

BAT C NSERVATION

I N T E R N A T I O N A L

Written Statement of
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Oversight Hearing on
“Bat White-Nose Syndrome”

Before the
Subcommittee National Parks, Forests and Public Lands
and the Subcommittee on Insular Affairs, Oceans and Wildlife
Committee on Natural Resources
U.S. House of Representatives

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This testimony is presented by Dr. Merlin D. Tuttle, Founder and President Emeritus of Bat Conservation International (BCI), the international leader in bat conservation. He has studied bats for 50 years, including extensive research on seasonal migration and behavior of bats in the southeastern United States. The full testimony is submitted for the record. Dr. Tuttle will summarize his statement for the Committee on the emergent and disturbing threat to bats known as “White-Nose Syndrome” or “WNS.” This written testimony contains a summary of the current scientific understanding of WNS, a discussion of the current Federal, State, local and private responses to its spread, and recommendations for Federal actions needed to further comprehend and contain this crisis.

The Problem:

WNS has spread across the Northeastern states and beyond in the past three years, killing an estimated 1 million bats. Mortality rates of 95 to 100 percent are reported among infected bat populations. The disease reached Virginia last winter and bats throughout North America are at risk, with devastating ecological and economic consequences. Some of the best wildlife scientists and conservationists in America are desperately seeking solutions, but questions still are far more plentiful than answers. Research efforts to date have been largely uncoordinated and underfunded. Urgent Congressional action is needed to establish a clear leadership role at the federal level, to require development of a national strategy to understand and combat WNS, and to fund targeted research and mitigation efforts nationally.

Introduction

Chairman Grijalva, Chairwoman Bordallo and Members of the Subcommittees, my name is Merlin Tuttle, Founder and President Emeritus of Bat Conservation International (BCI). I've studied bats for 50 years, especially in the areas most currently threatened by the spread of White-Nose Syndrome (WNS), and for the past 27 years I've led Bat Conservation International's worldwide conservation efforts. With members in 60 countries, we are a nonpartisan, science-based organization and have become the world leader in the conservation of bats and the ecosystems they serve. We have led efforts to educate the public to a better understanding of bats as essential to healthy ecosystems and economies and have protected and restored many of America's most important remaining bat populations, including those of endangered gray and Indiana bats.

I am here today at your request, and I appreciate the opportunity to discuss the ecological crisis caused by WNS and look forward to responding to any questions from the Subcommittee. In my invitation, I was asked to address three topics and, after providing background information, I will focus most of my comments on these specific areas.

Background

More than 1,100 species of bats worldwide account for nearly 20% of all mammals, yet they are poorly studied and often neglected in conservation planning. Forty-six species occur in the United States, and many of these have declined alarmingly¹. Nine species or subspecies of bats in the U.S. and territories are listed as endangered under the U.S. Endangered Species Act and 24 are designated as species of concern (formerly Category 2 candidates for listing under the ESA).

Little is known about historical or current populations of most species. The most accurate population assessments are for those that form large colonies in caves and mines, but even these are often inadequately monitored with the exception of endangered species. Most experts base inferences on population trends on changes in capture rates over time, winter counts at hibernation roosts and trends in habitat loss or protection¹. Bats are long-lived and have exceptionally low reproductive rates, population growth is relatively slow, and their ability to recover from population decline is limited, thereby increasing the risk of extinctions².

Bats play essential roles in keeping nature in balance. Like birds by day, they are primary predators of the vast numbers of insects that fly at night, including pests that cost American farmers and foresters billions of dollars annually. Additionally, the droppings of bats that live in caves provide primary energy for whole ecosystems of unique life, no less than plants do for surface-dwelling animals. Bat-dependent cave microorganisms provide potentially invaluable resources for detoxifying industrial wastes as well as for producing safe pesticides, gasohol and antibiotics. Loss of bats could have serious, even irreversible consequences, both ecologically and economically.

