WHITE-NOSE SYNDROME: WHAT'S KILLING BATS IN THE NORTHEAST?

JOINT OVERSIGHT HEARING

BEFORE THE

SUBCOMMITTEE ON INSULAR AFFAIRS, OCEANS AND WILDLIFE

JOINT WITH THE

SUBCOMMITTEE ON NATIONAL PARKS, FORESTS AND PUBLIC LANDS

OF THE

COMMITTEE ON NATURAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

Thursday, June 4, 2009

Serial No. 111-21

Printed for the use of the Committee on Natural Resources

Available via the World Wide Web: http://www.gpoaccess.gov/congress/index.html
or
Committee address: http://resourcescommittee.house.gov

U.S. GOVERNMENT PRINTING OFFICE

50-087 PDF WASHINGTON : 2009

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CONTENTS

JOINT OVERSIGHT HEARING ON WHITE-NOSE SYNDROME: WHAT'S KILLING BATS IN THE NORTHEAST?

Thursday, June 4, 2009
U.S. House of Representatives
Subcommittee on Insular Affairs, Oceans and Wildlife, joint with the
Subcommittee on National Parks, Forests and Public Lands
Committee on Natural Resources
Washington, D.C.

The Subcommittees met, pursuant to call, at 10:01 a.m. in Room 1324, Longworth House Office Building, The Honorable Madeleine Z. Bordallo [Chairwoman of the Subcommittee on Insular Affairs] and The Honorable Raúl M. Grijalva [Chairman of the Subcommittee on National Parks] presiding.

Present: Representatives Bordallo, Grijalva, Napolitano, Shea-Porter, Tsongas, and Cassidy.

STATEMENT OF HON. MADELEINE Z. BORDALLO, A DELEGATE TO CONGRESS FROM GUAM

Ms. BORDALLO [presiding]. Good morning, everyone. If there are people standing in the back, we always invite you to come and take the chairs here in the lower section here, this round table here. Thank you.

The Joint Oversight Hearing by the Subcommittee on National Parks, Forests and Public Lands and the Subcommittee on Insular Affairs, Oceans and Wildlife will come to order.

Today, we will hear testimony concerning an unprecedented disease affecting bats known as the White-Nose Syndrome. Under Committee Rule 4[g], the Chairwoman, Chairman and the Ranking Minority Members will make opening statements.

White-Nose Syndrome is named for the striking fungal growth on the muzzles, the ears and the wings of bats. Little is known about this disease but it was first documented west of Albany, New York, in February of 2006. Over the last three years, White-Nose Syndrome has spread to nine states from New Hampshire to West Virginia. The mortalities are astonishing, reaching up to 100 percent in some caves and mines.

There is great concern that White-Nose Syndrome may quickly spread to southern and midwestern regions, and ravage both healthy and endangered species of bats.

White-Nose Syndrome in bats has profound public health, environmental, and economic impacts. Bats are nature's best control of insect populations as a single bat can eat its entire weight in insects in one night. When not controlled, many insects spread disease and others are agricultural pests. One study estimated that the value of bats in controlling cotton pests in parts of Texas was as great as $1.7 million per year. Their decline will likely have far-reaching ramifications for both agriculture and public health.

Bats with White-Nose Syndrome exhibit uncharacteristic behaviors and emerge from hibernation during the winter, consuming fat reserves which may result in starvation. Transmission of the disease is not fully understood but is believed to be bat to bat or possibly transferred by humans who visit affected caves.

Given this limited understanding, the Fish and Wildlife Service has issued an advisory, asking for a voluntary moratorium on caving activities in affected areas and some caves on Forest Service, state, and private lands have been closed.

While I commend this action, the severe mortality and the sudden spread of White-Nose Syndrome demonstrate the need for a rapid response beyond closing caves where bats live. We must quickly ascertain the causes of, and the vectors for, the spread of White-Nose Syndrome to avoid what could be an ecological and economic disaster if it remains unchecked.

So, this morning I look forward to hearing from our invited witnesses who under limited resources have been working cooperatively and diligently to understand and manage White-Nose Syndrome in bats, and I appreciate their recommendations on how this challenge can quickly be met.

[The prepared statement of Ms. Bordallo follows:]

Statement of The Honorable Madeleine Z. Bordallo, Chairwoman, Subcommittee on Insular Affairs, Oceans and Wildlife

White-Nose Syndrome is named for the striking fungal growth on the muzzles, ears, and wings of bats. Little is known about this disease, but it was first documented west of Albany, New York in February of 2006. Over the last three years, White-Nose Syndrome has spread to nine States, from New Hampshire to West Virginia. The mortalities are astonishing, reaching up to 100 percent in some caves and mines. There is great concern that White-Nose Syndrome may quickly spread to southern and mid-western regions and ravage both healthy and endangered species of bats.

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While I commend this action, the severe mortality and the sudden spread of White-Nose Syndrome demonstrate the need for a rapid response beyond closing caves where bats live. We must quickly ascertain the causes of and vectors for the spread of White-Nose Syndrome to avoid what could be an ecological and economic disaster, if it remains unchecked.

I look forward to hearing from our invited witnesses who, under limited resources, have been working cooperatively and diligently to understand and manage White-Nose Syndrome in bats, and I appreciate their recommendations on how this challenge can quickly be met.

Ms. BORDALLO. As Chairwoman of this Subcommittee, I now recognize Mr. Cassidy, the acting Ranking Republican Member of the Subcommittee on Insular Affairs, Oceans and Wildlife, for any statement that he may have.

STATEMENT OF HON. BILL CASSIDY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF LOUISIANA

Mr. CASSIDY. Thank you. Some of which I say will be a repeat but it is worth acknowledging again.

Good morning. Today, we will examine the White-Nose Syndrome affecting our bat populations. We know little about the cause of this disease, and how we can stop it from spreading to caves and mines throughout the United States. What we do know is that the White-Nose fungus was first documented in a single cave in the Adirondack Mountains in New York in February 2006. Since that time, its prevalence has dramatically increased across New England and the Mid-Atlantic states.

It has been responsible for the deaths of a million or more bats, and if left unchecked has the potential to wipe out several species of bats, including the highly endangered Indiana bat and the Virginia big-eared bat.

While I am pleased that both Federal, state, and local agencies have taken proactive steps to combat the White-Nose Syndrome by closing caves, mines and sink holes, it is critical that the cause be identified and an effective strategy developed before the onset of next winter. We must stop this disease before it spreads to other states, for example, my own, Louisiana, or Texas.

We need a large, healthy bat population in the United States and across the planet. Bats are important to agriculture. Bats consume more than 3,000 insects a night. An entire colony of bats eats millions of crop-destroying and disease-carrying pests. They reduce the need for pesticides and, by so doing, save farmers billions of dollars a year.

In fact, the Smithsonian recently issued a report documenting bats consume roughly twice as much plant-eating insects as do birds.

I am also pleased to hear that the U.S. Fish and Wildlife Service recently approved a two-year $1.3 million state wildlife grant to find the cause of the White-Nose Syndrome, how it is transmitted, and how to stop the disease from spreading. We hope these efforts are successful.

In the meantime, Madam Chairwoman, we will hear from a distinguished panel of witnesses today. I am hopeful that we will gain a better understanding of this disease and we will hear about effective ways we can stop it in the very near future.

Again, thank you, Madam Chairwoman.

Ms. BORDALLO. I thank the Ranking Member for his opening statement, and now it is my distinct pleasure to recognize Mr. Grijalva who is the Chairman of the Subcommittee on National

Parks, Forests and Public Lands, and I will mention that this is a joint hearing. So, Mr. Grijalva's Subcommittee is also chairing this particular hearing. And so now I would like to recognize the gentleman from Arizona to give his opening statement.

STATEMENT OF HON. RAÚL M. GRIJALVA, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ARIZONA

Mr. GRIJALVA. Thank you, Madam Chairwoman, and let me associate myself with your opening comments and the Ranking Member's opening comments.

The only point that I want to add is that White-Nose Syndrome is the issue that we are dealing with right now—the cause, how to contain, how to mitigate what is going on. It is a potential ecological disaster, as the Chairwoman aptly pointed out.

But I also think that how we respond, how we gather the information, how we look at root cause is also essential because I think this challenge is not isolated to the White-Nose Syndrome. Likely with the growing impact of climate change, we will need to respond more and more to unknown diseases, unprecedented deaths in animal populations. Our ability to determine the level of response will be key in minimizing any negative effects of these threats.

I want to thank all the witnesses. I am particularly interested in how the Federal agencies are going to coordinate and respond in a timely manner, and look forward to the witnesses, and thank you very much, Madam Chair.

Ms. BORDALLO. I thank the gentleman who is co-chairing this hearing, the gentleman from Arizona.

I would also like to mention joining us on the dais here is the gentlelady from California, The Honorable Grace Napolitano. Thank you.

And now at this time I would like to introduce the witnesses. First, we have Mr. Marvin Moriarty, the Northeast Regional Director of the U.S. Fish and Wildlife Service, and Mr. Joel Holtrop, Deputy Chief, National Forest System.

As we begin, gentlemen, I would note for the witnesses that the red timing light on the table will indicate when five minutes have past and your time has concluded. We would appreciate your cooperation in complying with these limits, but be assured that your full written statement will be submitted for the record.

So, at this point, I would like to recognize Mr. Moriarty. Welcome, and please begin.

STATEMENT OF MARVIN MORIARTY, NORTHEAST REGIONAL DIRECTOR, UNITED STATES FISH AND WILDLIFE SERVICE, U.S. DEPARTMENT OF THE INTERIOR

Mr. MORIARTY. Thank you very much. Chairwoman Bordallo and Chairman Grijalva, and Members of the Subcommittees, my name is Marvin Moriarty, and currently I am the Acting Deputy Director of the Fish and Wildlife Service. This just happened on Monday. I am here for a month, but I am representing the Department of the Interior, and when I do go home in July, I will resume my position as the Northeast Regional Director of the Fish and Wildlife Service.

I would really like to thank you for the opportunity to testify about White-Nose Syndrome. It is an emerging disease which has

spread rapidly and is posing a serious threat to U.S. bat populations.

White-Nose Syndrome was first recorded in 2007 in a cave near Albany, New York, and is associated with greater than 90 percent mortality of hibernating bats in more than 65 caves through nine Northeast and Mid-Atlantic states. Six bat species have been affected thus far, including the Federally endangered Indiana bat. The sudden and widespread mortality associated with this syndrome has never been observed before in the more than 1,100 known bat species.

The white powdery substance on the faces of affected bats is caused by a fungus never before documented. A description of the fungus has been published in a scientific journal this month by the U.S. Geological Survey and other scientists. It apparently grows only in cold temperatures. When hibernating bats lower their body temperature significantly and pack together, these two factors seem to promote the spread of the fungus from bat to bat.

Most of the bats affected live about five to 15 years and have only one offspring per year, and thus populations will be slow to recover, if at all, from this disease.

The verification of White-Nose Syndrome in West Virginia and Virginia caves last winter indicates its potential spread to Southeastern and Midwestern states. These states support larger populations of hibernating bats, including millions of individuals of several species. Other bat species may be impacted if the disease spreads.

In response to this crisis, the Department of the Interior is leading a coordinated response among the U.S. Fish and Wildlife Service, U.S. Geological Survey, the National Park Service, U.S. Department of Agriculture, and other Federal agencies, affected states, the academic community, private nonprofit organizations, and other stakeholders.

Through funding provided by the Department we have assembled a team of experts from more than 50 partner agencies and organizations. This community is working together to monitor the spread of the White-Nose Syndrome and mortality in affected bats, to identify the mechanisms of transmission, to research the cause, and to develop management and containment options for wildlife managers, which we expect to be in place this coming September.

The Department is also working closely with the recreational caving and cave research communities to develop decontamination protocols and cave access recommendations to prevent potential spread through human activities.

In March of 2009, the Fish and Wildlife Service issued an advisory recommending voluntary suspension of caving activities in affected and adjoining states. The National Park Service has closed wild caves and mines in several units, although large commercial caves and national park units remain open at this time. More closures will occur in response to any spread of the White-Nose Syndrome.

In conclusion, White-Nose Syndrome is the greatest challenge to bat conservation we have ever faced, and we are employing an approach that combines the strengths of each of our bureaus and our partners.

As climate change significantly alters habitats and introduces other stressors to native fish and wildlife, we may experience other changes to fish and wildlife populations in the United States. Moving through this challenge will help us further develop a model for successful community-based responses to emerging wildlife diseases.

The Department appreciates the interest of the Committee and your respective Subcommittees in White-Nose Syndrome and of the efforts our community is taking to address it. We look forward to working with you to slow the spread of this disease and to mitigate its impact on bat populations.

Again I thank you for the opportunity to testify before you today, and I would be happy to answer any questions that you or the Committee members might have.

[The prepared statement of Mr. Moriarty follows:]

Statement of Marvin Moriarty, Regional Director, Northeast Region, Fish and Wildlife Service, U.S. Department of the Interior

Chairwoman Bordallo, Chairman Grijalva, and Members of the Subcommittees, I am Marvin Moriarty, Regional Director for the U.S. Fish and Wildlife Service's Northeast Region. Thank you for the opportunity to testify about an emerging wildlife disease, known as white-nose syndrome, which has spread rapidly through the Northeast and is posing a serious threat to bats.

Background

White-nose syndrome (WNS) is a term given to a disease first recorded in March of 2007 in bats hibernating in a cave near Albany, New York. WNS is associated with greater than 90% mortality of hibernating bats in affected caves throughout the Northeast, with close to 100% mortality in some locations. Thus far, six bat species have been affected, including the federally endangered Indiana bat. Other currently affected species are the little brown bat, northern long-eared bat, tri-colored bat, big brown bat, and small-footed bat. The sudden and widespread mortality associated with WNS has never been observed before in any of the more than 1,100 species of bats known to science.

Affected bats display a white, powdery substance on their faces and, on closer examination, many show tissue damage and scarring in their wings. Based on microscopic analysis, the powdery substance and tissue damage is a fungus from a group of fungi that is commonly found in the environment. However, this particular species of fungus has never before been described by scientists. This species grows only in cold temperatures, and unlike most fungi, it invades living tissues. When hibernating, bats lower their body temperature significantly, and they pack tightly together—two factors which seem to promote the spread of the fungus from bat to bat. Although the primary vector of transmission is believed to be from bat-to-bat, WNS may be inadvertently spread from cave to cave by human activity in caves. WNS has spread into new areas farther away and faster than expected in typical bat migration patterns. Often when WNS affects a new area, it appears first in caves with high human visitation. Nearby caves that do not receive significant human traffic remain unaffected, at least initially. On March 26, 2009, The Service issued an advisory asking for a voluntary moratorium on caving in any state with confirmed WNS sites and in any adjacent states (available at http://www.fws.gov/northeast/wnscaveadvisory.html).

The exact cause of mortality of affected bats is not yet fully understood, but the newly identified fungus is considered a likely contributor. Dead bats are often found to be emaciated, and bats in affected caves have been observed exhibiting more activity than is normal during hibernation, including leaving caves on cold winter days. Since 2007, WNS has been documented in more than 65 caves with hibernating bats in nine Northeastern and Mid-Atlantic states.

There are gaps in our current scientific understanding of bat populations, ecology, biology, and life history. However, we can use existing information and our recently gathered knowledge about the newly-discovered fungus to piece together an initial assessment of the impacts of WNS on affected bats and potential impacts on their populations.

The species of bats thus far affected by WNS are insectivorous, and they all rely on hibernation as a strategy for surviving harsh winter conditions when their insect

food is not available. Prior to hibernation, these bats build up fat reserves to sustain them through the winter. To survive winter months without food, bats slow their metabolism and hibernate, so that most of the time their body temperature remains just a few degrees above air temperature in the cave. This strategy allows them to survive the winter on their stored fat, which can be quickly depleted in only a few hours of activity.

The fungus has been observed to grow on and invades the skin and underlying tissue, particularly the wings of affected bats, where it causes swelling and scarring. Wing membranes represent about 85% of a bat's total surface area and play a critical role in balancing complex physiological processes, such as body temperature regulation, blood pressure, water balance, and gas exchange—not to mention allowing bats to fly and to capture insect prey. WNS may interfere with these critical functions and cause skin irritation, disturbing hibernating bats and causing them to expend more energy than their fat reserves can sustain.

For some small mammal species, a mass mortality event like that caused by WNS would not significantly affect the long-term sustainability of their populations. However, bats differ from most other small mammals in that they have long lives and reproduce slowly—a combination that precludes rapid population growth and recovery. Most of the bat species currently affected by WNS live about 5-15 years and have only one offspring per year. Thus, biologists are concerned that, even if we are able to abate the situation, it will take many human generations for populations of WNS affected bat species to recover.

Among the 25 species of bats in the United States that rely on hibernation to survive winter, four species and subspecies are federally listed as endangered through the FWS, and several other species are identified by other federal and state agencies as in need of conservation.. All four endangered species and subspecies of hibernating bats in the U.S. rely on caves or mines for successful overwintering and are at risk from WNS.

Although much of the scientific understanding of bat population ecology and dynamics necessary to make a precise determination is lacking, biologists estimate that between 500,000 and 1 million bats have died so far as a result of WNS. The Department is concerned about its potential impact on bat populations, especially those species currently listed as federally endangered, because of the high mortality associated with WNS and its rapid spread.

White-nose syndrome was found in West Virginia and Virginia caves for the first time late last winter, indicating its potential spread from Northeastern and Mid-Atlantic states to Southeastern and Midwestern states. These states support much larger caves and populations of hibernating bats, including millions of individuals of several species, including the federally endangered Virginia big-eared bat, of which there are only about 20,000. Ultimately, it is possible that other federally listed bat species may be impacted if the disease spreads further south and west, including the gray bat and the Ozark big-eared bat. Also, significant mortality of more common species may threaten the stability and health of these populations.

The role of bats in larger ecosystems is not well understood, but bat species comprise about one-fifth of all mammal species in the world, making their loss potentially significant to the sustainability of other animals and the plants that share their landscapes. One million bats can consume up to 8,000 lbs of flying insects per night, including some pests like mosquitoes and moths. As predators of these insects, bats may play an important role in protecting agriculture crop and forest health and in reducing risk of human disease transmitted by flying insects.

In addition to impacts on biological resources, WNS will have impacts on some local economies. The closure of caves reduces opportunities for recreational caving and impacts many caving organizations, clubs, and local grottos that rely on access to these resources. Drastically reduced bat populations likely will also impact the enjoyment of visitors who come to federal lands to see them. For instance, caves and bats are the primary attractions at some of the National Park Service (NPS) units. These include Mammoth Cave National Park (Kentucky), Carlsbad Caverns National Park (New Mexico), and Timpanogos Cave National Monument (Utah). Caves with bats are a secondary attraction at numerous other units such as Cumberland Gap National Historical Park (Kentucky) and Ozark National Scenic Riverways (Missouri). WNS has been detected in one national park unit—Delaware Water Gap National Recreation Area (Pennsylvania and New Jersey). As caves and bat populations in these national park units and other federal lands are affected, outdoor recreation guides, gateway communities, and outfitters may experience loss of visitors and income.

