prohibited species that exists on the property, the department will seek funds to assist in the control of prohibited species. Therefore, conducting control measures will not necessarily result in a cost to commercial cave operators. Additionally, commercial caves will have the option to exclude bats from their cave(s) with the help of the department, allowing them to remain open for tourism, and resulting in no loss of tourism dollars.

Analysis of Alternatives

No Action

Under the “no action” alternative the fungus *Geomyces destructans* would not be listed as a prohibited species and there would therefore be no regulation of possession, transportation, transfer or introduction of this species.

3. White-nose Syndrome Management

Rule Description

The proposed rule lists *Geomyces destructans* as a prohibited invasive fungus species under Chapter NR 40, Wis. Adm. Code which establishes a classification system for invasive species and regulates those in the prohibited and restricted categories. The added provisions to s. NR 40.04 and 40.07 relate to early detection and prevention of the spread of WNS due to anthropogenic activities.

The Rule also sets out authority for the department to grant written exemptions from the new decontamination requirements if it would not allow WNS to be transported to other locations and adds the following key definitions:

“Cave” means any naturally occurring void, cavity, recess or system of interconnected passageways beneath the surface of the earth or in a bluff, cliff or ledge, including pits and sinkholes, but does not include a rock shelter.

“Mine” means any artificial excavation, shaft, underground passageway, slope, tunnel or working from which ore or mineral is or was extracted, but does not include an open pit mine. However, caves or mines may be located adjacent to open pit mines.

“Near” means, for purposes of s. NR 40.07 (8), within 100 feet of.

“Rock shelter” means an overhang or cave-like opening in a bluff, cliff or ledge that is shallow and does not provide an area of substantial daytime darkness.

Rule Summary

The proposed rule provides the tools for early detection of WNS in Wisconsin, requires decontamination procedures of persons and gear entering caves and mines, and allows physical exclusion as a means to prevent spread of *Geomyces destructans*. *Geomyces destructans* has been identified as the fungus associated with white nose syndrome in cave bats. Because the department has little if any control over the natural movements of bats, the main focus in WNS management is on removing humans as a vector for spreading the disease. It establishes these preventive measures, that when followed will help minimize the spread of this invasive species into or within Wisconsin.

Under the proposed rules, the public will be asked to take preventive measures that are meant to slow the introduction and spread of *Geomyces destructans* in the state. The department is seeking funding to assist with the installation of barriers, and therefore cost to those parties who install such barriers should be negligible. Additionally, commercial caves will have the option to exclude bats from their cave(s) with the help of the department, allowing them to remain open for tourism, and resulting in no loss of tourism dollars. Finally, the department will work with active underground mines to develop control plans that will not hinder mining operations.

Under current ch. NR 40, the department may ask any person who owns, controls, or manages property where a prohibited species is present to control the prohibited species in accordance with a plan approved by the department. While a person who owns, controls, or manages property where a prohibited species is present is responsible for controlling the prohibited species that exists on the property, the department will seek funds to assist in the control of prohibited species.

The department will normally follow an informal, stepped enforcement process in order to obtain compliance with invasive species rules. This process involves informal discussions between department staff and the individual, landowner or company, notifying the person of potential violations and providing guidance on how to comply with the rules. Notices of non-compliance may follow if necessary. If formal enforcement is necessary, ch. NR 40 will be enforced by department conservation wardens, county district attorneys, and circuit courts through the use of citations and civil or criminal complaints. Civil and criminal enforcement may also be carried out by department referral of violations to the Wisconsin Attorney General, with prosecution and abatement actions in the circuit courts. Criminal enforcement will be limited to intentional violations. Finally, violations of the permits issued under ch. NR 40 also may be enforced by administrative permit revocation proceedings.

Rule Authority

DNR authority for these rules is granted in Sections 23.09 (2) (intro.), 23.091, 23.11 (1), 23.22 (2) (a) and (b), 23.28 (3), 27.01 (2) (j), 29.039 (1) and 227.11(2) (a), Wis. Stats.

Estimated Cost and Funding Source

The department is working with the few commercial caves businesses to address decontamination or exclusion or other measures to assure their business and prevent the spread of *Geomyces destructans*. The rule may have favorable effects on a number of businesses by preventing the introduction or limiting the spread of WNS, thereby preserving the agricultural, economic and environmental benefits associated with healthy bat populations. The cost of decontamination will be minimal. The cost of excluding bats at a cave with high human visitation would be \$100-\$1,000. The department is seeking funds to cover these costs. The cost of caving gear typically ranges from \$125-\$750. Very few sites in Wisconsin require vertical climbing gear. The cost of signage at caves and mines would be \$0 because the department will provide the signs.