¹ O'Shea, T. J., and M. A. Bogan, editors. 2003. Monitoring trends in bat populations of the United States and territories: problems and prospects. US Geological Survey, Biological Resources Discipline, Information and Technology Report, USGS/BRD/ITR—2003—0003.

² Barclay, R. M. R., and L. M. Harder. 2003. Life histories of bats: life in the slow lane. Pages 209–253 in T. H. Kunz and M. B. Fenton, editors. *Bat ecology*. University of Chicago Press, Chicago, Illinois, USA.

Topics Requested by the Subcommittee

1) What is the current scientific understanding of WNS?

Key Points:

- The affliction has been given the name “**White-Nose Syndrome**” (WNS) because of the telltale white fungus growing on the noses and sometimes wings, ears, and tail of most infected bats.
- The direct cause of mortality associated with WNS is still unknown. We do not know if the fungus is the sole cause of death or an opportunistic pathogen that takes advantage of weakened immune systems.
- 2008 bat-population surveys suggested a two-year population decline in excess of 75%³ at affected sites, and mortality continues. By 2009, losses approach 100% at some locations, as an estimated one million bats have died.⁴
- At the current rate of spread, the most critical hibernation sites for federally endangered Indiana bats (*Myotis sodalis*), gray bats (*Myotis grisescens*), Virginia big-eared bats (*Corynorhinus townsendii virginianus*) and Ozark big-eared bats (*Corynorhinus townsendii ingens*) will face WNS within two years or less, and several additional bat species may warrant consideration for Endangered Species listing.

Description

White-Nose Syndrome (WNS) is a mysterious ailment killing hibernating bats throughout the northeastern states and rapidly spreading south and west. Current field observations have shown that bats affected by WNS are characterized by some or all of the following: 1) a white fungus that grows on the nose, ears, and wing membranes; 2) depleted white and brown fat reserves by mid-winter; 3) a reduced capacity to arouse from deep torpor; 4) an compromised immune response during hibernation; 5) ulcerated, necrotic and scarred wing membranes; and 6) atypical behavior causing bats to emerge prematurely from hibernacula in mid-winter.

Laboratory studies have isolated a previously undescribed psychrophilic (cold-loving) fungus in the genus *Geomyces* from bats affected with WNS⁵. This fungus grows on the skin (nose, ears, and wing membranes) of hibernating bats, and laboratory studies have revealed that it grows optimally at low temperatures characteristic of bat hibernation caves. There is histological evidence that the fungus sometimes penetrates the dermis, especially in areas associated with sebaceous glands and hair follicles. Genetically identical isolates of this fungus have been collected directly from bats located in widely dispersed hibernacula in the northeastern United States. In laboratory environments, the fungus was initially cultured at 3°C (37.4°F), grew optimally between 5°C and 10°C (41–50°F), but grew marginally above 15°C (59°F). The upper

³ Blehert, David S., Alan C. Hicks, Melissa Behr, Carol U. Meteyer, Brenda M. Berlowski-Zier, Elizabeth L. Buckles, Jeremy T.H. Coleman, Scott R. Darling, Andrea Garga, Robyn Niver, Joseph C. Okoniewski, Robert J. Rudd, and Ward B. Stone. 2008. Bat White-Nose Syndrome: An Emerging Fungal Pathogen? *Science* vol. 323. Published online 30 October 2008. 10.1126/science.1163874. www.sciencemag.org.

⁴ Proceedings from the Second WNS Emergency Science Strategy Meeting, May 27-28, 2009 in Austin, TX. *In Prep.*

growth limit was about 20°C (68°F)³. Affected bat hibernation sites seasonally range between 2°C (35.6°F) and 14°C (57.2°F), permitting year-round growth and potential reservoir maintenance of the fungus⁵.

Analysis of preliminary data indicate that concentrations of chlorinated hydrocarbon contaminants, pyrethroids and heavy metals are not markedly elevated in bats examined, nor have known bacterial or viral pathogens been identified. Narrowing the field of potential causative agents requires research to understand whether the causative agent is pathogenic and if the fungus associated with WNS is, in fact, itself a pathogen. Both field and laboratory investigations will be required to assess several intrinsic and extrinsic factors that may contribute to this condition.