Department of the Interior Response

The Department of the Interior (Department) is leading a cooperative and coordinated response among its bureaus, including the U.S. Fish and Wildlife Service (FWS), the National Park Service, and the U.S. Geological Survey; as well as the U.S. Department of Agriculture and other affected agencies; affected states; the academic community; private nonprofit organizations; and other stakeholders. Through the FWS, the Department has assembled a team of experts from these stakeholders to address this disease. Today, more than 50 partner agencies and organizations are working together to identify the mechanisms by which WNS is transmitted and mortality in affected bats, monitor its spread, and develop management and containment options for federal and state wildlife managers.

Currently, the Department is planning on providing resource managers with management recommendations, based on the best available science, to control the spread and minimize the effects of WNS in 2010. To this end, the Department is engaged in a structured decision making process, in which bat experts from multiple agencies are weighing the various management alternatives against much uncertainty. We expect to have management recommendations in place by September of this year.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (FWS) is coordinating the Department's response to WNS, and is currently collecting and distributing critical information to other federal agencies, states, partners, and the public; administering several working groups focused on specific elements of the problem; and working with stakeholders to identify and carry out collaborative investigations, monitoring, and management actions. The FWS serves as the primary resource for up-to-date information and recommendations for all partners, such as important decontamination protocols and a March 2009 cave access advisory that requested voluntary moratorium on activities in caves in affected states to minimize the potential spread of WNS.

The Department has and will continue to invest resources to address to WNS, including coordination with states and other partners to improve our understanding about this disease, to take appropriate actions, and to monitor for its spread. As the potential for spread increases, the need for and complexity of this coordination increases. Through the FWS, the Department will continue to monitor federally listed species and, because states have primary jurisdiction over bats not federally listed under the Endangered Species Act, to support state monitoring and management efforts through State Wildlife Grants and other programs.

U.S. Geological Survey

Investigation into the disease and the implicated fungus species has been conducted at the U.S. Geological Survey (USGS)-National Wildlife Health Center, in collaboration with multiple partners, including the USGS-Fort Collins Science Center, the FWS, Symbiology LLC, Cornell University, and conservation agencies from all WNS-affected states. Much of this work was summarized in a paper published in the journal Science. USGS has also lead efforts to publish two additional studies that define criteria for diagnosing WNS and that describe and name the fungus that causes the skin infection characteristic of WNS. These papers will be released in June, 2009.

To close gaps in scientific understanding of affected bat populations, this fungus, and its affect on bats, the Department has funded research through USGS into several lines of investigation. Data collected during a WNS infection trial are being analyzed to identify mechanisms by which WNS is transmitted. Additionally, an environmental survey is underway to determine the prevalence of the WNS fungus in the eastern U.S. and to evaluate the potential role of the environment in maintaining the WNS fungus. The USGS is preparing to conduct epidemiological studies to determine the origin of the WNS fungus, ecological studies to ascertain whether bats are surviving the disease, and modeling studies to determine the potential for further WNS spread.

National Park Service

The National Park System contains 391 units comprising approximately 84 million acres. Nearly one in four national park units have caves, and one in three units contain mines that can provide habitat for bats. System-wide, all 45 species of bats in North America occur in national park units, including seven species that are federally listed as threatened or endangered, and numerous others that are listed through state laws as threatened or endangered.

NPS is fortunate to have both wildlife health professionals and public health professionals working together to provide "One Health" recommendations that consider

the health of humans, animals, and the environment in addressing disease issues. This infrastructure, which is being applied to the NPS response to WNS, has been useful and successful in addressing a variety of disease threats in national park units.

The NPS has established a working group comprised of managers from across the entire national park system under the leadership of one of our Washington Office veterinarians. This group facilitates coordination within NPS and with the Department and its partners. Such national coordination is critical because the impacts of WNS are already nationwide as evidenced by cave restrictions and closures from Great Smoky Mountains National Park (Tennessee and North Carolina) to Sequoia-Kings Canyon National Park (California).

Limiting Potential for Human Transmission

The Department is working closely with the recreational caving and cave research communities to develop decontamination protocols and cave access recommendations to prevent potential spread of the fungus through human activities. In March 2009, the FWS issued an advisory recommending voluntary suspension of caving activities in the states with affected bats, as well as in the adjoining states. In addition, the FWS has developed guidelines for scientists working in hibernacula to take precautions to avoid contributing to the spread. The NPS has closed "wild" caves and mines in several units of the National Park System, although large, commercial caves in national park units remain open at this time. More closures will occur in response to any spread of WNS. Several states have closed caves on lands under their management, including Indiana and Kentucky, although WNS has not yet been recorded in these states. The National Wildlife Refuge (NWR) System under FWS management includes lands with significant bat hibernacula, including those of the federally listed gray bat. Fern Cave NWR, Suata Cave NWR, Key Cave NWR, and Logan Cave NWR have been closed to public entry to protect wildlife from human disturbance, including bats.

Conclusion

Madame Chairwoman and Chairman Grijalva, the Department is dedicated to continuing its coordination of research and response to white-nose syndrome and its impact on bat populations. The rapid onset and high mortality associated with this disease is unprecedented, making WNS the greatest challenge to bat conservation we have ever faced. To successfully combat this disease, we are employing an approach that combines the unique strengths of each of our bureaus and our partners.

As globalization continues to increase the incidence of disease and exotic species invasions, and climate change impacts our landscapes, significantly altering habitats and introducing other stressors to native fish and wildlife, we may experience similar population changes to fish and wildlife populations in the U.S. The ultimate cause of WNS has yet to be confirmed, but the wildlife conservation community's response to WNS may serve as a model for how we respond to other emerging diseases with wide-ranging ecological impacts in the future.

The Department appreciates the interest of the Committee and your respective Subcommittees in WNS and our efforts to address it. We look forward to working with you to effectively slow the spread of this disease, and to mitigate its impacts on bat populations.

Thank you for the opportunity to testify before you today. I would be happy to answer any questions that you or the committee members might have.

Response to questions submitted for the record by Marvin Moriarty

Questions from Ranking Republican Member Henry E. Brown, Jr. (R-SC), Subcommittee on Insular Affairs, Oceans and Wildlife

(1) What is the origin of this disease? In other words, how did it end up in the cave in the Adirondack Mountains in 2006?

The origin of White-Nose Syndrome (WNS) is not currently known. However, there is circumstantial evidence suggesting that the cause is the fungus, Geomyces destructans. This fungus causes the skin infection that is hallmark of WNS and has occasionally been observed to infect cave-hibernating European bat species since the early 1980s. However, the mortality associated with WNS in the U.S. has not been reported in Europe, but there are significant differences between North American and European bats. First, the ranges of bat species present in Europe and North America do not overlap (it is possible that European and North American bat species exhibit different susceptibilities to fungus and WNS). Second, while U.S. cave-bat species hibernate in large aggregations (>100,000 individuals for some species),

European cave-bat species tend to form much smaller hibernation groups. The large aggregations of cave-hibernating bats in the U.S. may serve both to promote the spread of WNS and to facilitate the detection of the resulting large numbers of sick and dead bats. If WNS occurs in Europe, detection may be more difficult as a result of the smaller numbers of animals present in hibernation caves. The cave where G. destructans was first observed in North America is visited by more than 200,000 tourists each year. Because no species of bats move between Europe and North America, it is plausible that humans inadvertently brought G. destructans into North American caves from another continent.

(2)(a) What is the test to determine whether a bat has the white-nose syndrome?

The U.S. Geological Survey (USGS) National Wildlife Health Center currently has three tests to determine whether a bat has WNS. Tissues from dead bats are placed in culture media that grow fungi, which are then identified as G. destructans by various methods, including its distinctive physical appearance. Also, a molecular biology technique, polymerase chain reaction (PCR), is used to determine whether DNA from the fungus G. destructans is present on or in animal tissues. This technique is useful as fungi can be difficult to grow in the laboratory—PCR can identify G. destructans without having to grow it. Last, tissues are examined under a microscope to detect the presence of fungi and associated skin damage. This process, however, is less specific at present and research is planned to improve specific fungal identification using additional specialized techniques.

(b) If the Service finds a sick or dying bat, what steps are being taken to care for this animal?

The U.S. Fish and Wildlife Service (Service) is not taking steps to care for sick bats. A few private wildlife rehabilitators have experimentally treated WNS-affected bats and have reported the healing of damaged wing tissue. However, most states do not permit the release of these animals for fear of further spreading of the disease; there is currently no method for determining whether a bat that has apparently recovered from the WNS is actually free of the fungus.

(c) What has been the rate of recovery?

The rate of recovery is not known. In the more than 60 caves in which bats have been found to be affected, over 90% were dead by the end of the winter. In some caves, mortality has been 100%.

(3)(a) What are the current estimates on how many bats have died as a result of the white-nose syndrome?

Current estimates indicate that over 1,000,000 bats of six different species have died as a result of WNS over the past three years. [1]

(b) Are they dying of this disease or is this a symptom of a different problem?

Bat mortality of the magnitude associated with WNS has never previously been documented among any of the 1,100+ species of bats in the world. All field and laboratory analyses completed to date indicate that bats in the northeastern U.S. are dying as a result of WNS. Although research is ongoing, there is a growing body of evidence supporting a direct link between WNS mortality and infection by a newly-discovered species of fungus, Geomyces destructans. As determined by microscopy, culture, and PCR analyses, bats from all sites where WNS-mortality has been observed have tested positive for G. destructans. Furthermore, laboratory infection trials have demonstrated that G. destructans is transmissible bat-to-bat, and laboratory and field studies indicate that this fungus causes a severe skin lesion resulting in significant damage to bat wing tissue. It is hypothesized that irritation from the fungal skin infection may lead to aberrant behaviors during hibernation and subsequent premature fat depletion and death in some animals. Other animals die more acutely without depletion of fat reserves.

(4)(a) Which bat species have been most adversely affected by this fungus?

The little brown bat (Myotis lucifugus) is the most common cave-hibernating species in the Northeast region and presents the largest gross number of observed dead bats. The closely related endangered Indiana bat (Myotis sodalis) has also been severely affected.

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[1] http://www.batcon.org/pdfs/whitenose/consensusstatement2009.pdf

(b) Is there a real likelihood that species like Indiana bats and Virginia big-eared bats may become extinct because of this disease?

If WNS spreads to the largest Indiana bat hibernating colonies in the nation, located in the Midwest, and mortality is consistent with that observed in the Northeast, extinction of the species will become a real possibility. To date, Virginia big-eared bats (Corynorhinus townsendii virginianus) have not been diagnosed with WNS, although it has been detected in other species at sites they occupy.

(5) Now that winter is over, what is the current state of the white-nose syndrome?

The post-winter state of WNS is unclear. Bats observed in the summer with scarred wings indicate the possibility that bats infected with the fungus can survive at least one year of infection. Scientists are uncertain about the fate of these bats during a second winter, but it is clear that the ability to fly or catch prey is limited for at least some of these scarred individuals. The condition of these bats, therefore, may be less than optimal as they approach the winter, making them more vulnerable to death during the cold months. This scenario may explain the steady year-by-year decline in the hibernating bat populations of affected caves. The multi-year prognosis for bats observed with WNS, based on the rate of mortality of bats in affected caves, is very poor. Scientists are also uncertain about whether apparently healthy bats can transmit the fungus during the summer months. If this is possible, the condition may spread to new caves as bats from different hibernacula live closely together in summer maternity colonies.

(6) What is the period of time from the start of the disease to when bats are dying because of it?

The interval from initial infection with WNS to death is not currently known, however bats may die from the infection during their first hibernation season, a period of six months. Most WNS mortality occurs during the last half of hibernation. This seems related to the more rapid depletion of body fat reserves in WNS-affected bats than those without infection. Bats with a milder initial infection could survive the hibernation period.

(7) Have you closed caves on land managed by the Service including your national wildlife refuge units? Do you have any refuges where recreational caving is permitted?

The Service prohibits the recreational use of any cave on National Wildlife Refuges until the Secretary determines that a general public use is compatible with the conservation and protection of fish and wildlife, including bats. There are currently no caves supporting bats on Refuges that are open for use by the general public.

(8) What is the basis of your statement that: "There is currently no evidence to support a link between climate change and WNS"?

Since no research has been conducted to date to determine whether there is a link between WNS and climate change, there is no scientific evidence of such a link. Federal research efforts to date have been focused on determining the nature of the syndrome, its cause, and methods of control. No research conducted to date has revealed that climate change is a factor in WNS.

(9)(a) Are there any similarities between the white-nose syndrome and the colony collapse disorder in bees? (b) Have we ever discovered the cause of CCD?

There is no scientifically demonstrated link between WNS and CCD. A definitive cause for CCD has not been determined, and there are many differences between the two diseases. Infection of bat skin by the fungus G. destructans is a clinical hallmark of WNS. G. destructans has not been found to be associated with CCD. Also, WNS affects multiple species of wild bats native to North America. In contrast, CCD is a malady of honey bees which were introduced to North America and which are maintained in artificial hives by bee keepers. A better comparison can be made between WNS and chytridiomycosis. Chytridiomycosis is a fungal skin infection of numerous wild amphibian species (frogs, toads, and salamanders) that causes high mortality and that has been identified as a cause of global amphibian population declines. Chytridiomycosis is caused by a fungus, Batrachochytrium dendrobatidis, that is believed to have been inadvertently spread from Africa to other continents through trade in African clawed frogs.

(10) What are the goals of the $1.3 million dollar two-year state wildlife grant proposal that has recently been approved by Service?

The goal statement for the proposal is as follows: "This project will support a region-wide coordinated response to White Nose Syndrome (WNS), a rapidly-emerging threat to bats. Funding is urgently needed to 1) investigate the causative agent(s), transmission, and control; 2) detect new occurrences; 3) detect and manage the threat to adjoining regions, and; 4) implement response and control strategies."

(11)(a) Prior to the first reported case of WNS in the winter of 2006, did the Fish and Wildlife Service routinely conduct winter surveys of caves? (b) Are the surveys you are now performing limited to those caves located on federal land and are they targeted to listed bat species?

Historically, the Service has not routinely monitored caves on Federal or other lands, other than those caves harboring endangered species. Currently, in its Northeast Region the Service is monitoring caves on federal lands, as well as some caves on other lands, and these surveys are not limited to listed bat species. Most monitoring of caves on non-federal lands and for species not listed as threatened or endangered is conducted by state fish and wildlife agencies.

(12) The state of Indiana, which has no reported cases of the white-nose syndrome, has closed all of its caves on state property to stop the spread of this disease. Would you recommend that every state adopt this proactive step of closing their caves and mines?

Based on evidence that indicates human activity in caves and mines may be a factor in the spread of WNS, the Service issued an advisory on March 26, 2009, recommending a voluntary moratorium on all caving activity in states known to have hibernacula affected by WNS, and all adjoining states, unless conducted as part of an agency-sanctioned research or monitoring project. The State of Indiana does not yet fall under this advisory, but because of its significant hibernating bat populations, the state chose to close caves and mines on state-owned properties as a precaution. In its advisory, the Service has also recommended that cavers not use equipment or clothing that has ever been used in WNS-affected areas, which applies to all states not currently affected by WNS. The Service has made its recommendation regarding the level of precaution that is prudent for states to help limit the spread of WNS in its March 2009 advisory, and it is not prepared to make further recommendations at this time. More details about the management of WNS should be available in September of 2009.

(13) The U.S. Fish and Wildlife Service has several national wildlife refuge units including Logan Cave NWR, Ozark Cavefish NWR, Ozark Plateau NWR and Pilot Knob NWR that provide critical habitat for endangered bat species and they are closed to the public. Is there any indication that the white-nose syndrome has affected any of these bats?

WNS has not yet been observed in any of the caves mentioned in the question, nor have they been designated as critical habitat under Section 4 of the Endangered Species Act. Of listed species supported in these caves, the fungus has not been observed in either the ESA-listed gray bat (Myotis grisescens) or the Ozark big-eared bat (Corynorhinus townsendii ingens). However, the pattern of spread for WNS suggests that it will move into areas occupied by the gray bat and the Ozark big-eared bat in the relatively near future. In the northeast, three species of bats in the genus Myotis, including the ESA-listed Indiana bat, have been severely affected by WNS. While both the gray bat and the Ozark big-eared bat are probably vulnerable to WNS, the gray bat is also in the genus Myotis, and therefore may be especially vulnerable.

Ms. BORDALLO. Thank you very much, Mr. Moriarty, for you testimony.

And before we recognize our second guest on the first panel, I would like introduce the gentlelady from Massachusetts, Ms. Tsongas, and also the gentlelady from New Hampshire, Carol Shea-Porter.

We will now hear from Mr. Holtrop. It is a pleasure to welcome you, sir, before the Subcommittee, and you are now recognized to testify for five minutes.

STATEMENT OF JOEL HOLTROP, DEPUTY CHIEF, NATIONAL FOREST SYSTEM, U.S. DEPARTMENT OF AGRICULTURE

Mr. HOLTROP. Thank you very much, Chairwoman Bordallo, Chairman Grijalva and Members of the Subcommittees. It is my honor and pleasure to be able to talk with you today about the White-Nose Syndrome.

You have my full written testimony for the record and so I want to spend these just few moments just pointing out to you why this is an important issue for the Department of Agriculture, for the U.S. Forest Service, and for me personally in my role of responsibility for the National Forest System throughout this country.

A diminished population of bats diminishes the integrity of forest and grassland ecosystems, and that is an important statement to make right there. Bats are an important integral part of healthy ecosystems and they are ecologically significant, and it is very important for us to be addressing this issue, and I very much appreciate the Subcommittees' recognition of that by holding this hearing and your commitment to continuing to work with us.

I think Mr. Moriarty did a great job of explaining the significance of this as well as your opening statements did as well.

Bats are important for us because they are predators of some of the insects that cause forest health problems. They are important for us ecologically also because they are predators on insects that are an annoyance and irritants to human populations. They are important to us because they are an important predator on agricultural pests as well. Also, some of the bats that have been affected are threatened or endangered species that are listed under the Endangered Species Act. As a Federal land manager, we have the responsibility not only of conserving those bat species, but working toward their restoration and recovery. So, this is an extremely important issue to us.

I want to say that I am proud of the response of the Forest Service, that the Administration has made to date on this, and recognize that there is a great deal more work to do. This is a fast-moving issue. We have been talking about this being discovered three years ago. We found out how widespread this has become just in the past several months, and already we have closed all of the caves on the National Forest System in the eastern United States, over 2,000 caves and abandoned mines that are bat habitat. So, we have acted quickly in the face of a significant threat.

I am also proud of the fact that we have done so in cooperation with the other Federal agencies, our state partners, and nonprofit organizations such as Bat Conservation International, the National Speleological Society and other organizations that have worked capably with us and I very much appreciate that effort as well.