Early Detection

Background

Since WNS was first discovered in New York in 2006, it has continued to spread to nearby and distant hibernacula in the Northeast. *Geomyces destructans* in North America has only been found in hibernacula where WNS is known to occur (Lindner et al. *In Press*). Data on WNS observations continue to be collected throughout North America but the spread is still poorly understood and no epidemiologic models exists. The spread of the fungus and the disease in the past year has been more rapid than initial movements suggested and winter 2009/Spring 2010 occurrences of WNS were discovered in Missouri and Ontario, Canada. Based solely on what has been observed to date, *Geomyces destructans* may arrive in Wisconsin as early as the winter of 2010/2011 on bats migrating from the north or south, or on humans from any infected site (Turner and Reeder 2009).

Monitoring bat populations in Wisconsin, currently considered WNS free, is crucial for two reasons: pre-WNS baseline data collection and early disease detection. Critical baseline data on parameters such as population densities, hibernaculum locations, health (e.g., pre-torpor body condition and wing damage in unaffected bats), reproductive status, and hibernaculum microclimate data are needed from unaffected locations for on-going research dedicated to understanding the disease and informing a coordinated national and regional response. Furthermore, early detection will give managers and researchers the greatest opportunity to develop and experiment with control methods focused on stopping or slowing the spread of the disease. A better understanding of the bat population in Wisconsin will allow managers to measure the efficacy of management decisions and gauge the overall effect of management and disease-response on the state's bat population as a whole. As well, baseline data will guide conservation and recovery efforts.

Early detection requires active surveillance of hibernating bats. Active surveillance is achieved by visiting the interior of hibernacula to look for signs of WNS, such as fungal growth on bats, abnormal behavior, and changes in distribution within hibernacula. Active surveillance goes along with population monitoring so that in the process of looking for early signs of WNS, the number of bats, species, and location within the hibernacula can also be recorded. Hibernating bats should be disturbed as little as possible during surveillance, and thus visits should be limited (only one or possibly two/season) and should involve as few individuals as possible. Furthermore, researchers should keep as much distance as possible between themselves and the bats to avoid waking them.

The goal of the current, and largely completed, effort to catalogue all of Wisconsin's caves and mines is to identify all important natural and artificial roosts. Sites are to be prioritized for

monitoring, surveillance, management, and conservation efforts based on site details and significance to the population as a whole. For example, sites that contain the largest or most diverse populations and the most threatened or endangered species will be given higher priority. Cave and mine roosts are categorized for prioritization according to 1) total numbers of bats accommodated, 2) number of species sheltered, 3) apparent value of the site in meeting bat needs, 4) long-term safety of the site, if protected, 5) known threats if not protected, and 6) context in relation to nearby hibernacula, and 7) status of the species involved. If time is limiting for surveillance, effort will be given to higher priority sites.

Proposed Action

Because the time and place of *Geomyces destructans* arrival in Wisconsin cannot be known in advance, early detection is critical to: 1) learn more about the epidemiology of the fungus and of WNS, 2) allow managers time to consider all management options and implement using the best available techniques for responding to outbreaks of WNS. Department staff will need landowner permission or must pursue an inspection warrant, to access caves and mines in order to monitor, survey, and inspect for the presence of *Geomyces destructans*.

Effects

Disease Control. As with any epidemic, early detection of *Geomyces destructans* increases the probability of success of containing, or slowing the spread of the fungus from the affected site (i.e., early detection strategies for avian influenza, gypsy moth, and emerald ash borer). Furthermore, early detection will give managers the chance to re-prioritize future surveillance, evaluate disease control options before the end of the hibernation season, and participate in disease control research.

Ecologic & Cave Ecosystem. Any time people enter a bat hibernaculum, they may disturb hibernating bats and introduce foreign substances to the cave ecosystem. Hibernating bats cannot survive constant or repeated disturbance, which wakes them during hibernation (Speakman et al. 1991, Thomas et al. 1990) and causes them to deplete energy reserves needed to hibernate until spring. Active surveillance that limits the number of visits and minimizes any potential disturbance to bats, however, is not mortally detrimental to healthy bats (Boyles and Brack 2009). Early detection of WNS is unlikely to change the ultimate fate of infected individuals until a cure for WNS is developed. However, early detection can potentially have a dramatic effect on bats at the population level by giving managers the time to contain the disease outbreak in the hibernaculum. With the proper disinfection protocol there should be minimal effects of early detection on the bats and cave ecosystem.