Bat Mortality

2008 bat-population surveys suggested a two-year decline in excess of 75%.⁵ However, mortality rates approaching 100% have now been documented in hibernation roosts (caves and mines) found to have WNS⁶. In caves where fewer than 100% of the bats died the first year, populations continued to decline in successive years. Damage to wings and bodies persists in bats that survive a winter in WNS-affected populations, thus likely reducing their ability survive and reproduce. Six species of bats (all those that hibernate in caves or mines) in northeastern states have been affected by WNS; Indiana bats (*Myotis sodalis*), little brown bats (*Myotis lucifugus*), eastern small-footed bats (*Myotis liebii*), northern long-eared bats (*Myotis septentrionalis*), tri-colored bats (*Perimyotis subflavus*), and big brown bats (*Eptesicus fuscus*).

If mortality events of this magnitude continue to occur, the number of U.S. hibernating bat species requiring federal endangered listings could more than quadruple the current number listed (4) and threaten some previously common species with extinction. For example, the little brown bat, now one of America's most widespread and abundant species, is experiencing 95 to 100% population losses at some infected hibernation sites⁶. To date, all cave-dwelling species exposed to WNS have been susceptible, and approximately half of America's 46 species enter caves during some part of their annual cycle. We have estimated that more than a million bats have died in three years from WNS, and the largest hibernating colonies of endangered bats are expected to be at risk in the next two years.

Transmission and Spread

In just three years since its discovery near Albany, New York, WNS has spread beyond the northeastern United States and now infects at least nine states: New York, Vermont, Massachusetts, Connecticut, New Jersey, Pennsylvania, New Hampshire, West Virginia and Virginia (Appendix I).

While the rapid rate of spread is readily apparent by the distribution of newly affected sites, the mechanism for transmission is still unconfirmed. Research is underway at the USGS National Wildlife Health Center to determine the likelihood of transmission among bats by physical

⁵ Blehert, David S., Alan C. Hicks, Melissa Behr, Carol U. Meteyer, Brenda M. Berlowski-Zier, Elizabeth L. Buckles, Jeremy T.H. Coleman, Scott R. Darling, Andrea Garga, Robyn Niver, Joseph C. Okoniewski, Robert J. Rudd, and Ward B. Stone. 2008. Bat White-Nose Syndrome: An Emerging Fungal Pathogen? *Science* vol. 323. Published online 30 October 2008. 10.1126/science.1163874. www.sciencemag.org.

⁶ Proceedings from the Second WNS Emergency Science Strategy Meeting, May 27-28, 2009 in Austin, TX. *In Prep*.

contact as well as through environmental exposure. Data are still being analyzed, but preliminary results indicate that transmission between bats can occur. Humans may also inadvertently transport WNS from infected sites to clean sites, though bat-to-bat transmission is believed to be the primary route. Research is underway to investigate the feasibility of transmission to bats by humans at the University of Northern Kentucky and at the National Wildlife Health Center.

At the current rate of spread, the most critical hibernation sites for endangered Indiana bats (*Myotis sodalis*) and gray bats (*Myotis grisescens*) will face WNS within two years or less (Appendix I). One of America's most important hibernation caves, which shelters eight species, including over 250,000 endangered gray bats, is currently just 120 miles from the nearest infected cave in southern Virginia. If nothing is done to slow its spread, WNS likely will infect caves/mines critical to 95% or more of remaining populations of endangered gray and Indiana bats within the next two to three years and could move continent-wide, unless a solution to stop or slow its movement is found (Appendix I). More than 30 years of conservation progress costing millions of dollars could be lost very quickly. The gray bat has recovered to the point where down-listing from endangered status could now be considered in the absence of threats from WNS. The most rapidly growing populations of Indiana bats may also suffer heavy losses.