And I am proud of the fact that we have a research and development part of our organization that has been doing scientific work on what are the habitat needs of bats so that we are managing our forests in a way that is going to be providing for healthy bat populations when they are not hibernating, when they are out in the forest, and in their maternity mode and in their foraging mode. And so those are all important aspects of forest management for us and I am proud of the approach we have taken on that.

We stand ready to continue to work with the Subcommittees, with our Federal partners, state partners and non-governmental organizations to continue to find out more information about this pathology: to find out what are the steps that we need to take to continue to slow the spread of the disease; to find out what actions we can take to actually start addressing the disease directly; and how we can manage our habitats in an effective manner so that we are providing for the healthiest bat populations possible so that they are able, perhaps, to be more effective in withstanding the disease.

I look forward to answering any questions you might have.

[The prepared statement of Mr. Holtrop follows:]

Statement of Joel Holtrop, Deputy Chief, National Forest System, Forest Service, U.S. Department of Agriculture

Madame Chairman and Mr. Chairman, Ranking Members Bishop and Brown and members of the Subcommittees, thank you for the opportunity to testify before you today on bat white-nose syndrome. The subject of white-nose syndrome is important to forest managers, wildlife managers, agricultural producers and the public-at-large. This hearing is timely because white-nose syndrome is an emerging disease of cave dwelling species of bats that is both perplexing and potentially devastating. The interest of Congress and in particular the joint Subcommittees on National Parks, Forests and Public Lands and the Insular Affairs, Oceans and Wildlife is welcomed and commendable.

The Forest Service is very concerned about white-nose syndrome and the future of bats in the United States and North America. White-nose syndrome (WNS) is a name given to a fungal agent recently identified in the genus Geomyces associated with mass mortality of several bat species at hibernation sites in the New England, Mid-Atlantic and northern Appalachian States. Once introduced into a cave or abandoned and/or inactive mine, WNS has the potential to kill more than 90 percent (Blehert, et al 2009 Science Vol. 323 pg. 227) of the hibernating bats. WNS has killed an estimated 500,000 to 1 million bats during the last three years. Since 2007, when WNS was first documented in New York, at least six bat species, including the Endangered Indiana bat have been affected. The Forest Service can contribute towards the larger effort to better understand WNS, and can play a role in attempting to slow the spread of WNS to hibernation sites in caves and abandoned and /or inactive mines. The mission of the Forest Service is "to sustain the health, diversity and productivity of the Nation's forests and grasslands to meet the needs of present and future generations". This mission includes sustaining the health, diversity and productivity of the many species that use the Nation's forests and grasslands as habitat, including bats.

Declining bat populations diminish the integrity of our forest and grassland ecosystems. The continued loss of bats in forested ecosystems could have significant ecological and economic impacts. Because bats are primary predators of night-flying insects, a significant decline in bat populations could contribute to larger insect pest populations, a possible decrease of agricultural crop production, and a potential decline in forested ecosystem resiliency, including forest health. Increases in insect pest populations could lead to an increase in the perception of the need for pesticides, which would have both environmental and economic consequences.

Coordination and cooperation among all parties involved in addressing WNS is critical. The Forest Service is committed to full partnership and cooperation with the Department of Interior (U.S. Fish and Wildlife Service, National Park Service, U.S. Geological Survey), State and Tribal wildlife management agencies, universities, industrial and non-industrial private forestland owners and non-governmental organizations such as Bat Conservation International to identify the species of the genus Geomyces afflicting bats and arrest its spread throughout bat species. We will continue to assist in the cooperative effort for the monitoring, epidemiology and isolation procedures required to prevent the spread of WNS to unaffected areas and regions of the United States.

THE ROLE OF THE NATIONAL FOREST SYSTEM

The Eastern and Southern Regions of the National Forest System have adopted a very aggressive response to the threat posed to bats by WNS. This includes specific budget direction to address bat species conservation relative to WNS in the

Forest Service fiscal year (FY) 09 budget advice. There are approximately 24 million acres of National Forest System lands in the Eastern and Southern Regions of the Forest Service with approximately 2000 caves and abandoned and/or inactive mines that serve as bat hibernation sites. It is in these hibernacula where WNS mortality is most evident among hibernating bats. White-nose syndrome has not yet been documented in populations of migratory bat species that hibernate in trees or forest leaf litter. There are approximately 2,000 caves and abandoned and/or inactive mines in Eastern and Southern Region national forests. Several species of bats listed as Endangered by the U.S. Fish and Wildlife Service under the Endangered Species Act use these sites including the Indiana bat, gray bat, Virginia big-eared bat, and Ozark big-eared bat. Other bat species classified as Sensitive, a designation established by the Forest Service, include Rafinesque's big-eared bat, southeastern bat, eastern small-footed bat, and tri-colored bat, formerly known as the eastern pipistrelle.

For the Eastern Region of the Forest Service, WNS is confirmed in one abandoned and/or inactive mine within the Green Mountain National Forest (Vermont) and confirmed in a cave in West Virginia's Monongahela National Forest. At present, there are no caves or abandoned and/or inactive mines in the Southern Region National Forests confirmed as infected with WNS. In Virginia, two caves on private lands adjacent to the George Washington and Jefferson National Forests are infected. Of significant concern, is the short six-mile proximity between the contaminated cave on the Monongahela National Forest and the privately owned Hellhole Cave, which is designated critical habitat for both the Indiana bat and the Virginia big-eared bat—both Endangered Species. Hellhole Cave is habitat for approximately 45% of the known population of Virginia big-eared bats and more than 100,000 little brown bats, the species hit hardest by WNS. Species of bats killed by WNS include little brown, big brown, northern long-eared, eastern small-footed and tri-colored bats, as well as the Endangered Indiana bat. In New York State, approximately 25,000 Indiana bats or about 50% (Blehert, et al 2009 Science Vol. 323 pg. 227) of the known New York population has died since 2006. The Finger Lakes National Forest (NY) does not have any caves or abandoned and/or inactive mines within its land base.

Forest Service Cave and Mine Closures

It is critical we stop or slow the spread of WNS before it reaches the larger bat hibernacula of the Midwest and Southeast. In an attempt to slow the spread of White-nose syndrome, the Regional Foresters for the Eastern and Southern Regions closed all caves to the public and abandoned and/or inactive mines, unless posted as open with official Forest Service signs. Exceptions to the closure order are for research and monitoring, law enforcement and search and rescue operations. The closure does not include El Yunque National Forest in Puerto Rico because it is unlikely the fungus thought to cause white-nose syndrome would survive in the tropics. The fungus grows in cold conditions (Blehert, et al 2009 Science Vol. 323 pg. 227).

There is evidence to suggest humans can spread WNS, from cave to cave on their gear and equipment (Blehert, et al 2009 Science Vol. 323 pg. 229). This includes cavers as well as resource managers. Researchers and managers working on WNS are permitted to enter caves or abandoned and/or inactive mines if decontamination protocols are implemented. The protocols include the use of specific clothing and equipment for each individual cave and abandoned and/or inactive mine. Thus limiting a vector suspected of transmitting WNS. The closure orders are crafted to reduce concerns that they would deny access for Tribal rights and ceremonies by allowing requests for Tribal ceremonies to be authorized by permit on a case-by-case basis. Our Tribal partners are supportive of our efforts to slow the spread of WNS.

Although the U.S. Fish and Wildlife Service requested a limited moratorium on caving in WNS confirmed states and adjacent states (available at http://www.fws.gov/northeast/wnscaveadvisory.html), the Eastern and Southern Regions of the Forest Service expanded their closure orders region-wide. The Forest Service acted because we observed WNS jump from New York to southwest Virginia in one winter, a far greater distance than bats or small mammals could travel in such a short timeframe. There are critical bat hibernacula in the Midwest and Southeast that we intend to protect from contamination. For the Southern Region, the closure order may help slow the spread to significant gray bat, Indiana bat and Ozark big-eared bat caves in Alabama, Arkansas, Georgia Kentucky, Oklahoma and Tennessee. Approximately 1,900 Ozark big-eared bats remain in the world and they all occur in Oklahoma and Arkansas. In the Eastern Region, Michigan and Wisconsin have large populations of bats residing in abandoned and/or inactive mines, while large populations of Indiana bats occur in Illinois and Indiana, all of which are cur-

rently free of WNS. If we fail to keep WNS contained, there could be a rapid and precipitous population decline for many bat species. Therefore, it is critical that we keep their hibernacula isolated from the Geomyces that is linked to WNS. There is no known cure for WNS, so we must rely upon the basic principles of epidemiology, which includes trying to limit disease spread between geographic regions and using decontamination procedures when visiting hibernacula.

Management of National Forests

Bats need healthy forests and healthy forests need bats. Other than implementing the cave and abandoned and/or inactive mine closure order, the best thing we can do to conserve bats is manage for healthy and resilient forests. While the national forests are approximately six percent (6%) of the forested lands in the Eastern and Southern U.S., they play a critical role in conservation of all endemic species. We are using research findings to develop management strategies to benefit bats. Our primary management tools include thinning forested stands, creating canopy gaps, managing mid-story and under-story vegetation, conserving potential roost structures such as snags, and providing upland water sources. The objective is to create suitable roosting and foraging habitat across large landscapes. The Eastern and Southern Region national forests are ideally suited to contribute to large forested landscape ecosystems. There is a significant but discontinuous corridor of national forests from northern Georgia to New Hampshire. If we can retain healthy bat populations on national forests, the corridor could serve as a conduit to repopulate bat populations in areas decimated by WNS. This assumes our ability to arrest the spread of WNS; that the bats develop some resistance to it; or a method is found to address the fungus that causes the hallmark WNS skin infection.

There may be potential to increase our management efforts to develop suitable habitat at an accelerated rate. Forest Service biologists are cooperating with State and Federal partners to inventory and monitor bat populations on National Forest System lands to establish baseline data. This will allow us to assess the impact of WNS on bat populations. These efforts are in conjunction with other Federal, State, and private partners in bat conservation.

FOREST SERVICE RESEARCH & DEVELOPMENT (R&D) ROLE IN BAT HABITAT RESEARCH

Because bats are difficult to study and their role in forested ecosystems was not clearly, understood, little research was conducted by Forest Service scientists on bats prior to the late 1990's. However, with advances in technology such as miniature radio-transmitters and field-hardy, easy-to-use bat detectors, biologists soon realized that forested ecosystems are critical for bat survival and forest management activities could have consequences for the habitat and bat populations. Coupled with growing concerns over the viability of bat populations and advancing knowledge of the role of bats in maintaining healthy ecosystems, the Forest Service Research Stations developed bat research programs throughout the United States.

Five Forest Service Research scientists are currently conducting research on the role of bats in forested ecosystems in the U.S. Two scientists are in the Northern Research Station (Massachusetts and Missouri), two are in the Southern Research Station (South Carolina and Arkansas), and one is in the Pacific Southwest Research Station (California). At the Forest Products Lab in Madison, Wisconsin, two research mycologists have recently offered their expertise to support the effort to understand the Geomyces fungus and its relationship to WNS.

Research on bats by Forest Service scientists falls into three main areas:

- basic habitat requirements of bats,
- the effects of forest management on bats, and
- development and testing of inventory and monitoring methods.

Although many bats roost in caves and abandoned and/or inactive mines during winter hibernation, most bats roost in trees during the summer months. Summer is a critical period for bats because this is when the young are born and nurtured. Thus, much of the research conducted by Forest Service scientists has focused on determining optimal roosting requirements of bats during the maternity season. In general, our research has found that bats prefer large trees or snags, often in relatively open areas. However, there is still considerable unexplained variation within and among species that needs further study.

Since 1990, Forest Service research scientists and their cooperators have produced over 85 papers on bats that have been published in refereed journals, books, or Forest Service Research Papers, General Technical Reports or Research Notes. Scientists are also engaged in a variety of other lines of research such as bat population genetics, the use of stable isotopes to study migration patterns, and the consequences of wind turbine development and siting on bat populations. Information

from all lines of research is valuable for managing the possible recovery of bats from WNS.

Maintenance of optimal foraging habitat and insect prey is also critical for the survival and viability of bat populations. Much Forest Service research has focused on the impacts of forest management; particularly the consequences of harvest methods and fuels reduction treatments such as thinning and prescribed fire on bat foraging habitat and use. The results of these studies have found that many forest management practices, particularly thinning, prescribed fire, and creation of small canopy gaps or openings, do not reduce habitat attributes for bats and may be very beneficial.

National forests and grasslands are required to inventory and monitor all Threatened, Endangered, and Sensitive species on their lands, including bats. Bats are an extremely difficult group of animals to survey and monitor, however, several Forest Service scientists have been working to develop robust methods to obtain reliable estimates of changes in bat species composition and relative abundance over time.

Information gained from Forest Service R&D studies on habitat requirements, bat response to forest management, and the consequences of human development on bat habitat and populations will be critical to understanding the direct, indirect and cumulative effects of WNS and other stressors on bat populations. The science surrounding bats would contribute to the management strategies for the National Forest System and other public and private lands in the future. These studies will provide managers and the public with the information needed to provide optimal habitat to sustain current populations and foster the recovery of bat species populations rebounding from WNS. Further, Forest Service studies of migration patterns and population genetics of Indiana bats and other species are critical for predicting the spread of WNS and its consequences at the population level. The robust inventory and monitoring methods developed by Forest Service scientists will be critical for documenting the spread of WNS and its effects on bat populations on National Forest System lands and other lands at a regional or multi-regional scale.

THE ROLE OF STATE AND PRIVATE FORESTRY AND CONSERVATION EDUCATION

Another approach for the management of healthy and resilient forests is to implement efforts with State Foresters through State and Private Forestry. The Forest Stewardship Program provides financial and technical assistance to State Forestry organizations for private forestland management advice, consultation, and plans. Targeting private forest management efforts to implement prescriptions that would enhance or develop attributes for bat foraging, roosting or maternity habitat in privately owned forests in and near areas affected by WNS could help to ensure populations of bats capable of withstanding WNS infection.

Conservation Education

We know the public is a critical partner in the effort to help save the bats. The Forest Service is actively involved in educating people regarding WNS, bat species conservation and ensuring the public understands the ecological and economic importance of bats. Children find bats fascinating and are a key part of our education programs. We are informing people why Eastern and Southern National Forest System caves and abandoned and/or inactive mines are closed to the public until more is learned about the pathology of WNS.

CONCLUSION

The Forest Service is in the process of responding to the serious threat to bat populations posed by WNS. The Forest Service Deputy Areas for National Forest Systems, Research and Development and State and Private Forestry are contributing to this vital cause. This agency-wide effort includes targeted closures of cave and abandoned and/or inactive mine features on approximately 24 million acres of National Forest System lands, scientific knowledge and applied research; and broad, private land forest stewardship to ensure populations of bats for present and future generations. To further the conservation management of the vast and diverse habitat and fauna, the Forest Service is committed to cooperation and partnerships with Federal, State, Tribal and nongovernmental organizations interested in the conservation and preservation of bats. Madame Chairman and Mr. Chairman, this concludes my testimony. I am pleased to answer any questions that you or the Members of the Subcommittees may have.

Ms. BORDALLO. Thank you, Mr. Holtrop, for your insights on the management of the White-Nose Syndrome, and we will now begin

questioning the first panel. I will begin with myself. I have a few questions for Mr. Moriarty.

Number one, do changes need to be made to the state wildlife grants program to allow a more rapid response to wildlife emergencies such as this syndrome?

Mr. MORIARTY. Madam Chairwoman, thank you for the question. It is a question I have been discussing with the Association of Fish and Wildlife Agencies, Mr. Gary Taylor is here. It is a complex issue. I think the simple answer is I would like to have the association take a look at the process whereby they do allocate the monies from the state wildlife grant program, and work with the Fish and Wildlife Service over potential changes that might be necessary in that process.

I do know that the process is a very formal process. It requires matches and things like that which may be troublesome to some states, and so I think it is a good question to raise to the association, and have them deal with that, and work with the Service so that we could look at different options.

Ms. BORDALLO. In addition to that, do you receive any money at all for this particular problem?

Mr. MORIARTY. We mostly have just redirected what we have in order to get into this thing, but we did have some funds like prevention of extinction funds which we were able to tap into for this, and also several state wildlife grants went to helping work with the bat syndrome.

Ms. BORDALLO. I see.

Mr. MORIARTY. So, we did have some funds that were available to go right into this, but mostly what we had to do is redirect our activities.

Ms. BORDALLO. What other authorities and resources does the Fish and Wildlife Service need to rescue the bat species now teetering on the edge of extinction?

Mr. MORIARTY. Right now we have the Endangered Species Act which we think is sufficient to allow our biologists to go out and work on this issue. The states also have a tremendous amount of responsibility since most of the caves exist on state and private property, and we think at this time where the authority is given to the Fish and Wildlife Service and the states through our various acts that we have the ability to do the job. I think if it does arrive or does happen that we need some additional authorities, we would certainly be willing to come forward and speak with you about that.

Ms. BORDALLO. Thank you. And have there been any assessments on the cumulative impacts of wind energy projects and the White-Nose Syndrome on bats?

Mr. MORIARTY. Madam Chairwoman, there have not been any assessments done together in that regard. We are aware that—you know, we do have many projects out there which may impact Indiana bats, which is an endangered Federal bat, Federally endangered bat, and that decisions have been made on that bat prior to the White-Nose Syndrome action coming along. At this point in time we are more directed at finding out the causes of the problem, and getting management actions in place to deal with that, and we

will be looking as projects come along at the potential impacts to these projects to Federally listed species as we do that.

Ms. BORDALLO. Thank you. I have more questions later, but I would like to give the opportunity now to the Ranking Member, the gentleman from Louisiana, Mr. Cassidy.

Mr. CASSIDY. Thank you.

This grows in cooler temperatures. I read in the testimony that, for example, therefore it is not felt to be a risk in Puerto Rico because it is a warm place. So, is there a southern limit to where you could project this to spread?

Mr. MORIARTY. Sir, we do not know what that southern limit is. We are hoping there is a southern limit.

Mr. CASSIDY. Presumably you know the temperatures of caves, so how far—if it is 67 degrees Fahrenheit below, how far south, if you will, will you still achieve the optimal temperature for growth?

Mr. MORIARTY. OK, I see what you are asking.

I would like to ask, if I could, Dr. David Blehert, who is with our Wildlife Health Disease Lab in Madison, Wisconsin, who does have experience with that, and if he could come forward, I would have him answer that question.

Ms. BORDALLO. I have no objection.

Dr. BLEHERT. Thank you. So, what we have seen with the growth range of the fungus would actually be consistent—that it could propagate in caves as far south as northern Florida, and into the State of Georgia.

Mr. CASSIDY. Now you say that but in the testimony, it may not be one of your, I forget, I have been skimming, that optimally it would be what, 54 degrees Fahrenheit, so do those caves get that cool?

Dr. BLEHERT. You know, the range I am used to thinking is in Centigrade which goes up to—the fungus will grow up to about 15-16 degrees Centigrade.