Socio-economic. WDNR is already receiving positive feedback and concern for the bats from the general public, early detection of a WNS infection within the state of Wisconsin may trigger even greater public concern for native bats. This support may be instrumental in combating and tracking the disease. The loss of cave bats from the environment could mean an increase in the density of pests affecting agriculture and human health. Early detection of WNS would be an early warning to the agricultural industry of the potential need for increased amounts of manufactured pesticides. The loss of bat control on mosquito populations could mean the increase in the number of mosquitoes carrying disease infections to humans and animals (i.e. West Nile Virus). Early detection of WNS will give human health providers an early warning to be vigilant about diseases carried by mosquitoes. The department has provided and will seek additional funds for cave/mine owners to implement preventive measures. Notifying the public that the commercial caves are safe, environmentally friendly sites may increase visitation.

Analysis of Alternatives to Early Detection

No Action. Under the ‘no action’ alternative there would be no effort to detect the introduction of the fungus *Geomyces destructans* and WNS to Wisconsin hibernacula. Bat population monitoring would not change from current WDNR population monitoring and research effort levels. Disease detection under this alternative would involve late stage manifestation recognized by the public when large numbers of dead and dying bats are found on private property.

Disease Control. In the absence of early detection through active surveillance, researchers lose the ability to track and study the disease, and develop concrete parameters for epidemiological models. Managers may not have a chance to attempt control or containment measures before remaining living bats disperse from the hibernaculum in spring. Early detection may still arise from continued current-level bat population monitoring but is less likely without active surveillance. Under ‘no action’ bats carrying the fungus are more likely to disperse from the hibernacula and contaminate other individuals and roost sites resulting in a greater rate of increase in *Geomyces destructans* prevalence, more rapid spread of WNS and a quicker regional population collapse.

Ecological & Cave Ecosystem. Because surveillance that limits the number of visits and minimizes any potential disturbance to bats is not mortally detrimental to healthy bats, ‘no action’ changes little for these individuals. ‘No action’ may benefit sick bats if the result means no hibernacula visits that disturb them during hibernation. Conversely the bat population on the whole will be negatively affected by ‘no action’ if it leads to an inability to control the spread of *Geomyces destructans* following the hibernation season. No action changes little for the cave ecosystem.

Socio-economic. ‘No action’ means there will likely be no early warning for the decline in summer resident bats and the subsequent increased number of pests including disease carrying mosquitoes. The lack of early warning decreases the time to prepare by both human health providers and the agricultural industry, including organic farmers who do not rely on pesticides for pest control.

Passive Surveillance. The alternative of using Passive surveillance involves techniques of compiling information from incidental reporting, such as bat submissions to rabies labs and public calls about dead bats to state wildlife agencies and wildlife rehabilitators. Information from these sources can be unreliable, but can also serve as a “red flag” to identify new areas for priority monitoring and surveillance. Passive data have been useful for locating previously unknown bat hibernacula and late stage WNS affected areas experiencing high mortality.

Disease Control. Passive surveillance for the occurrence WNS relies on incidental detection of the disease making early detection unlikely. If WNS is confirmed, the exact hibernacula a sick bat has emerged from may still not be known and researchers lose the ability to track and study the disease. Managers may not have a chance to attempt control or containment measures before remaining living bats disperse from the hibernaculum in spring. With passive surveillance bats carrying the fungus are more likely to disperse from the hibernacula and contaminate other individuals and roost sites resulting in a greater rate of increase in *Geomyces destructans* prevalence, more rapid spread of WNS and a quicker regional population collapse.

Ecologic & Cave Ecosystem. Passive surveillance does not require entrance into hibernacula until enough evidence suggests the disease is present and there is enough information about the

possible location of the disease outbreak. The bat population on the whole will be negatively affected by ‘passive surveillance’ if it leads to an inability to control the spread of *Geomyces destructans* during the hibernation season.

Socio-economic. Early detection through passive surveillance is unlikely and without it there will be no early warning for the decline in summer resident bats and subsequent increased number of pests including disease carrying mosquitoes. The lack of early warning decreases the time to prepare by both human health providers and the agricultural industry, including organic farmers who do not rely on pesticides for pest control. There is concern that undetected WNS infection in human visited caves, including bat occupied commercial caves, would lead to increased human exposure to many moribund bats with potential disease of human concern. Without early detection there is little time to prepare for the proper disposal of large WNS caused die-off events.

Preventive Measures

Early detection and decontamination work hand in hand to slow the spread of the invasive fungus and enable the department to respond in a focused and timely manner with additional preventive measures to reduce fungal transmission. The department will work with those who enter caves or mines – including but not limited to researchers, recreational cavers, tourists, and commercial cave and mine operators – to implement decontamination protocols and additional preventive measures to reduce the risk of fungal movement from site to site. Decontamination is a widely accepted starting point for transmission-risk reduction, and additional preventive measures are outlined here to further reduce risks; suitability of each of these additional measures depends on site characteristics and landowner goals. The department will work with individual landowners to meet their goals with a preventive measures plan approved by the department.