2) What are the current Federal, State, local and private responses to its spread?

Key Points:

- A loose regional coalition of government agencies and NGOs, developed through voluntary participation and led by the U.S. Fish and Wildlife Service, is sharing information to better understand and combat the spread of WNS.
- Several organizations have held collaborative meetings to prioritize and focus WNS efforts.
- Regional and local cave closures have been implemented in an attempt to slow the spread of WNS by reducing the likelihood of human transmission.
- It is vital that funds for critical research be made available immediately. Without credible research to document a cause or causes and explore potential remedies, other activities may prove ineffective or even counterproductive.

The current response to WNS has emerged from multiple sources. The USFWS has provided regional leadership (region 5), state agencies have invested resources in monitoring and research, universities and research laboratories are investigating critical questions, regional bat working groups and non-profits have been mobilized to assist with funding, and private industry has expressed willingness to collaborate. Unfortunately, WNS is moving so quickly across the region that agencies and other groups have exhausted their staff and funds trying to address the crisis. This loose coalition of entities is a committed group that is looking for national leadership and guidance in order to capture and direct their efforts.

Current Voluntary Regional Coalition

Over the last three years, the U.S. Fish and Wildlife Service has hosted and participated in numerous conference calls devoted to monitoring and updating a wide variety of federal and state agencies, research labs and universities, land managers, non-governmental organizations, and private industry on WNS issues. These groups have come together with very little funding or legislative authority to form a loose regional coalition to understand and combat the spread of WNS. They are making the most of available resources, but a severe lack of funding to support priority research is greatly hampering progress, as is a lack of clearly defined, overall leadership.

Strategic Planning Meetings

Several organizations have also held a series of collaborative meetings to prioritize and focus WNS efforts. In June 2008, the first Science Strategy Meeting on WNS was held in Albany, New York, organized by Bat Conservation International, Boston University's Center for Ecology and Conservation Biology, Cornell University College of Veterinary Medicine, the New York Department of Environmental Conservation, the U.S. Geological Survey, and the U.S. Fish and Wildlife Service. More than 100 participants from two Canadian provinces and 20 U.S. state and federal agencies, eight universities and four non-government organizations attended, discussing existing knowledge and pending questions about the syndrome, and identifying critical research priorities. Proceedings are available at www.batcon.org/wns, and a manuscript will soon be submitted for journal publication.

In February 2009, the U.S. Fish and Wildlife Service hosted a national information update webinar to review 2008 mortality, monitoring efforts, and preliminary research results.

On May 27-28, 2009, a second Science Strategy Meeting on WNS was held in Austin, Texas. It was organized by Bat Conservation International and Boston University. Thirteen leadership scientists from the most relevant fields and 11 representatives from the most involved government agencies and NGOs participated, by invitation, in the meeting. Financial sponsors included the Disney Rapid Response Fund, the Department of Defense, the National Caves Association, the National Parks Service and the National Speleological Society. Key research projects were reviewed and revised research priorities were identified. A resulting press release and consensus statement are available at www.batcon.org/wns.

Critical Research and Monitoring

Because of the seasonal effects (mortality is during winter months among hibernating bats) and the rapid spread of WNS, it is critical to conduct priority research quickly. Delays of even a few months in launching research projects can mean the passage of another winter of mass mortality and the spread into still more states before results are in. Non-governmental organizations have mobilized to help fund initial experiments while universities and agency labs wait for federal funding. This quick infusion of NGO funds bridged the immediate financial gap, but NGOs lack the resources to address the mammoth challenges of WNS.

Over the past year, Bat Conservation International has provided \$125,000 in support of scientific consensus building and emergency research, and the National Speleological Society also has funded \$28,833 for emergency research. BCI, for example, donated more than \$4,500 for an environmental chamber the USGS National Wildlife Health Center needed to promptly begin a

study on the infectivity of the WNS fungus, while awaiting federal funds. Most current research is woefully underfunded. Government funds thus far have been used primarily for monitoring.