Mr. CASSIDY. So, 32 plus 32, 64. Now it will grow up to but that is not optimal, correct?

Dr. BLEHERT. Well, it is, unfortunately, more complicated than that. What we have seen is that it can actually grow faster at some of those temperatures, so we are in the process of developing experimentation to predict what those effects might be on bats at these warmer temperatures.

Mr. CASSIDY. Got you. Can I then ask you another question because I have limited time? Now, I presume that you have gone to caves where the bats are not infected to see if this is part of the normal flora. I mean, frankly, this strikes me as an immunologic disease and not something which is being spread. It seems like this is an opportunistic infection, if you will. So——

Dr. BLEHERT. Yes, but—I am sorry for cutting you off. What we have seen to date is that the fungus is new to science, which is suggestive that it perhaps has been introduced into our environment. As we have moved through our research, established contacts worldwide, we have found evidence that this fungus may have existed in Europe. There are references to a similar fungus in Europe dating back to the early 1980s, suggesting that there could have been an introduction into the U.S.

We do have a study underway right now where we are looking for the fungus in the environment.

Mr. CASSIDY. Does it kill bats in Europe or is it just present in Europe.

Dr. BLEHERT. The bat mortality that we have seen in the U.S. have not been observed in Europe, but there are some significant differences in the dynamics of their population.

Mr. CASSIDY. So, I guess my question is, is this a commensal organism which has just been manifested because of some underlying defect or is it the primary cause? Do you follow what I am saying?

Dr. BLEHERT. Yes. I suspect that it is not just a secondary manifestation, and we do have research underway looking for this fungus in cave environments from the Mississippi River eastward, and that research should be completed by the end of the summer.

Mr. CASSIDY. So, to put a point on that, as of right now, you don't know the prevalence in the unaffected caves?

Dr. BLEHERT. That is correct.

Mr. CASSIDY. It may be there, but we don't know that.

Dr. BLEHERT. Right, and we should have that answer in the next couple of months.

Mr. CASSIDY. OK, great. Then again this may be for someone later, but I assume you have done autopsies on these bats.

Dr. BLEHERT. Yes.

Mr. CASSIDY. And?

Dr. BLEHERT. So, in the course of our disease investigation, we have seen no pathological lesions suggestive of anything going on other than infection by this fungus.

Mr. CASSIDY. What about the immunologic system?

Dr. BLEHERT. So, that is an interesting point. Bats are very different than typical mammals. Typical mammals, as you are pointing out, often are only affected by fungi when they are otherwise immunocompromised. Bats, when they hibernate, are naturally immunocompromised, and they are also, in effect, in a cold-blooded state, and so if you look—fungi are rarely primary infectious agents of warm-blooded animals, but they are very commonly primary infectious agents of cold-blooded animals, be it insects, trees, amphibians where there is a similar fungal disease currently impacting amphibian populations

Mr. CASSIDY. So, I guess my question is—well, let me back up. Something else that intrigues me. In humans, antibiotics will predispose to fungal infection, and so is there any evidence that there are antibiotics in the blood stream of these bats?

Dr. BLEHERT. Contaminants analyses have been done and we have seen no evidence that there is any cause for concern in that respect.

Mr. CASSIDY. And then last, T-cell analysis? I mean, I presume there has been a T-cell analysis?

Dr. BLEHERT. There are currently immunological studies ongoing, and I believe that there will be people on the second panel that can more directly address that.

Mr. CASSIDY. OK. Thank you very much.

Ms. BORDALLO. I thank the Ranking Member, and before I recognize the Co-Chair of this hearing, I would like to say that I represent the Territory of Guam in the Pacific. We have a lot of bats

in the Pacific area, and we have fruit bats which are, I guess, a different species, but then again I guess we don't have to worry about this fungus growth since it is only in cold weather and we have warm weather, so maybe we ought to heat the caves.

[Laughter.]

Ms. BORDALLO. Just a suggestion.

And now I would like to recognize my Co-Chairman here, Mr. Grijalva, the gentleman from Arizona.

Mr. GRIJALVA. Thank you, Madam Chair.

Mr. Moriarty, with regard to human diseases, we have alert systems that indicate to the public and to response agencies what the seriousness of that outbreak is. Has Fish and Wildlife considered such a system to help coordinate the responses from both local, state, and Federal agencies? And do you, in your estimation, see any benefit to a national system like this, responding to these outbreaks?

Mr. MORIARTY. Yes, Mr. Chairman. In the past we have had other wildlife disease outbreaks. I think you may remember the chronic-wasting disease outbreak several years ago, and it was that outbreak that actually got the community involved. The states and Federal agencies, and the Center for Disease Control and others, got together at that point in time and developed a plan to move forward—a framework as it were—to bring in all of the interested parties and stakeholders to get the information out, get in place the kinds of surveillances that were necessary—at a place where everybody could go to see them, and grab them right away.

Mr. GRIJALVA. Is that a formalized system or did that system come into place as a consequence of an outbreak?

Mr. MORIARTY. That hasn't been formalized as that, but what I see happening with this outbreak we are going to be using that same kind of framework to attach all the surveillances and the types of information that the states and our partners, stakeholders and others, need to be able to deal with the issue because it is a very well developed framework. I would see that—after we use this framework—as I said in my comments, I think we will be looking at that to become kind of a standard way that we respond to wildlife disease outbreaks because I think we can expect to see more come in the future, and so this is a second good learning effort for us, and I do believe that we have——

Mr. GRIJALVA. Moving toward a more formalized system.

Mr. MORIARTY. More formalized type of a response, that we have a good framework for.

Mr. GRIJALVA. OK, thank you.

Mr. Holtrop, welcome again. How effective have the cave closures been? What has been the public response in terms of the closure?

Mr. HOLTROP. As you might expect, there has been a mixed response, but largely, and I think a lot of this is to the credit of organizations like the National Speleological Society, the response has been one of understanding that this is a significant threat that requires some aggressive action to be taken. So, there have been certainly some indications of some people in local areas that are wondering if it is maybe too much of an action to close all the caves over the breadth of the area that we have, but by and large it has been fairly widely supported.

Mr. GRIJALVA. Let me follow up on that because one of the public concerns is the inconsistency of a response to the outbreak, and the example being that—and appropriately so, I believe the Forest Service did the closure of the caves, but adjacent to that is state land which has not proceeded to close their caves. So, in terms of consistency what should the public expect when you have that situation?

Mr. HOLTROP. I think the public has the right to expect that their government agencies are coordinating as much as feasible and as much as possible, and I would certainly expect that there is additional coordination and cooperation that could continue to improve that collaboration between how different agencies are dealing with this issue.

I think one of the things to recognize again, it was in March of this year that we realized how widely spread this disease was and what we have chosen to do is in our two eastern regions to close all of the caves and abandoned mines that are bat habitat unless posted "open". And so we maintain the opportunity to look on a case-by-case basis if there are extenuating circumstances.

Mr. GRIJALVA. OK.

Mr. HOLTROP [continuing]. To post a cave open. But I think the public has a right to expect that we continue to work with our partner agencies to look for ways to be as consistent as possible. There are going to be differences in mission, there are going to be differences in perspectives, we won't always be identical on that, of course, but we should continue to work and collaborate.

Mr. GRIJALVA. Let me, if I may, ask the question I asked previously, do you feel that a national alert response system for the outbreaks of disease would help the Forest Service coordinate the response that you just talked about between local, state, and Federal agencies? How do you feel about that?

Mr. HOLTROP. And I think you are referring to the statement that you made in your opening comments that this is maybe a pathology that we are going to be dealing with other issues such as this with climate change and some of those aspects that are associated with that.

Mr. GRIJALVA. More specifically, a formalized response system as I asked the gentleman. How do you see that helping with the coordination issue that I just asked about in the previous question?

Mr. HOLTROP. Information is always valuable to help with coordination, and if everybody is receiving the same best information, that certainly is going to facilitate good coordination.

Mr. GRIJALVA. OK. Thank you, Madam Chair.

Ms. BORDALLO. I thank the gentleman from Arizona, and now I would like to recognize the gentlelady from California, Mrs. Napolitano.

Mrs. NAPOLITANO. Thank you, Madam Chair.

The testimony is of great interest to me, and dove-tailing into Congressman Grijalva's statement about the formation of a strategy or a national strategy, I would also like to ensure that we include in that, Mr. Grijalva, the farming cooperatives because I think they have a vested interest in ensuring that the bats continue to thrive for their own benefit. They need to be part of the solution.

With that, I go back to the funding that was mentioned. How much is the amount that you have to do the R&D and the research on that? You didn't quite make a statement. You said you have adequate. What is adequate? I find sometimes the agencies are timorous in asking and telling us because this has such great implications for the national economy. We need to think big and be able to ensure that whatever we do, that we put enough money and support for every single agency to work cooperatively to get this done.

Mr. MORIARTY. Thank you, Madam Congresswoman. I really appreciate your comments there.

It was a big learning process for us in 2006, and we said, oh-oh, we have this. What do we about it?

Mrs. NAPOLITANO. That was three years ago.

Mr. MORIARTY. That was three years ago, and we very quickly, without reservation, redirected funds into this. I think that was—

Mrs. NAPOLITANO. How much funds?

Mr. MORIARTY. At that point—

Mrs. NAPOLITANO. Roughly.

Mr. MORIARTY. I have some numbers here I can give you. Since 2006 until now, the Department of the Interior has put about $5 million into the effort, dealing with the research, developing the causes and management options.

Mrs. NAPOLITANO. To address an issue that could have national implications—

Mr. MORIARTY. Exactly.

Mrs. NAPOLITANO [continuing]. I think that is a drop in the bucket.

Mr. MORIARTY. It is. We did put together a coordinating mechanism right away.

Mrs. NAPOLITANO. OK.

Mr. MORIARTY. Which was really the states and us. The partners came together very quickly; got that coordinating mechanism going. As the states and the Federal government started putting their redirects into this, we did find some funds that were available to us.

Mrs. NAPOLITANO. I know, but that means it takes time to be able to—

Mr. MORIARTY. Takes time.

Mrs. NAPOLITANO [continuing]. Search out those funds, and I think it is incumbent on the Subcommittee to realize that you need to have enough funding to be able to address it head on, and put a priority on it because of the economy.

And because of climate change, there are many implications, at least for us in the West, whether or not that is going to spread out to our area. Because of the nature of our economy in California specifically, and some of the western states for that matter, how is that being found, what is being done to alert those areas, check the caves out for the temperature to ensure that it is not harboring the ability of spread of this disease? Those are questions that have great implications for our economy in the west.

Mr. MORIARTY. Yes, I understand that. Right now many of the questions that we have relative to transmission and the like are still being answered. We have the pathology being dealt with. The lab in Wisconsin is working on all of those questions for us right

now. When we have those questions, we will know what triggers the spread, and if we can then portray that out to other parts, like in the Midwest or Southwest where there might be situations where that would occur, we would certainly work—

Mrs. NAPOLITANO. OK, I understand that, and I am pressed for time. But as you know some of these, are you sending them out to the states so that they can begin looking and doing their own R&D?

Mr. MORIARTY. Yes, we do that. The hallmark of this community is the states are in it, so right now it is the Northeastern states, and several of the Southeastern states, and some of the Midwestern states.

Mrs. NAPOLITANO. Are you looking at growing some of these endangered species in nurseries so there is no extinction?

Mr. MORIARTY. We are currently looking at the possibility of doing that for one of the bat species, the Indiana bat, and it may be necessary in other bat species.

Mrs. NAPOLITANO. I suggest that that be part of your budget request, to be able to have something to address that particular segment of what is going to be needed. And as a matter of curiosity, the caves are closed, if the mines are closed, where do the bats go?

Mr. MORIARTY. Actually, the bats are free to go in and out of the caves. The caves are closed usually by bars.

Mrs. NAPOLITANO. OK.

Mr. MORIARTY. They are heavily barred.

Mrs. NAPOLITANO. So, they still can get in?

Mr. MORIARTY. Yes, the bats can still get in.

Mrs. NAPOLITANO. Is there a way of spraying them to be able to ensure that there is no longer spread of healthy bats that might come in, that migrate?

Mr. MORIARTY. The concern around the—we thought about that, but there is a concern that the caves are highly complex ecosystems in and of themselves with lots of critters in them already that could be very badly damaged by that kind of an activity, so we would have to balance that with a threat to the population.

Mrs. NAPOLITANO. Some kind of spraying as they go in or out that will trigger anything in some—

Mr. MORIARTY. I don't think we have considered that, but that certainly is a good idea for us to put on the table.

Mrs. NAPOLITANO. That would only affect the bats flying in and out.

Mr. MORIARTY. Flying in and out, yes. Sort of a misting kind of—

Mrs. NAPOLITANO. Correct. Yes, something new. And then the last question and then I will quit, Madam Chair, is, is there any danger of that disease being passed on to another mammal, to another animal outside?

Mr. MORIARTY. Right now what we know that it does fit the model for the bat because the bats own internal temperature drops down into the area where the disease can take hold, so it is a requirement that if you are a mammal, you have to have temperature down at that level, and you have to live in a cave, and be at that temperature for you to get it. So, our estimate is right now it is not likely, but we are watching that. We are looking at that

as well because we haven't done all the studies to really assure ourselves of that.

Mrs. NAPOLITANO. May I also ask if there is any way of being able to find out what impact this has on the plague of the bark beetle that is affecting our pine forests? Because I know the bats would eat some of the pine beetle, and if there are no bats to eat it, and then we have a climate change, then—I mean, this is all part and parcel of protecting our forests.

Thank you, Madam Chair.

Ms. BORDALLO. I thank the gentlelady from California. Now I would like to recognize the gentlelady from Massachusetts, Mrs. Tsongas.

Ms. TSONGAS. Good morning and thank you both.

I have a couple of questions. One was that in the testimony you suggested that this White-Nose Syndrome was introduced from Europe. Do we have any thoughts about how that might have taken place?

Mr. MORIARTY. We do. We have discussed this. Right now there is not a whole lot known other than it has been found there. We don't see the mortalities associated with the mortalities over here, but we don't see the densities of bats that we see over here. So, we don't know quite what that means. It could mean that there used to be many more bats, this happened, and now they have adjusted to much smaller numbers. That could be the case. We just don't know.

So, it would be very difficult to go much beyond that—other than we need the research to address that issue.

Ms. TSONGAS. Can bats cross the ocean?

Mr. MORIARTY. Birds can. I don't know if there has ever been documentation of a bat crossing the ocean on the air currents. I get the answer "occasionally".

Ms. TSONGAS. Has Canada encountered this?

Mr. MORIARTY. Dr. Jerry McColman who is my White-Nose Syndrome coordinator informed me last night that they think they have suspicious sites; two in Ontario and two in—where else? In Quebec. So, we are investigating them right now.

Ms. TSONGAS. So, that leads me to the question of how much coordination is taking place with the international community.

Mr. MORIARTY. There will be a lot very soon. I don't know. I do know that we do coordinate across borders very well, and I am sure that the bat syndrome has been high on their mind because they are watching it spread.

I have been informed that there is an international bat meeting that we participated in last winter and we discussed it at that meeting.

Ms. TSONGAS. It really leads me to the thought, as we have talked about, of a more coordinated approach generally. If you attribute this to the inevitable impact of global warming, if we don't really need a CDC for fish and wildlife, then as these kinds of new illnesses come forward, there is in place an entity that can move as quickly as we have seen, for example, around swine flu—simply to contain the impact and better understand its implications for our fish and wildlife and for our broader economy.

Mr. MORIARTY. And that suggestion has been loud and clear. I would add that we have been working with the CDC as well on this issue. They have been a very, very helpful partner on it.

Ms. TSONGAS. Thank you, and I yield back.

Mr. MORIARTY. Thank you.

Ms. BORDALLO. I thank the gentlelady, and now I would like to recognize the gentlelady from New Hampshire, Mrs. Shea-Porter.

Ms. SHEA-PORTER. Thank you, Chairwoman, and Chairman Grijalva, for having this hearing, and I had requested that we look into this because I was so concerned about the impact in the Northeast, in New Hampshire where I live, and where I might not always have appreciated the bats that got into our house when I was growing up—as a matter of fact, I was terrified of them, I am sorry to say—I recognize how important their role is in our environment and what a tragedy this is unfolding, and thank you for your work to highlight this and to try to figure out what is going on.

In order to give these bats the best fighting chance, I know that some types of chemicals and other things in our environment are impacting them as well, is there something we can do while we try to save them from this syndrome to also be working just as vigorously to protect them from certain chemicals and certain other challenges that they have?

Mr. MORIARTY. That is an excellent question. We simply don't know to what extent the existence of those chemicals in the environment is precluding the bats to possibly be affected by this particular fungus. That will be part of the research that we are doing to ensure that. Outside of that I just simply don't know of any mechanism to provide that protection that is necessary, so I think the knowledge about the transmission, how it takes hold and what the triggers might be will be very, very important to answering that question.

Ms. SHEA-PORTER. Are we stepping up the research for say affects of pesticides?

Mr. MORIARTY. That is on the table for us to be investigating. I would like to add that since the chronic-wasting disease has come through, there have been different decision tools that have been put in place that have been very helpful to us, and we use one now called structured decisionmaking, which allows us to better get our scientists together, pose all of these various questions to them in very specific questions, and have them work through them in a way that informs our management priorities and our research priorities. So, there have been upgrades, I would say, since our chronic-wasting disease effort, and it is helping greatly in this effort as well.

Ms. SHEA-PORTER. Is there a public education role here? And also on top of that, I know that we are talking about hundreds of thousands, but would individual bat houses in any way diminish the impact of all of them? Would they offer a bat house?

Mr. MORIARTY. Well, actually, the bat houses are very helpful because they use them in the summertime. The problem that we are having is when they leave the bat houses and go to what we call hibernacula. In the winter, they group together and they gain warmth from their numbers. They are not in the bat houses at that time, but bat houses are very useful for us.

Ms. SHEA-PORTER. Just to help them to continue to survive. The other question I had was, is there any role that we have to fill right now for what they are not able to do because they are dying in such large numbers?

For example, we know that they eat insects, thousands, right, for an hour and they are very effective predators. Is there something that we need to be doing as a society knowing that they are not doing that work right now in order to control any possible problem down the road involving some kinds of insects that are dangerous for mankind?

Mr. MORIARTY. The only control we know of right now in the absence of the bats will be an increased use of pesticides and herbicides.

Ms. SHEA-PORTER. OK, so we are kind of caught in that dilemma knowing it could have an impact on them. We appreciate the research and again I heard my colleagues talk about the funding, and I think this is something that requires as much funding as you think it needs right now and the research has to be focused across several disciplines because this really is incredibly serious. And I thank you again for holding the hearing. I yield back.

Ms. BORDALLO. I thank the gentlelady for her questions, and just to wrap up the first panel here, I think I have just a couple of closing questions to Mr. Moriarty. How will the Department of the Interior address concerns that the composition of the Wind Turbine Advisory Committee is unbalanced to ensure that the impacts of wind projects are minimized on bat populations already ravaged by White-Nose Syndrome?