Background

The science of WNS control is under development, and many answers are still emerging. Research throughout the nation is ongoing and regular updates critical to WNS management decision-making are made available to federal and state WNS managers on a regular basis. Implementation of any action will need to be informed by current best available science and by the situation surrounding the site. Therefore any disease management option needs be considered, both for prevention of introduction of WNS into new areas, and for control of WNS where it is detected.

Disease management options need to be chosen in response to a specific WNS detection event. Chosen actions will be based on the specifics of the situation, including, for instance: the species and number of bats judged infected or exposed, the seasonal timing of WNS detection, the characteristics of the cave/mine (including ownership, access, physical features, other cave biota), the potential for implementing various control treatments at the site, the geographic area, and proximity to other hibernacula.

The best available scientific data, including risk analysis results of the structured decision making process (Szymanski et al. 2009), support cave closure for publicly and privately owned caves. The USFWS has a cave moratorium in the states affected by WNS and recommends decontamination in non-affected states to prevent the anthropogenic spread of *Geomyces destructans*. The USFS has closed cave/mine access in the 20 states of Region 9 (Northeastern states), the 13 states of Region 8 (Southeastern states), the five states of Region 2

(Rocky Mountain states), Wayne National Forest, OH; Ottawa National Forest, MI; and Monongahela National Forest, WV. Indiana restricted state-owned cave access and following discovery of WNS in a Missouri cave, other Midwestern states have closed all visitor access to state managed bat caves: Missouri-2010, Illinois-2010, and Iowa-2010.

There are approximately 120 known bat hibernacula in Wisconsin, and approximately 12 of these are public caves. In addition, less than 20 of the caves and mines in Wisconsin are routinely used for recreational caving, and less than 10 are commercially operated caves.

Decontamination

Background

Geomyces destructans can be transferred bat to bat, cave to bat, and from cave to equipment or equipment to cave. Laboratory experiments conducted at the USGS National Wildlife Health Center (Madison, WI), have demonstrated that healthy bats can contract WNS directly from infected bats housed in the same cage. Cave-to-bat contamination was documented in a multi-agency field experiment in which healthy bats from Wisconsin were moved into two WNS-infected hibernacula in the Northeast. Although sick bats were absent from the cave, healthy Wisconsin bats were colonized by *Geomyces destructans*, and developed WNS symptoms. Finally, cave-to-clothing/gear transfer was observed when the New York Department of Environmental Conservation, Wildlife Pathology Unit isolated and cultured *Geomyces destructans* fungal spores on equipment and clothing after exiting an affected cave.

A human role in inadvertently carrying *Geomyces destructans* spores from an infected site to a clean site on clothing, shoes, or gear has been accepted as possible (Sleeman 2009), and is supported by long-distance jumps in the spread of WNS beyond the distance bats would likely transmit the disease. These “jump” sites have been frequently-visited caves, often with small bat populations (Turner & Reeder 2009). The U.S. Geological Survey, National Wildlife Health Center isolated *Geomyces destructans* fungal spores in cave sediment, demonstrating that infected caves are persistent reservoirs of environmental contamination that may continue to spread the disease to other sites via human activities long after the cave’s hibernating bats have been wiped out (Lindner et al., *In Press*).

The USFWS has recognized and responded to the possibility of human WNS transmission by creating decontamination protocols for field researchers and recreational cave users - the two most frequent groups to visit caves and therefore likely to contaminate sites (Appendix C & D). Although gear and clothing can be disinfected, there is currently no safe way to decontaminate an infected cave without substantially impacting the cave ecosystem, nor is there a protocol to decontaminate infected bats. Based on the devastating effects of WNS on bats populations in other states – and the fact that *Geomyces destructans* cannot be safely removed from a cave at this time – the USFWS National Response Plan and Strategic Decision Making Initiative (Szymanski 2009) recommend that WNS-free states implement strict biosecurity measures to minimize the risk of anthropogenic transmission of the fungus into caves.

The proposed rules to add restrictions regarding gear being used in Wisconsin and require decontamination before and after entering caves or handling bats are among the few tools currently available to slow the spread of WNS.