Some federal funds have been awarded. In April 2009, a State Wildlife Grant (SWG) was awarded to a consortium of 11 states affected by WNS. This grant provides \$940,000 over two years for a variety of agencies to pay for staff time, buy equipment, carry out field work, and coordinate monitoring activities. The SWG does not fund any of the federal agencies or labs conducting research on WNS, nor provide funds for priority research that is largely conducted by academic researchers and their labs. It is urgently important that funds for critical research be made available immediately. Without credible research to document a cause or causes and explore potential remedies, other activities may prove ineffective or even counterproductive.

Cave Closures

Although research to confirm a cause and modes of transmission are not yet complete, a series of cave closures and caving moratoriums have been released. While we cannot stop WNS transmission by bats, several organizations have recognized that it is prudent to reduce the likelihood of added human transmission of WNS, potentially across long distances, to unaffected sites in the rest of the country. The following is a partial list of cave closures and moratoriums resulting from WNS;

- 1) The Forest Service issued a 1-year emergency closure order for all caves and mines on National Forest System lands in Forest Service Region 9.
- 2) U.S. Fish and Wildlife Service recommended a 17-state caving moratorium to help limit the spread of WNS.
- 3) Great Smoky Mountains National Park has closed all of its caves to public entry until further notice.
- 4) Virginia Department of Game and Inland Fisheries and the Virginia Department of Conservation and Recreation Natural Heritage Program have closed 62 critical bat caves to help slow the spread of WNS.
- 5) The National Speleological Society (NSS) closed preserves in the USFWS advisory area.
- 6) Both the Northeastern and Southeastern Cave Conservancies closed caves due to WNS.

3) What are the needed Federal actions to further comprehend and contain this unparalleled crisis?

Key Points:

- The most urgent need is to establish a national strategy with clear leadership at a national level.
- Implementation will require funding support at three broad levels: 1) funds to develop and implement a national strategy to address WNS; 2) research funding to identify the root cause of WNS mortality and find solutions to manage its transmission and spread; and 3) agency support for monitoring, risk assessment, and risk management.

- Reallocation of funds within existing agency budgets is unlikely to prove sufficient to meet escalating needs without harm to other programs. Supplemental 2009 funds are urgently needed.

Immediate Establishment of a National Strategy

Legislative action is needed immediately to establish a national strategy with clear leadership. Many local and regional strategies are underway to address WNS, but the speed of transmission and the scale of losses have moved well beyond our current capacity to answer this threat. The response to WNS has been fueled by passionate individuals who care deeply about the resources they manage, but they can no longer keep pace with the rate of spread. In the rush to address WNS, many independent efforts are underway, but they lack a coordinated approach directed by a national strategy with clear leadership.

Allocate Federal Funding

We recognize the difficult choices this committee must make to allocate limited resources in this period of economic uncertainty. However, implementation of a coordinated national strategy will require funding support at three broad levels: 1) funds to develop and implement a national strategy to address WNS; 2) research funding to identify the root cause of WNS mortality and find solutions to manage its transmission and spread; and 3) agency support for monitoring, risk assessment and risk management. Reallocation of funds within existing agency budgets is unlikely to prove sufficient to meet escalating needs without harm to other programs. Supplemental 2009 funds are urgently needed, and new funds must be budgeted in future fiscal years to effectively address this disease.

Provide Funding to Develop and Implement a National Strategy

For the past 3 years, the U.S. Fish and Wildlife Service has provided leadership for addressing WNS through its northeast regional office (Region 5), but the rate of spread and threat to federally endangered species demands a national approach and adequate funding for its implementation. A WNS national strategy will enable stakeholders to coordinate activities and prioritize research efforts and funding allocations. Other wildlife epidemics, including Chronic Wasting Disease and Avian Influenza, have benefitted from such a strategy. We respectfully request that these subcommittees support the immediate funding for development of a national strategy to accelerate the efforts to slow WNS and prevent future endangered species listings or extinctions.