Mr. MORIARTY. That is a very interesting question, Madam Chairwoman. Did I hear you say that the FACA committee that has been put together is unbalanced?

Ms. BORDALLO. Yes.

Mr. MORIARTY. OK, I am unable to address that. I don't really know myself about that, but I do know that recommendations coming from the committee soon will be used to help us evaluate the projects for siting, for environmental impacts and the like. Hopefully those guidelines will enable us to do a much better job than we are currently able to do because we don't have those guidelines in place. All we are using is some guidelines that we developed in the Northeast many years ago.

Ms. BORDALLO. Right.

Mr. MORIARTY. We will have to include other stressors in all of those guidelines. Those stressors will include climate change, they will include White-Nose Syndrome, they will include other types of wildlife diseases if they in fact are impacted by the turbines. So, that will all be included in the normal evaluation process that the Service does.

Ms. BORDALLO. How soon do you think the committee——

Mr. MORIARTY. That I am not aware of, Madam Chairwoman, right now how soon that will be.

Ms. BORDALLO. No idea at all?

Mr. MORIARTY. Well, I do know it is fairly soon. They have been working——

Ms. BORDALLO. Fairly soon. All right.

Mr. MORIARTY. Yes.

Ms. BORDALLO. I would request that the Committee receives a copy of that.

And in February of last year the Center for Biological Diversity submitted a petition to the Fish and Wildlife Service to immediately stop implementation of any Federal projects that could affect bats, re-initiate formal consultations under Section 7 of the Endangered Species Act and close bat hibernation sites to the public. Now, the petition also calls upon Fish and Wildlife to allocate additional funding for research and remedial action.

What is the status of that petition?

Mr. MORIARTY. Madam Chairwoman, I am going to have to ask Wendy Weber, my Deputy Regional Director, and who is now the Acting Regional Director in the Northeast Region, to address that, but I would just start out by saying that the petition actually does concern us greatly because if we have to go do what the petition asks for right now, it would divert all of our resources into those actions which we think those resources are much better directed at developing the science and the management expectations that, or the management recommendations that are needed.

But as far as the status of that petition I would have to defer to my Deputy Regional Director. Wendy.

Ms. WEBER. Yes, thank you.

Ms. BORDALLO. Would you identify your name for the record, please?

Ms. WEBER. Oh, I am sorry. Wendy Weber, Fish and Wildlife Service, Northeast Region.

Ms. BORDALLO. Thank you.

Ms. WEBER. We are currently evaluating the population status now so we can make the appropriate decision on how it relates to the Endangered Species Act consultation decisions that we have made, so we are currently looking at population status now and the effect of this.

But complementing what Mr. Moriarty said is that we are at the same time making sure our highest priority—you asked about funding—is being focused at research and mitigation and control and management decisions that need to be made at the same time.

Ms. BORDALLO. Do you have any idea when we will have some answers on that?

Ms. WEBER. We are working on it diligently now with our partners at USGS on population modeling. We hope by the end of the summer we will have some more definitive answers.

Ms. BORDALLO. Good. The end of the summer should be a banner time. Thank you very much.

Ms. WEBER. Thank you.

Ms. BORDALLO. And I thank the first panel, and I would like now to recognize the second panel of this hearing.

Our witnesses on the second panel are: Dr. Merlin D. Tuttle, President and founder, Bat Conservation International; Mr. Scott Darling, Wildlife Biologist, Vermont Fish and Wildlife Department; Mr. Peter Youngbaer, White Nose Syndrome Liaison, National Speleological Society; and Dr. Thomas Kunz, Director of the Center for Ecology and Conservation Biology and Professor of Biology, Boston University.

Good morning, gentlemen, and welcome to the hearing. I would like to welcome first Dr. Tuttle and thank him for appearing before the Subcommittee.

As I mentioned for the previous panel, and I am sure you were here and heard it but I will repeat it, the red timing light on the table will indicate when your time is concluded, but be assured that your full written statement will be entered into the record.

And now, Dr. Tuttle, please proceed.

STATEMENT OF MERLIN D. TUTTLE, Ph.D., PRESIDENT AND FOUNDER, BAT CONSERVATION INTERNATIONAL

Mr. TUTTLE. Chairwoman Bordallo, Chairman Grijalva, and Ranking Members Bishop and Cassidy, thank you very much for holding this hearing and for inviting me to testify.

My name, again, is Merlin Tuttle. I am the founder and President Emeritus of Bat Conservation International. I studied bats for 50 years and have headed Bat Conservation International's worldwide conservation efforts for 27 years. Never in my wildest imagination had I dreamed of anything that could pose this serious a threat to America's bats.

As Messrs. Holtrop and Moriarty have already pointed out, and as our Chairwoman has emphasized, this is a very serious issue. We don't need to go into all the details again. It probably is the most serious threat to American wildlife of the past century.

If I could have a slide. I need a slide. OK, if we look here, from the epicenter in New York this spread in just two winters to almost all the Northeastern United States, and then last winter it spread all the way down to southern Virginia, and north into Canada.

Over here—I hope everybody can see this—a little bit farther to the west in Tennessee, Kentucky and Alabama, we have the largest bat hibernating caves known probably in the world, certainly in the United States, and these contain two of our most endangered species; 95 percent the endangered Indiana bats up in this area; probably 100 percent of endangered grey bats down in here. It is very reasonable to expect that within the next three years or less these key populations will be directly threatened by White-Nose Syndrome. I suspect that it will cover the whole eastern U.S. within four years and spread to the West Coast within five or six years.

This is the most alarming event in the lifetime of a person who has devoted his life to recovering these populations. We have successfully recovered literally millions of endangered bats only now to face losing them.

Last week we hosted—Bat Conservation International hosted in Austin, Texas, a group of preeminent, the most relevant scientists in America to this issue, and these scientists reached consensus on the following three points:

If not slowed or stopped, more than a quarter of the United States 46 species may have to be listed as endangered by the Federal government. As has already been stated, some of our most widespread and abundant species may literally become extinct.

Two, unstopped, as we have already heard, this is serious, potentially irreversible in terms of its harm to the environment and economy.

Number three, we urgently need a comprehensive national research program to identify underlying causes and develop sound management solutions.

To date, Federal and state agencies and private NGO's have done a really good job in terms of what they have had to work with. They have striven diligently, but they are being overwhelmed by the scope and the rapid spread of something totally unexpected. They are also hampered by a woeful lack of funding for the necessary research. We need supplemental emergency funding, perhaps through the stimulus bill, it is needed immediately. We cannot afford red tape delays.

Minus solid research, any attempted management could prove futile and even counterproductive. This is a case in which an ounce of prevention is probably worth tons of cure.

I appreciate your concern, your interest in helping, and I look forward to your questions. Thank you.

[The prepared statement of Mr. Tuttle follows:]

Statement of Merlin D. Tuttle, Ph.D., Founder and President Emeritus, Bat Conservation International

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 to100 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 alarmingly [1]. 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 extinctions [2].

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.

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 char-

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[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. U.S. 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.

[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.

acteristic 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 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 WNS[6]. 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 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%

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[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.

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

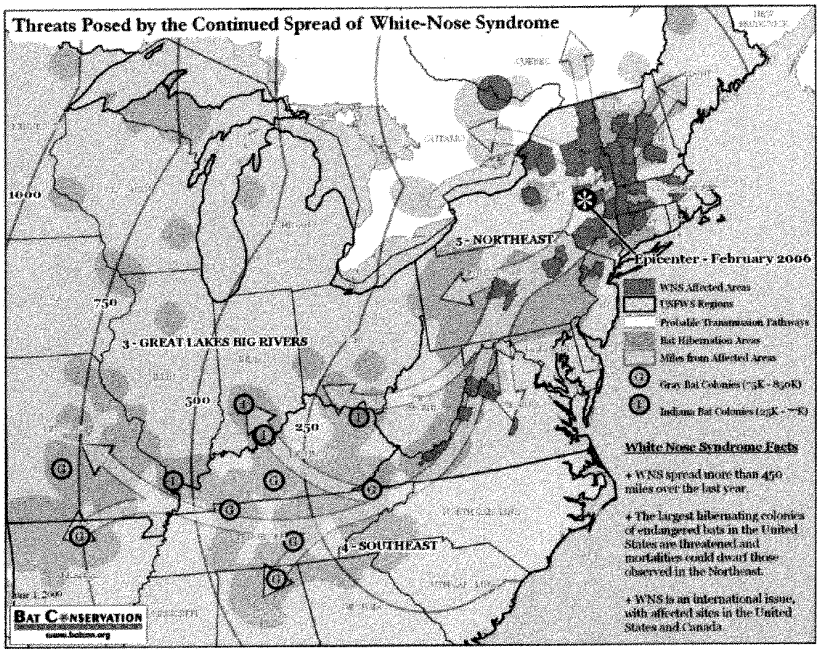
Our position is best summarized through a consensus statement developed by the group of prominent scientists and wildlife managers who met on May 27-28, 2009 at the second WNS Science Strategy meeting in Austin, Texas.

> "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.



Response to questions submitted for the record by Dr. Merlin D. Tuttle

Questions from Ranking Republican Member Henry E. Brown, Jr. (R-SC)

(1) Mr. Tuttle, you have been studying bats for 50 years. Have bats ever faced a crisis like the White-nose syndrome?

No. This is exceeding anything I ever could have dreamed of.

(2) If we are unable to stop the spread of this disease, what catastrophic impacts are we likely to experience?

Like birds by day, bats consume the vast numbers of insects that fly at night, including pests that cost farmers and foresters billions of dollars in annual losses, but few studies have measured exact impacts. Tom Kunz, based on his published research, estimated that just one bat species, in the Texas Winter Garden area alone, saves cotton growers approximately three-quarters of a million dollars annually, some years up to 1.7 million dollars in avoided pesticide spraying. That doesn't even include the region's other crops that also benefit. He also documented that the approximately one million bats already lost in the Northeast, would have consumed 1.39 million pounds of insects annually. In a study published in the April 4, 2008 issue of Science, Dr. Kim Williams et al., reported that bats significantly limited insects in the agroforestry system they studied and emphasized the need for further research on bat impacts. They concluded that "Declining bat populations may compromise critical ecosystem services, making an understanding of their conservation status vital." There is much we still do not know about bat impacts, but what we do know suggests that the massive losses we anticipate, if WNS is not stopped, could seriously threaten ecosystem balance as well as human economies, potentially irreversibly.

(3) What do you think is the cause of this disease and why do you believe it has become more deadly over time?

Available evidence points to a newly introduced fungus, but that has yet to be scientifically confirmed. Attempts to manage this affliction without first documenting its cause and mode of transmission through sound research, could prove useless or even counterproductive. If not funded very soon, even the best research could be too late to make a difference.

(4) Mr. Tittle, you mentioned the seasonal effects of the disease. What happens to WNS in the summer months?

Currently available evidence indicates that this fungus becomes inactive at higher summer temperatures, resuming growth only when bats reenter hibernation in winter. Infected bats have been shown to arouse too frequently, burning excessive amounts of fat, making it impossible to survive till food again becomes available in spring.

(5) You mentioned that Bat Conservation International has spent $125,000 for emergency research into the causes of the White-nose syndrome. What have you learned from these efforts?

Part of those funds were spend organizing strategic planning sessions where scientists developed consensus on needed research. The remainder were spread across several projects. Early results from these have documented the consistent presence of a unique fungal species on infected bats, that bats are arriving at hibernation caves with fat reserves sufficient to survive winter, and that too frequent arousals are depleting fat prematurely, leading to starvation before spring. We are partnering with other organizations to accomplish this. Without our help, several key projects leading to the above cited knowledge breakthroughs, likely would not have been possible last winter. Some of our funds also are being used to develop automated counting devices to more actively monitor population trends in infected caves/mines without causing stressful disturbance. What we have provided, though significant, is just a tiny fraction of what is needed if we are to find solutions before this rapidly spreading affliction does potentially irreparable harm.

(6) Is it your belief that even if bats survive their initial exposure to the White-nose syndrome that it destroys their immune system to the point that their long term survival is in serious jeopardy?

In areas where bats have been infected for multiple winters, very few remain, and we cannot confirm that even those are yet immune. The fact that, so far, mortality has worsened with each passing winter at infected locations is not encouraging.

(7) Do you agree with the testimony of Mr. Youngbaer that "There is no proof to date, or studies to establish proof" of human transmission of the White-nose syndrome?

I do agree with Mr. Youngbaer. It is certainly possible that human transmission can occur and may be important in enabling long distance jumps in distribution, but I am unaware of supporting evidence. Until we learn more about modes of transmission, prudence is justified, but I won't be surprised to see evidence emerging that supports at least the lifting of some local restrictions. Available evidence suggests that bat-to-bat transmission is by far the greatest source of spread. It is prudent to be careful, but if all humans became extinct tomorrow, WNS likely would continue its rapid spread. There is need for national coordination so that whatever restrictions are imposed are appropriate to available knowledge and are uniformly enforced to maximize effectiveness.

(8) Since in most cases the image that most Americans have about bats is based on misinformation, why should the American people care about the plight of various bat species in this country?

Because, like bats or not, they provide irreplaceable ecological and economic services that we very much need. Fewer bats mean more pesticide costs, to farmers and foresters as well as heightened threats to human health.

Ms. BORDALLO. Thank you very much, Dr. Tuttle, for your comments and for your organization's commitment to bat conservation.

And I would now like to recognize Dr. Darling to offer his testimony. Thank you for joining us.

STATEMENT OF SCOTT DARLING, WILDLIFE BIOLOGIST, VERMONT FISH AND WILDLIFE DEPARTMENT

Mr. DARLING. Thank you, Mr. Chairman and Madam Chairwoman and the Subcommittee members for this opportunity to come before you to testify on this critical environmental issue of national import.

My name is Scott Darling. I am a wildlife biologist for the Vermont Fish and Wildlife Department, and my testimony is also supported by the Association of Fish and Wildlife Agencies.

Vermont's experience with White-Nose Syndrome began in January 2008 when a recreational caver photographed a bat exhibiting a white fungus in a cave in southwestern Vermont. The next four months can only be described as a triage response of cave surveillance, specimen collection, multi-agency coordination, and outreach to the public and media.

As the winter progressed, bats afflicted with White-Nose were being observed flying out of caves and landing on peoples' residences, driveways and snow-covered lawns. Residents living within miles of caves arrived home from work to find dozens of dead or dying bats on or inside their homes.

May I please have the slide show?

One site, Aeolus Cave in Dorset, Vermont, now serves as the poster child of the effects of White-Nose on a bat population. In the winters of 2008 and 2009, Aeolus Cave quickly became a morgue. Our observations, as shown in this slide, documented bats freezing to death in clusters just outside the cave entrance. Most other bats flew out of the cave, onto the landscape to certain death. Those that could not take flight or dare risk Vermont's freezing winter temperature dropped to the cave floor.

Next slide, please. In 2008, the mortality was such that the mere stench of the carcasses precluded further surveillance inside the

cave. This slide shows the extent of the bat carcasses littering the cave floor in 2009.

Next slide. I estimate that between 10 and 20 thousand dead bats in this one cave chamber. Total mortality at Aeolus Cave must be in the hundreds of thousands.

Next slide, please. Our final act at Aeolus Cave was to salvage 500 specimens off of the cave floor to be archived at the American Museum of Natural History in New York. Thank you.

Small sites where complete counts of hibernating bats can be conducted provide sobering data showing declines of 95 percent of the cave's bat population. All of the major hibernates in Vermont are infected now, including the two largest in New England. I estimated that Vermont has lost as many as 400,000 bats in the last two years.

State fish and wildlife agencies play a crucial role in front-line activities to combat WNS. However, bat conservation programs are typically conducted by less than one full-time staff position. State agency budgets, hiring constraints and matching requirements of Federal funds preclude adequate state involvement at this time.

State fish and wildlife agencies concur that the Fish and Wildlife Service should play a leadership role in coordinating a national response to WNS. WNS is no longer just a regional issue. The FWS and the USGS are the appropriate arms of the Department of the Interior to oversee this task. One or both of the agencies should assign a national coordinator to oversee the development and implementation of the national plan.

The need for Federal action can be organized into three separate components:

First, the Fish and Wildlife Service and USGS must be provided the funding and staffing to coordinate the national plan. They cannot continue to patch together a framework from existing personnel.

Second, an infusion of additional Federal dollars to WNS research, surveillance and management is critical. A supplemental budget appropriation and increases in DOI's 2010 budget and beyond are needed.

Third, the Fish and Wildlife Service needs the authority to implement or encourage necessary surveillance and containment measures at privately owned caves, outbreak surveillance, collection of infected bats, decontamination or cave quarantines are critical potential management tools not available to state or Federal agencies at this time.

In closing, in my 27 years in this profession I never could have imagined such a dramatic and swift decimation of a suite of species of wildlife. Much of the country, however, is at a tipping point watching to see if we can muster together the energy, the resources and the public will to address this environmental crisis.

Thank you.

[The prepared statement of Mr. Darling follows:]

Statement of Scott R. Darling, on behalf of the Vermont Fish and Wildlife Department

Thank you, Chairman Grijalva and Chairwoman Bordallo, and Subcommittee Members for the opportunity to come before the subcommittees to testify on this critical environmental issue of increasing national import. My name is Scott Dar-

ling, certified wildlife biologist for the Vermont Fish and Wildlife Department. I have served in several capacities towards the Department's mission of wildlife conservation and management during my 27-year career with the organization, including big game species management, wildlife habitat management, wildlife division director, and management of endangered species such as the Indiana bat. I come before you today representing the Vermont Fish and Wildlife Department, my experience serving as its sole bat expert, and my personal response to witnessing firsthand the devastation of a critical suite of species for which so many of us have worked so hard to conserve. My testimony has also been reviewed and is supported by the Association of Fish and Wildlife Agencies (AFWA). I will share with you the current threats and challenges that the Vermont Fish and Wildlife Department is confronted with because of White-Nose Syndrome (WNS), and I will also offer the shared perspective of the challenges before other state fish and wildlife agencies as this crisis unfolds across the country.

Understanding the role of state fish and wildlife agencies in addressing WNS is essential to working toward a comprehensive, collaborative resolution to the crisis. Unless otherwise federally listed, the conservation of all bat species is the authority and responsibility of state fish and wildlife agencies. For example, of Vermont's nine species of bats, only the federally endangered Indiana bat is eligible for federal protection and oversight. The remaining eight species are the sole authority of the Vermont Fish and Wildlife Department. The separation of state and federal authorities is appropriate under most conservation efforts; however, such distinctions add complexity for species such as bats that migrate across state boundaries, if not regions, and for highly infectious wildlife diseases such as WNS that can sweep across the country in a matter of a few years. While this scenario is relatively new in the wildlife conservation field, recent threats such as Chronic Wasting Disease (CWD), Avian Influenza Virus, and the chytrid fungus affecting amphibians both nationally and globally suggest that WNS is yet another chapter, albeit more dramatic, in the increasing complexity of today's wildlife conservation issues.