Proposed Action

The decontamination measures include 1) a prohibition on equipment, gear, clothing and other objects used in or near a cave in a state outside WI from being brought near or placed into a cave

or mine in Wisconsin, 2) decontamination of equipment, gear, clothing and other objects that have been in or near a cave or mine within WI before they can be brought into another Wisconsin cave or mine, 3) decontamination of all equipment, gear, clothing and other objects that have been in or near a cave or mine in Wisconsin immediately upon exit, and 4) decontamination of all equipment, gear, clothing and other objects that will be or have come in contact with bats (including, but not limited to nets, traps, weighing tubes, bat bags, wing punches, rulers, clothing, gloves, electronic equipment and exclusion materials) and all individuals handling bats prior to and immediately after contact.

Effects

Disease Control. Simple disinfection procedures can play a big role in infectious-disease prevention and control. It is not possible to decontaminate bats, but decontamination of equipment and clothing can help prevent the anthropogenic transmission of *Geomyces destructans*, and may slow the spread of WNS to and throughout Wisconsin.

Ecological & Cave Ecosystem. Decontamination procedures benefit bats and caves by reducing the risk of anthropogenic transfer of *Geomyces destructans* to the cave ecosystem. Decontamination may also help prevent the introduction of other foreign fungi, bacteria or viruses to the cave ecosystem. These steps may slow the spread of WNS and buy time while ongoing research works to develop suitable treatments for bats and/or the cave environment.

Socio-economic. Decontamination places a time and cost burden on individuals traveling to caves or working with bats for research, recreation, or rehabilitation, but does not preclude these activities. Extra costs may include the purchase of appropriate decontamination materials and detergents and the purchase of a set of gear for dedicated use within Wisconsin. Time costs include extra time to disinfect clothing and equipment before and after entering a cave or mine, or coming into contact with bats. The general public is well versed in simple methods to prevent the spread of infectious disease (i.e. wash your hands with soap and warm water, or cover your mouth when you cough...) and will likely support the necessary steps to control the spread of the disease.

Analysis of Alternatives to Decontamination

No Action

Under the 'no action' alternative there would be no obligation to decontaminate before or after entering a cave environment or when working with bats. Furthermore, no restrictions would exist for gear coming from other states including known WNS-affected states.

Disease Control. 'No action' provides zero control on the anthropogenic transmission or spread of the disease. WNS may arrive in the state of Wisconsin much sooner than environmental routes (bat-to-bat transmission) alone would bring it here, and the spread of the disease would be faster throughout the state after it has arrived.

Ecological & Cave Ecosystem. 'No action' could lead to an earlier introduction of WNS into Wisconsin's caves. Decontamination has only a potential positive effect on a cave while no action can only lead to a negative outcome or more rapid spread of WNS.

Socio-economic. 'No action' would place no requirement for decontamination so there would be no financial or time burden on individuals involved with cave and/or bat research, recreation or rehabilitation. Because decontamination procedures are relatively simple and inexpensive, albeit

potentially time consuming, no action may be perceived by the public and nationwide bat researchers as negligence when actions to protect the WNS status of Wisconsin can be taken.

Partial Decontamination. Under the ‘partial decontamination’ alternative, not all avenues of decontamination would be required. Decontamination is an effort to minimize risk of human transmission; any compromise in this approach results in a higher risk of human transmission.

Disease Control. *Geomyces destructans* conidia can easily go undetected on clothing or gear, especially from an infected sight where white-nose syndrome has not yet been observed. By requiring only partial decontamination, whether it is certain items of equipment or times when decontamination is required, there is still an elevated risk, relative to full decontamination, that inadvertent anthropogenic spread of the fungus can occur. The risk that human transfer of the fungus could occur reduces the disease control effort of any decontamination procedures.

Ecological & Cave Ecosystem. Decontamination has only a potential positive effect on a cave. Partial decontamination benefits the ecosystem when used but when not required leaves caves at risk of WNS introduction, similar to when no action is taken.

Socio-economic. In requiring only partial decontamination some of the burden of decontamination (financial and time) may be alleviated. However, any investment into decontamination is made obsolete if the risk of WNS introduction to Wisconsin is the same as ‘no action’ with its subsequent consequences.

Additional Preventive Measures Options

The department will work with cave/mine owners to implement one or more of the following preventive measures to meet the goals of the landowner and minimize the spread of *Geomyces destructans*, as part of a department-approved plan:

1. Management of the WNS-associated fungus (*Geomyces destructans*)

Controlling spread of the fungal agent, *Geomyces destructans* is an approach for preventing further spread of WNS into Wisconsin and into new areas of Wisconsin. The fungus *Geomyces destructans* would need to be removed from the cave environment, as well as from the agents potentially carrying it between hibernacula (i.e., humans and bats). A key strategy to control spread of *Geomyces destructans* is to control those agents potentially carrying *Geomyces destructans*, e.g. humans and bats. There is little yet known about the efficacy, and most important, the practical application, of various fungicidal agents or techniques. Although current experimental trials are under way, proven treatments do not currently exist for bats affected by WNS, and nor have vaccines to prevent fungal colonization been developed. Future development of treatments/ vaccines may play an increasingly important role in reducing the disease incidence and mortality, and in recovery of population viability. Tools to manage the WNS-associated fungus are: 1) Fungicide applications to cave environments or bats and 2) Excluding bats from high human-transmission risk caves.