Provide Funding to Promote Science Based Decision-Making

Without immediate research funding to identify causes and solutions, extinctions are likely, even among species that are now widespread and abundant. We desperately need the scientific data required to make the appropriate, science-based decisions necessary to slow the spread of WNS. Federal funding, in my opinion, has been minimal and sporadic at best. Additional appropriations to support research initiatives will be critical in the immediate future. This should include appropriations to all federal agencies involved with WNS research, potentially including the National Science Foundation, the National Institutes of Health, the National Fish and Wildlife Foundation, and other appropriate venues for supporting much needed research.

Another approach could involve establishing a federal fund for priority research on WNS and its impacts. This funding could be appropriated to and administered by, for example, the United States Geological Survey. A scientific advisory committee embedded within the framework of a developed national strategy would determine: (a) what research needs to be done; (b) how research should be done (e.g., the study design should be peer-reviewed); and (c) peer-review processes required for credibility of work performed. All research findings would be available to the public. This would lead to a body of well-designed and accessible research results that decision-makers can rely on to help mitigate WNS.

The threat of WNS is enormous and imminent. We urge you and your colleagues to support significant funding for priority research into this potentially devastating and costly disease before the damage becomes irreversible.

Provide Funding to Support Federal and State Agencies

In this difficult economic climate, state and federal agencies are having difficulty addressing WNS with existing resources. Current budget shortfalls and hiring freezes have made mounting an effective response and accommodating federal grant-matching requirements impossible. We respectfully request that these subcommittees support the appropriation of new funds to enable the U.S. Fish and Wildlife Service, the U.S. Geological Survey, and other agencies to fund critical research and develop mitigation strategies for slowing or halting WNS. As the bats return to their hibernation caves this fall, it is vital that agencies have the resources in place to conduct required research and monitoring. We ask for your help in providing immediate, emergency funding for the U.S. Fish and Wildlife Service, the U.S. Geological Survey, and state fish and wildlife agencies for research, management, coordination, and outreach in order to provide an appropriate, coordinated response to this deadly, newly emergent disease.

Conclusion

Our position is best summarized through a consensus statement developed by the group of prominent scientists and wildlife managers who met on May 27-28, 2009 at the second WNS Science Strategy meeting in Austin, Texas.

“White-Nose Syndrome (WNS) is a devastating disease of hibernating bats that has caused the most precipitous decline of North American wildlife in recorded history. Since it was first discovered in 2006, WNS has infected six species of insect-eating bats in the northeastern and southern U.S., causing declines approaching 100% in some populations; estimated losses have exceeded one million bats over the past three years. If the spread of WNS is not slowed or halted, further losses could lead to the extinction of entire species and could more than quadruple those that are federally listed as endangered in the U.S. Such losses alone are expected to have unprecedented consequences on ecosystem health throughout North America, with unknown economic consequences. Most bat species in North America feed on night-flying insects, of which many are pests of forests, agriculture, and garden crops or pose risks to human health. The number of insects consumed annually by one million bats is staggering—equivalent to 694,456 tons—emphasizing the extraordinary value of these

bats to the normal function of both terrestrial and aquatic ecosystems. Establishment of a national comprehensive research program is urgently needed to identify underlying mechanisms causing WNS and to develop sound management solutions.”

American bats have never faced so dire a threat. The threat of WNS is enormous and imminent. We urge you and your colleagues to support the development of a national strategy and significant funding for well-targeted research into this potentially devastating disease before the damage becomes irreversible. Effective conservation action now may be critical to avoid the potentially crippling costs of federal protection for additional endangered species. Please help us address this threat that may have far reaching ecological, economic and social effects throughout North America.

Chairman Grijalva, Chairwoman Bordallo and Members of the Subcommittees, on behalf of Bat Conservation International I want to thank you for inviting me to share this information and assist you on this important issue. I would be happy to answer any questions you may have.

Appendix I. Rate of White-Nose Syndrome Spread and Risk to Endangered Bats.