Vermont's Experience with White-Nose Syndrome

In the winter of 2007, Allan Hicks, a veteran New York Department of Environmental Conservation (DEC) biologist distributed what is now the most widely published picture of a cluster of eight hibernating little brown bats, each exhibiting a white substance surrounding their muzzles. His inquiry asking bat experts if they had ever observed such a phenomenon yielded no results. Ensuing observations of extensive bat mortality at caves in the Albany, New York region heightened concerns over this discovery of unknown significance.

On Sunday night, January 21, 2008, this New York DEC biologist called me at home, saying, "This is a phone call you will wish you never got." He advised me that a recreational caver (i.e., spelunker) had just photographed the very same white substance on the nose of a bat in a cave in Mt. Tabor, Vermont. This is the date that a successful bat conservation program in Vermont turned into an environmental crisis for the state.

Little did I know that WNS had already spread to several caves in southern Vermont. The next four months can only be described as a triage response of surveillance of caves and mines across the state, specimen collection for cooperating labs such as the USGS National Wildlife Health Center, multi-state and federal coordination as WNS quickly expanded into Massachusetts and Connecticut, and outreach to Vermont's recreational caving community, the general public, and the media. The desperate need for surveillance was weighed against concerns of potential, unknown human health risks and the prospects that we, ourselves could be contributing to the spread of the disease by moving from site to site or by making the bats more vulnerable to the deadly disease by disturbing their hibernation patterns.

Unexpectedly, hibernating bats afflicted with WNS were being observed flying out of caves and mines in the middle of the winter and landing on people's residences, driveways, and lawns. The animal's evolutionary adaptation that has allowed it to survive Vermont's harsh winter weather, with its deep snows and sub-freezing temperatures, no longer applied. Residents living near caves and mines arrived home from work with a few to dozens of dead or dying bats on or inside their homes. The Vermont Fish and Wildlife Department and the Vermont Health Department viewed these events as significant potential rabies exposures requiring immediate public outreach and response. We established a hot-line with the Animal and Plant Health Inspection Service's (APHIS) Wildlife Services Program in Vermont to take phone calls to screen rabies exposures, track dying bats, and notify the Department of opportunities to collect specimens for lab analyses. Additional citizen calls to my direct line ranged from 10 to 30 per day. By the end of June, 2008, citizen reports

had been submitted from across two-thirds of Vermont. In 2009, the Department was able to relieve itself of a majority of the citizen response work by establishing an on-line reporting form and database to handle the more than 600 submissions to date.

We had anticipated that bats surviving the winter hibernation season (November through mid-April in Vermont) would have ready access to insects for food and would regain their body weight and healthy condition. However, bats captured in May and June exhibited significant necrosis of their wing tissue. Consequently, many of these bats continued to die on the landscape well into the summer.

In all, after four months of tireless work, assistance from the over-extended U.S. Fish and Wildlife Service (USFWS) New England Field Office endangered species biologist, and handcuffing shared and temporary Department staff to assist in the surveillance, the Vermont Fish and Wildlife Department had expended every remaining dollar in its $50,000 State Wildlife Grant for bat conservation. Additional surveillance work would have required 100% state funding and the money simply was not there. White-Nose Syndrome surveillance halted in Vermont until a cooperative agreement using the USFWS Extinction Prevention grant funds was made available.

WNS Impacts to Vermont's Bat Populations

Initial estimates of bat mortality from four WNS-affected caves in New York ranged from 81% to 97% mortality over a two-year period. Such estimates highlighted the significance of this threat, but many scientists, myself included, could not fathom the ability for any pathogen to sweep so rapidly and thoroughly through a wildlife population in its natural habitat.

Vermont's surveillance work during the winter of 2008 indicated that WNS had afflicted four large bat hibernacula in the state. Citizen reports of bat observations across the landscape along with Department surveillance of observed mortality at these sites indicated that a large number of bats would die from that year's affliction.

One site, Aeolus Cave in Dorset, Vermont now serves as the poster-child for the effects of WNS on a bat population. Although only a fraction of this cave is accessible to researchers, the large chamber at its entrance has been studied since the 1930's and research in the 1960's documented the significance of this cave to the region's bat population. Band returns from this work indicated that thousands of bats hibernating at Aeolus Cave every winter migrate out to their summer maternity colonies in New York, New Hampshire, Massachusetts, Connecticut, and Rhode Island. Simply put, Aeolus Cave has served as winter refuge for many of the bats in the entire New England region for the past 10,000 years.

In the winters of 2008 and 2009, Aeolus Cave quickly became a morgue. Surveillance reports, photographs (see Attachment), and video footage documented bats freezing to death in clusters just outside the cave entrance, streaming out of the cave all winter long and, if they did not cling to the trees outside the cave or flop onto the snow-covered ground, flying out onto the landscape, perhaps in response to their instincts to return to summer colony sites. Those that could not take flight or dare risk Vermont's freezing winter temperatures dropped to the cave floor. In 2008, the mortality was such that the mere stench of the carcasses precluded surveillance inside the cave entrance. In 2009, I estimate the number of carcasses littering the cave floor to between 10 and 20 thousand. Total mortality at Aeolus Cave must be in the hundreds of thousands. I fear that the final measure of the biological significance of Aeolus Cave now lies in the 500 little brown bat specimens that we picked off the cave floor and shipped to be archived at the American Museum of Natural History in New York.

Despite the grave situation at Aeolus Cave, the true impacts of WNS might best be quantified from surveillance efforts at some of the smaller, better accessible caves and mines where complete bat counts can be conducted. One research site in Vermont, Greeley Mine on the Green Mountain National Forest, is a gated abandoned talc mine that has been surveyed for bats for the past 20 years. Consistently this site overwinters over 1000 hibernating bats. This site, now infected with WNS, declined to 615 bats in November 2008 and to just 33 bats in March 2009—a decline of 95% of the population. Of the remaining 33 bats, all exhibited the fungus and a few of which were euthanized merely to put an end to their suffering. This very same scenario played out at other sites in New York and Massachusetts.

At this time, Vermont has observed only four of its 30 known bat hibernacula that appear not to be affected with WNS. All of the major bat hibernacula in Vermont are now infected. We also now know that six of Vermont's nine species of bats are susceptible to the effects of WNS. I estimate that Vermont has lost as many as 400,000 bats the past two winters. While Vermonters continue to report observa-

tions of live bats, far more numerous are reports of declines in the number of bats in a barn, bat house, or flying around the deck at night. Night-time bat capture surveys using mist-nets now being conducted in Vermont are capturing one to two bats per night at sites that typically would have caught an average of five to ten. This past weekend, biologists returned to an earlier survey site and captured only one bat—the same bat captured and banded a few nights before. More research is being conducted to quantify the changes in bat populations, but the initial evidence is bleak.

Perhaps more troubling is the reality that the very low reproductive rate of bats (i.e., a single pup born to a female each year) precludes their ability to rebound from a drastic event like WNS. Bats cannot produce the numbers of young like birds, rodents, or amphibians. Because of this, I fear that the next generation of Vermonters will never see bats, as we have, in their lifetime.

Vermont, like an increasing number of states, is experiencing this environmental crisis first-hand. We are the beginning of this ecological experiment on the importance of parts of an ecosystem to the whole.

State Fish and Wildlife Agency Response to WNS

My testimony is greatly informed by the experiences of the Vermont Fish and Wildlife Department in its effort to address WNS in our state. However; my direct working relationships with other state fish and wildlife agency biologists working on WNS provide a broader perspective on state fish and wildlife agency responses, responsibilities, and capabilities.

It is the state fish and wildlife agencies that provide on-the-ground local knowledge of bat populations, historic survey results, locations of caves and mines where bats hibernate, and information on key summer colony habitat. State fish and wildlife agencies are often the most credible, familiar voice in providing public outreach and education. In addition, state wildlife biologists play a role in implementing or assisting in much of the research activities associated with WNS. Therefore, any strategies to contain WNS or slow its progression across the country will require an increased level of effort from state fish and wildlife agencies.

I am hopeful that Vermont's brief history with WNS provides an example of the activities and demands needed to respond to the crisis once it enters a state. From New York to Virginia to Wisconsin, state fish and wildlife biologists are deeply entrenched in the battle to confront WNS. Like Vermont, most state bat conservation programs are conducted by a total of less than one full-time equivalent staff position. These biologists have numerous other duties and species that they oversee. Their ability to adequately respond to immediate, unanticipated crises such as WNS is severely limited by staffing, funding, and at times, simply the hours in a day. In addition, many state fish and wildlife agencies do not staff their own wildlife veterinarian or have access to a state or university disease laboratory.

Currently, state fish and wildlife agency WNS-related activities extend across the full range of responsibilities, including:

- monitoring caves and mines for WNS symptoms
- monitoring the progression of the disease where confirmed
- collecting specimens for lab analyses
- participating in priority research at WNS-affected states and control sites such as studying arousal patterns of hibernating bats, body fat composition, immune systems
- conducting pre and post-WNS monitoring of bat populations
- outreach and coordination with the caving community
- outreach and educating of citizens about WNS
- outreach to media

As WNS now threatens bat populations in the southeastern and central United States, the role of state fish and wildlife agencies will be expanded to include participation in activities designed to contain WNS or, more likely, slow its spread from region to region. This will require a much greater ability to respond swiftly and decisively to try and contain the disease to new sites and to preclude the potential for human transmission to additional sites. The staffing and funding necessary to respond in this manner is not currently available.

Lastly, after WNS marches through states such as Vermont, it is highly likely that state fish and wildlife agencies will be working in concert with federal agencies such as the USFWS to work toward the slow, but essential recovery of bat populations. Many of the bat species once common may very well become state or federally listed as threatened or endangered. Let us not repeat this process across the nation.

Coordinating a National Response to WNS

May I first commend the USFWS for stepping up to the plate and taking on WNS coordination responsibilities when that niche was clearly needed. In particular, their regional staff in the New England and New York field offices were instrumental in such critical components as multi-state coordination, the development of WNS protocols, and assistance in conducting WNS surveillance. USGS staff at the National Wildlife Health Center in Madison, Wisconsin also availed their expertise, their lab, and themselves in the race to determine what was killing the bats.

Given the rapidity at which WNS has spread from New York to Virginia in the past three winters, the responsiveness of state, federal, academic, and non-profit agencies/organizations has been nothing short of superb. Unfortunately, it is not enough.

We need to improve our coordination efforts to be more decisive and responsive. To date, over 50 organizations are involved in determining the cause, monitoring the disease's progression, and attempting to contain the effects of WNS. This level of coordination is extremely complex and cannot be successfully conducted using existing federal staff maintaining additional non-related duties.

State fish and wildlife agencies involved in WNS concur that the USFWS should play a leadership role in coordinating a national response to WNS. WNS is no longer just a regional issue. The USFWS, in concert with its sister agency, the USGS, are the appropriate management and research arms of the Department of Interior to oversee this task. Furthermore, the level of coordination, commitment, access to expertise, and responsiveness warranted for WNS is very likely similar to what has been or will be needed to address future highly infectious wildlife diseases in this country.

One or both of the agencies should assign a national coordinator to oversee the rapid development and orderly implementation of a national plan to address WNS. The national coordinator position(s) must be beholden to the priorities of the national plan, and not to any particular department, program, or region. A national plan must provide for the opportunity for significant participation, review, and comment by state fish and wildlife agencies, academic institutions, and disease experts and laboratories. The 2006 Plan for Assisting States, Federal Agencies, and Tribes in Managing Chronic Wasting Disease in Wild and Captive Cervids can serve as a model for organizing the effort using a task force of state, federal, academic, and non-profit representatives to approve a plan, portions of which can be developed by working groups. This CWD plan allows the federal agencies to provide the tools and financial assistance to states to implement consensus-based strategies. Given the state of our knowledge about WNS; however, the plan must be flexible enough to readily accommodate new information and hypotheses. This planning exercise must be expedited in order to be ready for 2010.

Like all federal agencies, the USFWS is procedurally constrained by Federal Advisory Committee Act (FACA) requirements that impede its ability to accept recommendations from outside entities such as states, academic institutions, and non-profit organizations. While a structure or process that is compatible with FACA requirements is necessary, in my opinion, developing a centrally coordinated effort led by the USFWS that provides for adequate input from state fish and wildlife agencies, participation by individuals or agencies representing a full array of expertise, and the promotion of consensus opinions on priority research and activities is imperative to a well-coordinated effort. A more formalized structure needs to be put in place that allows for a centralized decision-making entity representing those partnerships. We can no longer continue to coordinate efforts through conference calls of 25 to 50 participants. In the case of WNS, the importance of decisiveness and responsiveness in implementing a national plan cannot be understated.

Federal Actions to Address WNS

The need for federal action can be organized into three separate components. First, the USFWS and the USGS must be provided the funding and the staffing to coordinate the development and implementation of a national plan to address WNS. Inherent in this task is the need to establish a structure that provides for state fish and wildlife agency and other expert opinions and recommendations into the product. The implications of WNS are far too serious, rapid, and complex to continue to patch together a coordinated framework of existing personnel. Requiring the National Wildlife Health Center's existing limited personnel to serve as the lead federal agency directing WNS lab testing, analyses, and reporting has never been adequate. Funds and hiring authority are essential to both the USFWS and the USGS if we are to take WNS head-on. Hiring practices that consume nearly a year to complete are futile.

Second, an infusion of federal dollars to WNS research, surveillance, and management is critical. Bats could not have picked a worse time to fall victim to an infectious disease. Not unlike this nation's deep recession, we do not get to choose when a crisis requires our attention and commitment. To date, the USFWS has been very responsive to redirecting existing appropriations and awarding grants such as Extinction Prevention funds and Regional Competitive State Wildlife Grants to WNS research and management. However, taking from other existing programs is no long-term solution. A supplemental budget appropriation and increases in the Department of Interior's FY2010 budget is needed. More long-term, stable funding is a must.

State fish and wildlife agency budgets and hiring constraints are a major limitation to conducting the necessary planning and implementation for WNS. Currently available USFWS federal aid funds such as State Wildlife Grants include 50% match requirements that now preclude most states from seeking new grants to conduct this work or enhancing existing ones. State fiscal constraints are so severe at this time that their respective bat experts cannot receive state-funded approval to travel to meetings to formulate priority strategies, coordinate work, or exchange information on WNS. The current framework of cobbling together portions of federal and state fish and wildlife employees' time to address WNS is unacceptable and doomed to fail.

Because addressing WNS is, in part, a race against time, funding is essential to our ability to respond swiftly to conduct research, test priority hypotheses, conduct surveillance, and implement containment measures. Specifically, funding is needed for:

- National coordination within USFWS and USGS in order to develop the national plan and to organize and coordinate research priorities, response protocols, information exchange, and funding of priority WNS-related activities
- Staffing for the USGS National Wildlife Health Center in order to expedite lab analyses and conduct appropriate tests
- High priority research that ranges from testing the infectious nature of the Geomyces fungus to additional investigations into the broad array of alternative potential causes
- Development of potential captive-propagation programs for vulnerable federally endangered species
- Staffing and implementation of management activities such as surveillance and potential containment work by state and federal agencies
- The implementation of species recovery strategies in those regions where bat populations have been impacted

This crisis requires developing creative means to get people on the ground now. Federal funds directed at establishing inter-agency agreements to hire staff to serve within state fish and wildlife agencies may a suitable alternative in the near term. Such employees would serve as a vital link between state and federal agencies and be able to assist both agencies in their duties. Such employees can also potentially comprise a USFWS response team, albeit much smaller and less formal than what exists within APHIS. This response team could assist state fish and wildlife agencies in containment and surveillance activities as WNS expands its range into the jurisdictions of states having limited resources and experience in responding to WNS.

Third, federal action may be necessary to grant the USFWS the authority to implement necessary surveillance and containment measures on private lands, particularly on privately-owned caves with bats. Actions such as outbreak surveillance, collection and testing of WNS-suspect bats, management of WNS-positive bats, decontamination requirements, or temporary cave quarantines are critical potential management tools that are not necessarily available to state or federal agencies at this time, but have proven to be essential in addressing CWD. Creative and sufficient financial incentives for landowners for such purposes may also be a tool worth developing and funding. The movement of bats across state lines demonstrates the importance of being able to respond to WNS threats decisively and immediately, without which the ramifications extend well beyond individual state borders.

Closing Remarks

It has been stated by some that bats are not particularly popular and are in need of a good marketing agent. I beg to differ. In rural America, people do have a connection to the land and the parts that function as a whole. Vermonters know bats are important, they know they are in trouble, and they know something is terribly wrong. At the end of one of my recent speaking engagements in Manchester, Vermont, an elderly woman raised her hand and said, "Bats have been going to Aeolus Cave for ten thousand years, and now they are all dead. That's not right."

The outpouring of support from Vermonters wishing us success, offering their own theories for the disease, or wanting to donate to the cause are verification that WNS is not just about bats. It is about our responsibility as stewards of the environment.

The time for my professional, tempered response to the significance of the implications of WNS is over. In a matter of two years, I have witnessed the devastation of a bat population my Department had worked so hard to conserve. In my 27 years in this profession, I could never have imagined such a swift and dramatic decimation of an entire suite of species. I dare say, the Green Mountains of Vermont have never witnessed such an event as well.

May I reiterate that the battle against WNS is a race against time. Vermont's role in WNS has quickly shifted to serving as a study site for the role of bats in our ecosystem and the strategies needed to recover the species. Much of the country; however, is at a tipping point, watching to see if we can muster the energy, resources, and public will to address this national environmental crisis.

[NOTE: Attachments have been retained in the Committee's official files.]

Ms. BORDALLO. Thank you, Dr. Darling, for your testimony and your tireless work in Vermont.

Mr. Youngbaer, I invite you to present your testimony.

STATEMENT OF PETER YOUNGBAER, WHITE NOSE SYNDROME LIAISON, NATIONAL SPELEOLOGICAL SOCIETY

Mr. YOUNGBAER. Thank you, Chairwoman Bordallo and Chairman Grijalva, Members of the Subcommittee.

My name is Peter Youngbaer and I am testifying on behalf of the National Speleological Society (NSS) as liaison of White-Nose Syndrome.

Founded in 1941, with nearly 12,000 members in all 50 states and territories, the NSS does more than any other organization to study, explore, and conserve cave and karst resources; protect access to caves; encourage responsible management of caves and their unique environments; and promote responsible caving.

Our members run the gambit from the casual recreational caver to world class explorers, to full-time scientists who work in the areas of geology, hydrology, biology, paleontology, cartography, microbiology, and more. I mention these sciences to make a point: That while White-Nose Syndrome has our focus clearly on bats, we must keep the entire cave resource and cave ecosystem in mind as we plan our science and management responses.

White-Nose Syndrome has hit the NSS and the caving community hard. We own and manage numerous cave preserves across the country, many of them managed as bat hibernacula. Of the first four New York caves where White-Nose was discovered, two are ours.