Effects. Under this alternative, rather than trying to prevent the anthropogenic spread of *Geomyces destructans* to caves, a fungicide treatment would be used to eradicate or reduce the fungal load in the cave ecosystem upon its detection to prevent further spread. This option is not available at this time. Premature use of this option could incur negative and counterproductive effects. At present, this option would only be used under a research scenario.

Disease Control. The first step for any disease control program is prevention. Relying on a fungicide treatment for caves ignores any preventative options for disease control, such as steps to prevent anthropogenic transmission of *Geomyces destructans*. With early-detection surveillance for WNS, a fungicide treatment could take place before any living bats disperse from hibernation, thus offering some control on further spread of the disease. With vaccine treatments, it is also possible to offer some control on further spread of the disease. However broad-scale fungicide application in a cave environment would be experimental and efficacy is unknown. Efficacy is unknown, and a bat vaccine for WNS has yet to be created.

Ecological & Cave Ecosystem. Currently there are no fungicide treatments for *Geomyces destructans* that would not affect the cave ecosystem. There are a plethora of native soil fungi, some closely related to *Geomyces destructans*, found within the cave environment that may be impacted by a treatment, and these impacts may have broader and unknown effects on cave ecology. It is unclear exactly how it would change the ecology in the cave but the likely effect is presumed negative since fungicides are often powerful and could potentially affect living creatures in the cave ecosystem.

Socio-economic. Fungicide application may present some risk to humans. Experience with anti-fungal drugs used to treat humans infected with blastomycosis, caused by the soil fungus *Blastomyces dermatitidis*, has revealed side effects including life-threatening effects. Use of fungicides with possible health risks to humans would require management to minimize such risks.

Excluding bats from high human-transmission risk caves. Bat exclusion would reduce likelihood of human-to-bat WNS transmission by encouraging bats to hibernate elsewhere. Bat exclusion would also reduce WNS risk to the statewide population, by minimizing bat-to-bat transfer from high human-traffic sites. Loss of guano would reduce nutrient input to the cave ecosystem. Possible bat mortality, post-exclusion. Reduced disturbance to hibernating bats at high human-traffic sites.

2. Management through Disease Identification and Testing in Bat Populations

Host biology is always a key factor in the occurrence and management of disease. Research to date has shown that *G. destructans* will, for a period of time, co-exist with healthy bats in caves. Therefore, it is worth considering management of bat populations to decrease the transmission of *G. destructans* through a colony, or increase the WNS resistance of individual bats and decrease exposure of healthy members of a colony to the fungus.

Not every bat in a colony will become infected at the same time or even in the same hibernation period. Consequently, reducing the hibernaculum's fungal spore load may improve the chance that non-affected bats will survive through hibernation and reduce the overall fungal impact on the population. Reducing WNS-associated mortality rates at a site will reduce the long-term WNS impact both to that colony and to the statewide population. Tools to manage the disease through disease-identification and testing bat populations are: 1) In selected situations (e.g. small colonies, sole WNS detections in the area [i.e., "jump" site], other key bat hibernacula in the area at risk), removal of bats from the colony for testing, 2) Selective removal of *Geomyces destructans*-infected bats and their immediate neighbors for testing, 3) Mid-winter containment of *Geomyces destructans*-infected bat colonies, 4) Exclusion of bats from *Geomyces destructans*-infected hibernacula.

Effects.

Disease Control. *Geomyces destructans*-infected bats are a risk for movement of the fungus to new sites in the hibernaculum and to nearby hibernacula. Preventing mid-winter movements of affected bats would reduce the spread and impact of WNS. Removing *Geomyces destructans*-infected bats may reduce the load of agent in the affected colony (and thus reduce transmission risk to other bats). Preventing these mid-winter movements of affected bats to clean sites will minimize wintertime disease transmission among nearby hibernacula.

Ecological & Cave Ecosystem. Preventing clean bats from entering infected sites will maintain as many clean sites in Wisconsin for as long as possible. Preventing additional infection and spread will also directly increase bat survival. Maintaining clean sites could have additional benefits for caves, because the full impact of *Geomyces destructans* on cave ecosystems and their biota is unknown.