As White-Nose has spread, the NSS, Cave Conservancy, state and Federal agencies, private landowners have closed caves or issued advisories curtailing cave access, covering more than 30 states and 10 of thousands of caves. The decontamination protocol advisory issued by the U.S. Fish and Wildlife Service is nationwide. Regional, national and international caving events both within and well outside the currently affected region have been canceled or drastically cut back.

While the confirmed bat mortalities associated with White-Nose have only spread to the Virginias, the effects of management decisions are already nationwide.

The NSS has been actively involved in the White-Nose investigation since the beginning. We have assisted in field work, identifying White-Nose sites, collecting samples, surveying bats, assisting with media and public relations, running an active website, working on task forces, attending conferences, and participating in conference calls with the scientists and wildlife managers.

A year ago when the need for immediate research funding was apparent we created a White-Nose Rapid Response Fund. Our members have contributed over $55,000 and funded now five critical research projects, some alone, and others jointly, to help answer priority concerns identified by the science and management communities.

While we have learned some things over the past year and a half, urgent research need immediate response if we are to contain and beat White-Nose. While strongly implicated, we don't know if the fungus is the causal agent or merely taking advantage of bats weakened by something else. We need to know more about how White-Nose is transmitted; more about how the fungus affects bats; whether our decontamination protocols are effective; what can either kill the fungus or help the bats defend it off.

One thing we do know is the caves are delicate ecosystems. They are not just about bats. Many other things live in caves, including other endangered species, some as rare as in only one cave. Water that flows through caves provides not only energy and nutrients to cave dwellers, but is also a source of private and public water supply.

If we move to high risk management strategies, containment strategies such as biological or chemical controls or ceiling sites, what other parts of the caves' ecosystems will we affect? Research to test mitigation strategies must come before widespread application. Science must inform our responses.

In terms of government responses in our view the individuals I have met working with White-Nose have demonstrated extraordinary passion, frequently working outside the constraints of their jobs and funding sources. That said, to most experienced cavers government policy responses have been inconsistent, contradictory, confusing and sometimes counterproductive. Despite that we have complied and helped spread the word. We recognize that closure, including our own, have essentially been prophylactic in nature to buy time for the science to catch up. Now is that time.

We are asking you to recognize White-Nose as a national problem, to support and fund a comprehensive national research effort to address it. Current funding is inadequate and funding mechanisms cumbersome.

Our written testimony contains more details on all of these points. It also includes our policy statement on White-Nose, and a downloadable brochure from our website which we have created to reach out to the general public who comprise the majority of cave visitation, contrary to thinking about organized cavers being the prominent cave visitors. They come to us for advice about safe caving practices. You should also have a copy of our news conservation issue with an extensive article on the chronology of White-Nose and the conservation challenge it presents.

White-Nose is proceeding faster than we are at the moment. We need to change that. Bats have a critical place in our ecosystem. We need bats. Now they need us. Thank you.

[The prepared statement of Mr. Youngbaer follows:]

Statement of Peter Youngbaer, White Nose Syndrome Liaison for the National Speleological Society

Chairman Grijalva, Chairwoman Bordallo, Members of the Subcommittees. Thank you for the opportunity to speak with you today about the national crisis known as White Nose Syndrome or WNS, and to ask for your help in addressing this emergency. It is in honor and a pleasure.

My name is Peter Youngbaer, and I'm here testifying on behalf of the National Speleological Society as its White Nose Syndrome Liaison.

I want to start by telling you a little about the NSS itself and cave conservation generally, the effects to date on our membership, and specifically our deep involvement in addressing the ravages of WNS. I will then address the three specific questions posed in our invitation.

NSS—the organization and our WNS activities

With nearly 12,000 members in all 50 states and 200 local chapters, or grottos, the National Speleological Society does more than any other organization to study, explore, and conserve cave and karst resources; protect access to caves; encourage responsible management of caves and their unique environments; and promote responsible caving.

While WNS has our focus clearly on bats, we must keep the entire cave resource in mind as we plan our science and management responses.

Founded in 1941, we are affiliated with the American Association for the Advancement of Science, and the International Union of Speleology. Conservation is a primary function of the NSS. We have assisted in the protection of numerous bat hibernacula and habitat for other endangered cave species. Our members worked hard to help pass the Federal Cave Resources Protection Act and similar state legislation.

Our members run the gamut from the casual recreational caver to the full time scientist. Our scientists work in the areas of geology, hydrology, biology, paleontology, cartography, microbiology, and more. Members of our Communications and Electronics and Cave Diving Sections have developed many technologies used by industry and the military, including underground communications and other electronic equipment, hydrological, meteorological, and biological instruments, mapping aids, electric lights and battery systems, and underwater gear, including the rebreather. Our photographers have brought the wonders of the underground to the general public. Our explorers have discovered the breadth and depths of some of our National Parks caves, including Carlsbad Caverns and its neighbor Lechuguilla—now over 100 miles—and Mammoth Cave, the world's largest now at over 350 miles.

WNS has hit the NSS, its cave resources, and its membership hard. Cavers noticed the first bat deaths in the winter of 2006-2007, in two caves that we own and manage on our New York Nature Preserves. We were the first to close our caves in response to WNS. This year, bats in our West Virginia John Guilday Nature Preserve caves were found to have WNS, and those caves are now closed. A full chronology and description of the conservation challenges facing the NSS and its members is included in an article I authored in the NSS News publication provided to you with my testimony today. I will not repeat that here.

As the devastation has grown and spread, the NSS, Cave Conservancies, State and Federal agencies, and some private cave owners have closed caves or issued advisories curtailing cave access and recommending decontamination procedures. Caving events well outside the affected region have been cancelled or curtailed. This has caused economic fallout in neighboring communities that support these events with lodging, food, supplies and tourist opportunities.

The effect is both national and international. The USFWS decontamination protocol advisory is nationwide. Cavers in the west are puzzled as to why this affects them. National Cave Rescue Commission organizers are struggling to find a location for their annual intensive weeklong rescue trainings. Professors of cave sciences at our institutions of higher learning are concerned about the interruption of their cave field studies, and their undergraduate and graduate students involved in areas other than the study of bats.

This summer, the NSS is honored to host the 15th International Congress on Speleology in Kerrville, Texas. Nearly 1,400 people from almost 50 countries and vir-

tually every state are registered for the world's premier speleological event, which takes place every four years. The U.S. is the only country to now host two of the Congresses. Pre and post-Congress field camps provide international visitors the opportunity to see some of North America's finest caves and caving regions. Due to WNS, many of these trips have been cancelled or curtailed, and strict management of gear and decontamination protocols have been implemented for the entire event.

While the confirmed bat mortalities associated with WNS have "only" spread to the Virginias, the effects of management decisions on cavers, scientific researchers, other cave and mine visitors, and related economic fallout is already nationwide. All of these speak to the urgency of you acting quickly and comprehensively to address the situation.

The NSS has been actively involved in the WNS investigation since the beginning. Working closely with the NY Department of Environmental Conservation, and later Vermont Fish and Wildlife, we closed our caves and worked to develop a cohesive and collaborative public message. Our members have been particularly active in the northeast in fieldwork helping to determine the geographic extent of WNS, helping with bat counts, and other field work.

In March of 2008, the NSS Board of Governors created the WNS Liaison and appointed me as its WNS Liaison to act as a single point of contact with the emerging science and management effort. As Liaison, I have participated in the major conferences of scientists and wildlife managers, webinars, numerous conference calls, and task forces over the past fifteen months, and communicate information and developments from these venues.

We created an extremely active website at http://www.caves.org/WNS/index.htm. It tracks WNS developments, policies, research, and media coverage, and provides education and outreach tools to our members, the public, and agencies about WNS and how to prevent its spread.

In June of 2008, we helped underwrite the first Science Strategy conference in Albany, NY, and participate in the proceedings. The need for immediate research funding was paramount, and we created a WNS Rapid Response Fund to help. To date we have raised over $55,000 and funded five critical projects.

In April of this year, the NSS Board of Governors adopted a comprehensive WNS Policy Statement, which is attached for your information. In it, we ask our members and grottos to take the lead in reaching out to non-organized and unaffiliated cavers, as they are "out of the loop" in terms of ready mechanisms for communication about WNS. To that end, we created an information brochure that can be downloaded from our website, copied and distributed. It is being used widely, and we were just complimented to receive a request from the National Park Service to use its copy and design for their brochure on WNS. It is also attached for your information.

Indeed, an NSS study in the 1980's estimated that only about 5% of cave visitation is by organized cavers. Camp, scout, church, and other youth groups and outing clubs, plus a host of locals and the general public make up the majority of cave visitors. Many of these individuals seek out local cavers through our grottos to learn about safe caving techniques, basic cave science, and to gain access. These relationships are critical to effective dissemination of WNS information and to the protection not only of bats, but all other cave resources.

Our Views Regarding the Current Scientific Understanding of WNS

Although a new species of fungus is implicated in the massive bat die-offs, we still haven't answered the basic question of whether it is the primary pathogen or an opportunistic one. As outlined in the science strategy priorities last year in Albany, we know the bats are dying of starvation, emerging early from hibernation emaciated and marked by noted physical damage and marked behavioral changes.

In the absence of significant government funding, several of the NSS-funded projects are designed to help get at the answer of why the bats are starving: are they entering hibernation without sufficient quantity or quality of stored fats? Are they consuming more stored energy upon arousal than normal? Are bats affected with WNS immunocompromised? These studies are jointly funded with others, including Bat Conservation International and university funds. While fall and winter sampling is done, laboratory analysis is not complete, and results are not expected until the fall.

The NSS was the sole funder of a massive sediment sampling project, collecting nearly 1000 samples in nearly 30 eastern states, looking to see if the suspect fungus is ubiquitous to the background cave and mine environment. Sampling was coordinated with state and federal biologists already doing the biennial endangered Indiana bat surveys this winter, but dozens of cavers trained in sterile collection protocols, provided additional samples from much more geographically diverse sites.

Analysis of these samples will help determine one of the fundamental questions: is the fungus the cause or a symptom? If the fungus is already present, then something else is happening to allow it to take hold. If it's already present, then efforts to contain it via decontamination and limiting human access to sites may be moot.

The samples are waiting to be analyzed by the USGS National Wildlife Health Center laboratory in Madison, Wisconsin. We have learned that the analysis has been funded by the USFWS, which is good. However, Congress should understand that it took private funding to initiate and carry out the fieldwork in a timely fashion. Without it, we would need to wait another year to even begin the work.

Further, the committees should be aware that the government structure for receiving funds wouldn't work, and that we used a fiscal agent to pass the funds through to accomplish the work.

Other key questions remain about how the fungus is transmitted. While there is general agreement that it is passed bat to bat as the primary method of transmission, we do not know if the caves or mines themselves are infected and can transmit the fungus. Further, while most media stories covering the cave and mine closures include a line about suspected human transmission, there is no proof to date, or studies to establish proof. The lone circumstantial evidence comes from a cave visitation date base that documents some caver movement from WNS affected sites in NY to two newly affected sites in PA and WVA. The same and other cavers have visited numerous other sites in many states—notably WVA, VA, TN, KY, GA, and IN, yet no WNS has been observed in those sites. We do not know if there is an incubation period for the fungus, or if there are other possible transmission mechanisms.

We also don't know if the current decontamination protocols are effective. They take a universal precaution approach. Certainly, they are onerous and inconvenient for caver and field researcher alike. In the case of ropes, webbing, harnesses, and other load-bearing textiles, what may kill or contain the fungus also weakens or destroys the material, rendering it unsafe for use. To that end, the NSS has also funded current research through Northern Kentucky University testing a variety of decontamination techniques on these materials, which will then be stress tested by the manufacturers. This will lead to having both effective and safe protocols that will permit access for bat researchers and cavers alike to multi-level vertical mines and caves.

Much research is also needed into how the fungus itself and how it affects the bats. We don't know how to effectively contain it, kill it, or limit its spread. Can we create a vaccine? Can we identify the characteristics of survivors? Will geographic or other natural barriers become evident as WNS spreads? We simply don't know, but need to know soon.

One of the things we, as cavers, cave scientists, and cave conservationists do know, however, is that caves are delicate ecosystems. While we focus on bats, we must remember that caves are not just about bats. Many other significant and endangered species live in caves, some as rare as in only one cave.

With no light to provide energy to the ecosystem, energy must be brought it through other mechanisms. Bats are a primary, if not the primary mechanism in many caves. Bat guano provides a source of nutrients for many other species of cave life. Other fauna also bring in energy, primarily to the cave "twilight zone."

Water is another primary source of energy and nutrients, but also a source of private and public water, and a critical point to understand in terms of potential WNS mitigation activities under consideration. If we move to high-risk containment strategies, such as fungicides, biological controls, or sealing sites, what other parts of the ecosystem might we affect?

We must do the research to test mitigation strategies thoroughly before widespread application. Science must inform our responses, and this science needs to happen as soon as possible.

Our Views on Current Federal, State, local and private responses to its spread.

Most importantly, let me first state that the people I have met—whether federal, state, private, or higher education-related—have been doing yeoman's work on a primarily ad-hoc basis. Many work outside the constraints of their jobs and funding sources, demonstrating their passion to do what they can to figure out just what WNS is, how it can be stopped, and what we can do to save our bats and their critical place in our ecosystem. They deserve your utmost gratitude, and now your concentrated support.

As mentioned above and in our attachments, initial responses were by private and state entities. Responses grew on an ad hoc basis. While some federal personnel were involved, no real federal organization was evident until October of 2008. Fund-

ing streams and bureaucratic structure were clearly not set up and able to respond in a timely fashion. The State Wildlife Grant (SWG) mechanism is regionally competitive by design. Indeed, the fact that the title of today's hearing reflects a regional problem, rather than the national problem that it is, is telling.

To most experienced cavers, government responses have been inconsistent, contradictory, and at times counter-productive. Current government responses have favored closing caves on public lands to visitation, presumably to retard spreading the fungus by the human vector. While an apparently obvious reaction, the impact on the spread of WNS will likely not be conclusive, because of the numerous other visitations by uninformed or unaffiliated persons as described previously. Decontamination protocols and guidelines for determining what equipment may be contaminated seem arbitrary, overly broad, and sometimes dangerous.

In the private sector, the NSS has responded by closing some of its caves. So, too have numerous related cave conservancies—the Northeastern Cave Conservancy, the Middle Atlantic Karst Conservancy, the West Virginia Cave Conservancy, and the Southeast Cave Conservancy—and The Nature Conservancy on some of its properties.

At the state level and federal level, current government responses vary widely and are confusing to the caving community, and probably other cave and mine visitors, including gemologists, rock hounds, geocachers, and scientists and students study other aspects of caves than bats. For example, the USFWS advisory call for a voluntary moratorium on cave-related activity in a 13-state region. It also calls for nationwide implementation of decontamination protocols. The USFS has closed all its caves and mines in 30 states. Several National Parks have closed some of their caves and either have already adopted or are considering closures well outside the affected region. National River areas within and without the USFWS advisory region have adopted closures. States have taken even a wider variety of steps, all of which is confusing and reads as a lack of coordination.

Cavers knowledgeable of cave morphology and bat usage wonder about many caves covered by the advisories and closures, such as non-bat caves and caves that completely flood. Further, as cave conservationists attempting to protect the entire cave resource, taking the most experienced cavers out of the loop of interfacing with the unorganized public seems counterproductive. Some people will continue to visit caves, increasing the risk of vandalism, destruction of wildlife, and even additional unnecessary rescues.

The decisions to close everything except commercial caves strikes many as political, and not biologically based. Many local NSS Grottos have strong relationships with their local show caves, helping with conservation efforts, public education, exploration and management, promotion, and even cleaning. While we recognize the economic considerations of government and privately owned show caves, good science should drive closure decisions.

We recognize that closure decisions—including our own—have been essentially prophylactic in nature. However, where we go from here needs to be guided by science. Our call to you today is to support a comprehensive national research program to thoroughly research the underlying WNS mechanisms and develop sound management solutions.

Our Views on Needed Federal Actions to Further Comprehend and Contain this Unparalleled Crisis.

We think the first thing that needs to be done is to recognize this is a national, not regional problem. Its impacts are already being felt across the country, and beyond.

We believe a national plan for addressing WNS, with a supporting bureaucratic mechanism in place to coordinate funding and management, is necessary.

Immediate, significant new funding is needed. Others will testify to the appropriate amounts and specific needs, but they are substantial.

We also need to recognize the seasonal nature of bat research—that the hibernation and summer cycles only permit certain types of research during limited windows of time. WNS will continue to be spread quickly by the bats. We need to have a mechanism for quick delivery of significant funding.

While some limited federal funding has been put toward WNS, it has been woefully inadequate. The recently awarded State Wildlife Grant ($940,000 over two years), will be spread among 11-13 states over two years, and do little more than support current staff time for monitoring and surveillance. This is important, but doesn't address the critical research needs described above, and will take a while to actually get into the field.

The letter sent by various Members of Congress to Interior Secretary Salazar requested release of emergency funding. To the extent that is possible in the remain-

ing federal fiscal year, it would be helpful and timely. However, our understanding is that this will take away from other potential uses. New money is needed, perhaps through emergency supplemental legislation.

We strongly believe that funding needs to be directly available to the various entities working on WNS. Currently, the approach has been virtually all through the USFWS. Direct appropriations to the USGS, USFS, and the National Science Foundation—made more readily available to university researchers would be a significant improvement. From our view, it would also ensure a balanced and multi-disciplinary approach, and have more people working more quickly to solve this problem—a key factor.

We need to have the research questions about the fungus, its transmission, and potential treatments answered. How quickly will it or can it spread to the major bat colonies of middle America, and Texas, New Mexico, and beyond. How do we ensure that our management approaches are guided by sound science? How do we ensure that we consider the entirety of cave ecosystems, and the larger environment, with our mitigation strategies?

We also need to recognize the critical public education necessary. One thing we have learned at the NSS is what you think about WNS depends greatly on your vantage point. Those of us who live in the northeast have seen the ravages for several years. The Virginias and Pennsylvania are in the early stages. Those beyond—in Ohio, Indiana, Kentucky, Tennessee, don't know what to expect yet. Those much farther west can do much to prepare—to obtain baseline data on bats and hibernacula that we found lacking when WNS hit in the east.

Time is our enemy. We've enacted preventive closures to allow time for science to catch up. We need significant federal resources now, and they can make a difference. We are along the path to answers in some areas, and the sooner we get them, the more bats and areas of the country we can protect. The sooner we understand successful mitigation strategies, the sooner we can prevent further spread.

None of us wants to see the bat populations decimated and the subsequent dramatic increase in insect populations, which would lead to an increased use of pesticides. The economic and environmental costs would be tremendous.

It's not necessary. If scientists can quickly determine that, indeed, the fungus is the culprit, energies can quickly focus on the remedies.

Conclusion

The National Speleological Society has been proactive in researching the disease and attempting to halt its spread, and we will continue to offer our knowledge and resources as cave explorers, scientists, managers, and conservationists to fighting WNS.