Socio-economic. Bats provide ecological services to the general public, particularly in terms of insect pest control. Reducing *Geomyces destructans* spread diminishes bat mortality and therefore helps retain bats and their ecological services on the landscape. Identification and testing provides the information to inform ongoing WNS research and management responses. Testing provides data.

3. Management through Environmental Modification

Environmental factors can play a role in the development/mortality impacts of WNS when *Geomyces destructans* infects a cave. Studies show that bats themselves appear to be practicing "environmental modification", e.g. moving to different areas of a cave, once they are WNS-affected. In theory, a cave environment could be modified to be made less suitable for *Geomyces destructans* growth, while still being suitable for bat hibernation. Tools to manage *Geomyces destructans* through environmental modification are: 1) Modify temperature and humidity through air-flow manipulation to reduce fungal growth, 2) Provide temporary-harbor thermal refugia ("hot boxes") for *Geomyces destructans*-infected bats, 3) Create insulated roosting structures to maintain more stable temperature and humidity near cave/mine entrances, which normally experience high variability, and 4) Reduce roosting opportunities in parts of hibernacula where the microclimate most strongly favors *Geomyces destructans* growth, to encourage bats to roost where conditions are suitable for hibernation but less so for fungal growth.

Effects.

Disease Control. These approaches may not completely eliminate mortality, however they may increase annual WNS survival rates and help retain a larger potential recovery population. Such approaches need proper design and testing before broad application, to ensure that bats respond by seeking suitable roosting alternatives. Research with bat-to-bat transmission of WNS needs to be conducted to determine effectiveness of removal of infected and surrounding individuals. These actions may help identify prevalence and distribution of infected animals within hibernacula, as they relate to environmental conditions.

Ecological & Cave Ecosystem. Temperature and humidity modifications may alter sensitive and generally stable microclimates within cave systems – particularly pristine and generally undisturbed sites. In contrast, man-made mine hibernacula are novel environments that are largely devoid of endemic and sensitive native life forms, and therefore are suitable for such environmental-modification experiments.

Socio-economic. Environmental manipulation in abandoned or active mines could potentially incur initial setup and also long-term operational costs (e.g., installation or modifications of air-flow technology).

4. Management of Human Activities

The USFWS has recommended a moratorium on cave entries, and many federal and state public lands have been closed to human access. In Wisconsin, the USFS has closed abandoned mines on their lands, and a few private landowners have excluded unauthorized human access to their sites. Restriction on human access to caves is an effective disease control method and perhaps the only way to prevent potential human *Geomyces destructans* transmission. Under this option, humans would be restricted from entering caves. Because of the rapidly changing nature of WNS infection and management, cave-access restrictions are likely to be temporary, except where the landowner wishes otherwise.

The decision to limit access to caves or mines is the decision of the property owner. The rule proposes to work with property and business owners to find effective and practical management strategies at each site that both meet the commercial, recreational or other purposes while still slowing the spread of the fungus

The option of physically excluding bats is highly dependent on the unique characteristics of each site and is not an option for many caves. The feasibility of physical exclusion depends on the number and accessibility of entryways, as well as number of bats using the cave or mine. For example, to allow continued human visitation, WDNR physically excluded bats from a single commercially run cave beginning in late fall 2010. This cave deemed suitable for the technique due to the small number of bats hibernating in the cave, and limited number of bat entrances.

Human-facilitated introduction and spread of *Geomyces destructans* is a significant risk that warrants an abundance-of-caution approach. Unlike bat transmission, human transmission is something we can manage, and in fact control of human transmission is one of the most effective preventive actions we can take. Tools to manage human transmission of WNS include: 1) Cave access restrictions for humans or bats, 2) Permit and schedule coordinated research entry to caves, and 3) Require decontamination of equipment, clothing, and gear, or use of dedicated gear for a site.

Effects.

Disease Control. Access restrictions, if implemented without exception, would negatively affect WNS early-detection surveillance efforts and ongoing WNS research. Some level of authorized entry will be needed for WNS surveillance, monitoring, research, and management. Physical exclusion to caves is an effective disease control method to prevent potential for humans to spread *Geomyces destructans*, or to prevent bat exposure to the fungus in a potentially infected cave.

Ecological & Cave Ecosystem. Cave ecosystems can be biologically rich and highly sensitive to disturbance. Similar to the decontamination option, access restrictions will have a positive effect on cave ecology as they limit and prevents human introduction of any foreign fungus, bacteria or virus to the cave ecosystem. Bats themselves contribute to the cave ecosystem with nutrients (i.e nutrient supplement from guano or dead bats) and there are potential negative effects of bat exclusion depending on how integral bats in that site are to the cave nutrient cycle. Through fall

swarming and natural dispersal exploration, bats are potentially familiar with multiple caves throughout the landscape. Excluding bats from a cave before the hibernation period begins is critical to give them time to move to an alternative hibernaculum, and thus bat exclusions are not expected to have a high mortal effect on the bats.

Socio-economic. Cave and mine access for the general public presents a unique educational and recreational opportunity that may be reduced due to cave access restrictions. Caves and mines are integral for the recreation and exploration of cavers and spelunkers who would be negatively impacted by access restrictions, and commercial cave owners would be negatively impacted. Physical exclusions affect commercial caves and mines, active underground mines, private cave and mine owners, recreational cavers, agriculture and forest industries, and conservation organizations. WDNR cost-sharing for installation of bat gates or other physical barriers, cost-sharing for conservation actions, providing cave closure signage and decontamination protocols, and providing locations of caves that may be used for recreational caving activities (where bats are known to have been excluded) will alleviate some concerns and financial burdens of physical exclusion. Agriculture industries, forest industries and conservation organizations would be negatively affected by not attempting to control or slow the spread of WNS.

Permanent access restrictions are unlikely at most sites across the state. Identifying the process for removing or reducing these temporary access restrictions may lessen the impact of these restrictions on user groups.

Analysis of Alternatives to Preventative Measures

No Action

Under the 'no action' alternative there would be no attempt to prevent the introduction or spread of WNS in the state of Wisconsin as a measure of disease control.

Disease Control. 'No action' provides zero control on the transmission or spread of WNS by humans or wildlife. WNS may arrive in the state of Wisconsin much sooner than environmental routes. Under 'no action' bats carrying the fungus are more likely to disperse from the hibernacula and contaminate other individuals and roost sites. No preventative measures would result in a greater rate of increase in *Geomyces destructans* prevalence, more rapid spread of WNS and a quicker regional population collapse.

Ecological & Cave Ecosystem. 'No action' could lead to an earlier introduction of WNS into Wisconsin's caves and possible collapse of the Wisconsin cave bat population. Extirpation of bats from the cave environment removes a potentially important component of the cave ecosystem, as it removes a top predator and the nutrition from bat droppings.

Socio-economic. 'No action' would place no restrictions for cave or mine access and therefore no conflict of interest among cave users, and no financial or time burden on managers and individuals involved with cave and/or bat research, management, or recreation.

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Appendices

Appendix A. USFWS Cave Advisory March 26, 2009.

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

Appendix B – A National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats. Draft 21 October 2010.

http://www.fws.gov/WhiteNoseSyndrome/pdf/WNSNational%20Plan_DRAFT_10.21.2010.pdf

Appendix C. Disinfection Protocol for Bat Field Research/Monitoring U.S. Fish and Wildlife Service June 2009.

<http://www.fws.gov/northeast/whitenose/FINALDisinfectionProtocolforBatFieldResearchJune2009.pdf>

Appendix D. White-Nose Syndrome Decontamination Protocol (v.3) USFWS – Draft 7.31.2010

http://www.fws.gov/whitenosesyndrome/pdf/WNS1pageDecontaminationProtocol_073110.pdf

Appendix E. Supporting Decontamination Document for Cavers (WNS Decontamination Supplement 1 of 2) USFWS. Draft July 2010.

http://www.fws.gov/whitenosesyndrome/pdf/Supplement1of2_WNSDeconforCaversJuly2010.pdf

Appendix F. Alabama White-Nose Syndrome Management Plan. Alabama bat working Group, June 2, 2010. http://goodworkscomm.com/bats/AL_WNS_Management_Plan_Final_6-2010.pdf

Appendix G. Georgia White-nose Syndrome (WNS) Response Plan. Last revised July 19, 2010.

http://goodworkscomm.com/bats/AL_WNS_Management_Plan_Final_6-2010.pdf

Appendix H. Bat Handling/Disinfection Protocol for Summer Bat Field Studies in Kentucky.

May 1, 2009. <http://fw.ky.gov/pdf/batdisinfection.pdf>

Appendix I. White Nose Syndrome Action Plan, Missouri Department of Conservation 4-12-

2010. <http://www.fws.gov/whitenosesyndrome/pdf/MissouriDCStateResponsePlan2010.pdf>

Appendix J. Final White-nose Syndrome Interagency Response Plan for New Mexico. November

5, 2010. http://www.blm.gov/pgdata/etc/medialib/blm/nm/programs/wildlife/white-nose_syndrome.Par.78519.File.dat/Final_NM_Interagency_wns_ResponsePlan_05Nov2010_wAppendices.pdf