The situation is urgent. We ask for your help in providing immediate and significant funding for WNS research, surveillance, and mitigation. We ask for your help in creating a national plan—a comprehensive national research program—to address WNS. We ask for your help in educating and persuading your colleagues, particularly those who appropriate money, as to the urgency of the need.

We love caves, and we love bats. Others have spoken to the role of bats as voracious insectivores. Bats have also contributed to our knowledge of other sciences and medicine. Bat research has enabled advancements in sonar, vaccine development, blood coagulation, and artificial insemination, just to name a few. We need bats. Now, they need us.

[NOTE: Attachments have been retained in the Committee's official files.]

Response to questions submitted for the record by Peter Youngbaer

Questions from Ranking Republican Member Henry E. Brown, Jr. (R-SC)

(1) Mr. Youngbaer, if you were able to create a vaccine for WNS, how would you effectively administer it to potentially affected bat populations?

Dear Congressman Brown,

First of all, thank you for the opportunity to present to your committee on this important issue.

In terms of how to effectively administer a vaccine, let me couch my response with the caveat that I am, first and foremost, a caver. I am not a scientist, and others are more expertly prepared to respond perhaps more technically to your question.

That said, I have participated in a number of scientific and wildlife management meetings as the White Nose Syndrome Liaison of the National Speleological Society.

I am also directly involved in the ownership and management of a number of caves, including those with WNS-affected bat populations.

Based on what I know about caves—some of them quite immense systems—I would think the most efficient vaccine delivery system would be through the food supply. My understanding from some of the scientific discussions that have occurred is that there is a precedent for an oral rabies vaccine for bats that was administered by treating their food. I'm not sure exactly what the food was, but mealworms are a common item used to rehabilitate bats.

There is also the possibility of an aerial spray at a cave or mine entrance, but that may affect other species, such as birds, who also frequent the entrances of some caves.

In addition to the delivery system, choosing the proper sites must come into consideration. My view is that it is neither practical nor affordable to attempt to vaccinate every bat. Rather, targeting colonies that are endangered or threatened species would be one priority. That is, species protection.

It may also be an effective strategy for WNS containment. By properly identifying the front line of WNS advancement, and understanding the flight and migration limitations of the affected species, bats in a buffer zone could be vaccinated with the aim of halting the spread at that point.

Simultaneous with any vaccination strategy, we must also target research into learning whether any surviving bats in high mortality colonies have any unique genetic or other resistant characteristics, features, or behaviors that are permitting them to survive. We have not had the resources to focus on investigating survivors at this point, but that research is traditional and critical to understanding any resistant members of species and then being able to focus on encouraging those bat populations to grow and rebuild the lost populations.

While vaccination may stop WNS from affecting certain bats, and could also be an effective containment strategy, understanding why and how some bats do survive is perhaps more important long-range.

(2) Mr. Youngbaer, you correctly remind us that many other species, other than bats, live in caves and mines. Have they been impacted by the White-nose syndrome?

To my knowledge, there are no other species that have shown any susceptibility to White Nose Syndrome. After several years now of WNS in caves and mines, and the large number of people—researchers and cavers—who have been in these sites, one would expect any other affected species to have been noted by now. WNS appears to be bat-specific.

Whatever mitigation strategies we end up applying, we do need to keep the health and survivability of the other species that share the cave environment in mind, including, as I mentioned in my testimony, some other rare and endangered species.

Again, thank you very much for the opportunity to testify.

Ms. BORDALLO. Thank you very much, Mr. Youngbaer, for highlighting the national scope of this disease.

And finally, Dr. Kunz, welcome to the Subcommittee and you can begin your testimony.

STATEMENT OF THOMAS KUNZ, Ph.D., DIRECTOR, CENTER FOR ECOLOGY AND CONSERVATION BIOLOGY, PROFESSOR OF BIOLOGY, BOSTON UNIVERSITY

Mr. KUNZ. Thank you. Good morning, Chairwoman Bordallo, Chairman Grijalva, Ranking Member Cassidy and Bishop, and Members of the Subcommittee.

My name is Thomas Kunz. I am Professor of Biology and Director of the Center for Ecology and Conservation Biology at Boston University.

In over 45 years of conducting research on bats in the Northeastern United States and the Midwest and the West, this is one of the most devastating conditions I have ever observed. It is unprecedented in my lifetime and in documented record. We are wit-

nessing one of the most precipitous declines of wildlife in North America.

Today my testimony will address three items. I am going to briefly summarize what we know and what we don't know. We have obviously heard from various speakers today some of this. I will repeat this as sort of the clean-up hitter here. I want to highlight the ecological and economic importance of insectivorous bats, and provide a rough estimate of the amount of Federal funding we believe is needed to address this issue, not only in research but monitoring, and to provide the needed information that managers can make sound decisions.

I want to, first of all, compliment my previous panel members from Federal agencies and non-government organizations. With the limited amount of funding that all of us have had to do the research, it is quite amazing that we have learned quite a bit, and I want to cut to the chase here to tell you a little bit about what we do know. Very brief, this is spelled out more directly in my written testimony.

Obviously, there are unprecedented numbers of bats that have died, ranging from New Hampshire to West Virginia. It is a newly described fungus. We know this. It grows on ears and wing membranes. The fungus grows optimally at five to 14 degrees Celsius. The histopathological studies that have been done demonstrate that the fungus does penetrate the skin of affected bats. They are genetically identical isolates of this fungus collected over a wide range of caves. Hibernating bats have severely depleted fat reserves by mid-winter, and they show low concentrations of what is known as polyunsaturated fatty acids in their diets, and I will come back to that.

They have atypical high frequencies of arousals during winter. Many of them have atypical flight behavior during the winter as we have heard, flying outside in snowy weather. They have a reduced capacity to arouse when their fat reserves are depleted. They have a compromised immune system. They have ulcerated and necrotic and scarred wing membranes, at least those that survived the winter. Preliminary lab studies have indicated or suggested that there is no evidence of contaminants that have at least been examined, and there is no evidence of bacterial or viral pathogens.

Critical research is needed in order to establish the etiology of White-Nose Syndrome, research and monitoring are needed.

What we don't know are the following:

First of all, there are uncertainties in all of these questions. The Geomyces fungus, we don't really know whether it is the primary cause of mortality, and if it is, we don't know the mode of action and how it is killing bats. We don't know the geographic distribution of the fungus. The fungus, if it is not the primary cause of White-Nose, what is it? The secondary manifestation is—there is evidence for that.

Are there pathogens that we haven't identified either affecting directly or indirectly mortality? Are contaminants that we haven't really identified either causing indirect or direct mortality? Causing premature depletion of fat reserves is unclear, and why can't bats mount an effective immune system? And are some individuals

genetically or immunologically resistant to White-Nose? There are others that I won't have time to go into detail here.

We should care about bats as we have heard before. Little brown bat, for example, can eat up to, in one night, 60 medium-sized moths, over a thousand mosquito-sized insects. In one season we are talking about one bat eating up to 10,000 mosquito-sized insects, or I am sorry—10,000 moths or 180,000 mosquito-sized insects, just one bat in one year.

In summary, I just want to say regarding funding needs we have identified 10 major research topics. Research needs are greatest in the first few years. We request appropriation for supplementary funding in the stimulus bill but also request new funding, new appropriations for subsequent years, in Fiscal Year 2010 to 2014.

Our best estimate at this point ranges from about 10 million to 17 million dollars over a five-year period.

Madam Chairwoman and Mr. Chairman, I want to again express my thanks for being invited here. We have a major crisis at our hand. We need to identify the causes and consequences of this critical disease, and I totally support a national plan to address these issues.

Thank you very much.

[The prepared statement of Mr. Kunz follows:]

Statement of Thomas H. Kunz, Professor of Biology and Director of the Center for Ecology and Conservation, Boston University

Introduction

Chairwoman Bordallo, Chairman Grijalva, and Members of the Subcommittees, I am Thomas H. Kunz, Professor of Biology and Director of the Center for Ecology and Conservation Biology, Boston University. Thank you very much for the opportunity to testify concerning White-Nose Syndrome, a devastating disease of hibernating bats that has caused the most precipitous decline of North American wildlife in recorded history.

My testimony will (1) briefly summarize what we know and don't know about White-Nose Syndrome based on research and monitoring over the past three years, (2) highlight the ecological and economic importance of insectivorous bats to healthy ecosystems, and (3) provide an estimate of the amount of federal funding that will be needed over the next 5 years to address unanswered questions in efforts to identify causes and consequences of this emerging wildlife disease so that we can provide critical scientific information needed for making sound management decisions.

Background and Context

In recent years, bats have become increasingly subjected to a variety of anthropogenic perturbations, as they are being exposed to industrial chemicals, water pollution, air pollution, light pollution, habitat alteration, deforestation, and direct impacts of wind energy facilities. Several species of bats threatened by these and other human activities face a growing risk of extinction. In particular, alteration of natural habitats and subsequently replacement by agricultural monocultures and suburban sprawl, introductions of exotic plant species, human disturbances to caves and mines, and recorded decreases in some aerial and aquatic insect species compromise the ability of bats to successfully feed, reproduce, and hibernate.

Throughout the world, bat species provide important ecosystem services by pollinating flowers, dispersing seeds, and consuming insects, thus playing central roles in the maintenance and regeneration of forests and other ecosystems following natural and anthropogenic disturbances. Insectivorous bats, in particular, play critical roles in many ecosystems by suppressing insect populations in both natural and human-altered landscapes.

As we have already learned from others who have testified, White-Nose Syndrome has infected six species of insect-eating bats in the northeastern and southern U.S. (Appendix 1), causing declines approaching 100% in some populations, and 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 the bat species that are federally listed as

endangered in the U.S. Such losses alone are expected to have unprecedented consequences for ecosystem health throughout North America, with potentially extraordinary economic consequences.

Current, Federal, State, Local and Private Responses to the Spread of White-Nose Syndrome

Federal Responses

Federal responses to WNS have been slow, to say the least, not for lack of existing USFWS and USGS staff investing their energies to encourage research and monitoring, and to facilitate and conduct research and monitoring, but largely because of bureaucratic issues relating to the timely release of funds to an emergency situation. One impediment, in particular, to the timely release of funds is the federal requirement for matching non-federal funds, under the State Wildlife Grants Program, before awards can be made. WNS also is issue of national importance and should be on the agenda of other federal funding agencies, such as the National Science Foundation, National Institutes of Health, Department of Defense, and Department of Energy, each of which have a long history of supporting research and monitoring studies of national importance. A reallocation of funds from the existing 2009 FY budget (including funds from the Stimulus Package) would seem prudent, but a new source of funding for research and monitoring on WNS should be allocated starting in FY 2010.

State Responses

State responses to WNS have played an important role in supporting a small amount of research and early monitoring. Most notably, New York State, Vermont, and Pennsylvania, within the region of WNS affected locations in the northeastern U.S., have been the major contributors to research and monitoring, although they have not had sufficient funds to support the type of research and monitoring that is needed in response to early signs of WNS. Due to lack of state funds for travel, many qualified state wildlife biologists were limited in the monitoring work they have been able to accomplish, or to participate in Science Strategy Meetings or other conferences where WNS was on the agenda over the past three years.

Local and Private Responses

By most measures, the rapid responses of non-government agencies and private organizations have made it possible to conduct most of the research that has been conducted to date. Moreover, these resources were used to organize two important Science Strategy Meetings that identified questions, hypotheses, and research needs. At least three international societies—the American Society of Mammalogists and the North American Society for Bat Research—and two international conferences—the International Congress of Speleology (Kerrville, TX) and the International Bat Migration Symposium (Berlin, Germany), over the past two years have organized and sponsored special sessions on WNS.

In response to this developing crisis, two Science Strategy Meetings on White-Nose Syndrome (WNS) have been convened in the past year—the first on June 9-11, 2008, in Albany, New York to identify questions, hypotheses, and research needs related to the increased prevalence and spread of WNS, and another on May 26-27, 2009 in Austin, Texas to review what we know and don't know about WNS, and to identify questions, hypotheses and research needs to address unanswered questions. Both of these meetings were funded largely from non-government sources. Participation in these meetings by state and federal staff were funded by their respective agencies.

Over the past three years, some progress has been made to answer several key questions based on available funding. However, given limited funds available for research and monitoring, and the current rate of spread of WNS since it was first discovered, we can expect this disease in the very near future to advance into regions of the U.S. where some of the largest hibernating bat colonies are known. Many of these hibernating colonies at potential risk are located in southern and mid-western states, and include major populations of three federally listed endangered species, with adverse ecological and economic consequences extending well beyond the northeastern U.S. WNS should be of national concern, and emergency funds should be allocated from federal agencies.

Federal Actions to Further Comprehend and Contain this Unparalleled Crisis

To address the crisis of WNS spreading close to regions of major hibernating colonies in the U.S., at our most recent Science Strategy Meeting this past week in Austin, Texas, the participating scientists made a call to the Federal Government to es-

tablishment a national comprehensive research program to identify underlying mechanisms causing WNS that are needed to develop sound management solutions. With the availability of funding to support needed research, we are staged to move forward with the advantage of hindsight of what we know and the foresight of what we need to know to address this emerging disease.

Current Scientific Understanding of White-Nose Syndrome

What We Know

- Unprecedented numbers of dead bats attributed to WNS have been reported from hibernacula in nine states—ranging from New Hampshire to West Virginia.
- A newly described white fungus (Geomyces sp.) grows on the nose, ears, and wing membranes of bats affected by WNS.
- The fungus associated with WNS grows optimally at temperatures characteristic of most hibernacula—between 5 and 14 C.
- Histopathological studies have demonstrated that this fungus penetrates the skin and wing membranes of bats affected with WNS.
- Genetically identical isolates of this fungus have been collected from affected bats located in widely dispersed hibernacula in the northeastern United States, suggesting that it is a plausible causative agent of WNS.
- Hibernating bats affected by WNS have severely depleted fat reserves by midwinter.
- Hibernating bats affected by WNS show low concentrations of polyunsaturated fatty acids.
- Hibernating bats affected by WNS show atypical high frequencies of arousal from torpor, especially in early winter.
- Hibernating bats affected by WNS exhibit atypical flight behavior during winter and often fly outside hibernacula.
- Hibernating bats affected by WNS have a reduced capacity to arouse from deep torpor after fat reserves have been depleted.
- Hibernating bats affected by WNS show compromised immune responses.
- Bats that survive hibernation often have ulcerated, necrotic and scarred wing membranes.
- Preliminary results suggest that concentrations of chlorinated hydrocarbons, pyrethroids, and heavy metals are not markedly elevated in bats thus far examined, nor have known bacterial or viral pathogens been discovered.

To establish the etiology of WNS and to make sound management decisions, research and monitoring are needed to determine whether this cold-loving fungus is a direct cause or a secondary effect of this devastating disease. The recent spread of WNS to the south and west of the epicenter near Albany, in New York State, poses a severe threat to other hibernating species that form some of the largest colonies of hibernating bats in North America.

What We Don't Know

- Is the newly described cold-loving fungus associated with WNS the primary cause of mortality in hibernating bats? If so, what is the mode of action of the fungus in killing bats?
- What is the geographic distribution of the fungus associated with WNS?
- If the fungus is not the cause of WNS, is this condition a secondary manifestation of other underlying factor or factors? If so, what are these factors?
- Are pathogens (bacteria or viruses) a direct or indirect cause of mortality in bats affected by WNS?
- Are contaminants a direct or indirect cause of WNS related bat mortality?
- What causes the premature depletion of fat reserves in bats affected by WNS?
- Can bats mount affective immune responses to the fungus associated with WNS or to other potential pathogens or contaminants?
- Are some bats genetically or immunologically resistant to WNS and thus can survive infection?
- How does WNS affect bats at maternity colonies?
- What is the mode of transmission of WNS?
- Can we predict geographic limits to the spread of WNS?
- Can we slow or stop the spread of WNS?
- Can we reduce the mortality of bats affected by WNS?
- Can some individuals survive WNS, followed by a subsequent population recovery? If so, can population recovery be facilitated?

Why Should We Care?

Each of the six species of bats that are affected by WNS are obligate insectivores—many of which feed on insect pests of agriculture and garden crops, and at times these may include insect species that pose risks to human health. The enormous number and biomass of insects that would have been eaten annually by the estimated 1 million bats that have since died in the northeastern U.S. emphasizes the extraordinary value of insectivorous bats to the normal function and health of both the terrestrial and aquatic ecosystems in which they feed.

During the warm months of the year, one little brown bat (Myotis lucifugus), a species that has been most affected by WNS, is known to consume insects ranging from one-half to its entire body weight in a single night. Extrapolated to entire colonies and populations, this level of insect consumption provides an important ecosystem service to human kind, which in turn can reduce the use of pesticides often used to kill insects.

For example, assuming that, on average, one little brown bat that weighs 7 grams eats only half its body weight each night (3.5 grams) from April 15 through October 15 (180 nights), this would amount to the consumption of 3.5 grams x 180 nights, or 630 grams of insects annually during these warm months. If we multiply 630 grams of insects that can be consumed by one little brown bat times 1 million bats that have already died from WNS, this would amount to 630,000,000 grams of insects that would not have been eaten by bats. When the latter value is converted from metric to English units, this amounts to about 1,388,912 pounds or 694 tons of insects. This biomass is equivalent to the weight of approximately fifty-six M113 fully-equipped armored personnel carriers, twenty-three M3A3 Bradley fighting vehicles, seventeen fully-loaded 18-wheelers, 6 female blue whales, or 5,555,648 quarter pounders—take your pick for comparison.

The level of nightly consumption by one little brown bat would be equivalent to a 150-pound teenage boy eating approximately 300 quarter-pounders. Translated to the number of insects that would not be eaten by one little brown bat in your backyard on a given night, it amounts to the equivalent of 60 medium-sized moths or over 1,000 mosquito-sized insects. On average, this means that approximately 10,800 medium-sized moths or approximately 180,000 mosquito-sized insects each year would not be eaten by just one bat.

Although no studies have been conducted to assess the ecological or economic impact of insectivorous bats on ecosystem in the northeastern U.S., Cleveland et al. (2006) conducted a study in south-central Texas, and have shown that within an 8 county region, the quantity of insects eaten on an annual basis by an estimated 1.5 million Brazilian free-tailed bats saves farmers an average of $741,000 per year in reduced applications of pesticides needed to control cotton bollworm on cotton crops.

Summary and Conclusions

To date, a handful of university, state, federal laboratories have become engaged in research on WNS—largely funded by non-government organizations. Apart from characterizing the fungus associated with WNS, many questions remain unanswered. For example, although the psychrophilic fungus may turn out to be the "smoking gun," it is unclear whether this syndrome results from various anthropogenic conditions that have reached an environmental threshold. Regardless of whether the cause of WNS is the result of anthropogenic or natural conditions, it has become increasingly clear that emergency funds from the federal government are needed to identify the exact causes and consequences in time to implement mitigation and to prevent its spread to other species and geographic regions.

Many questions remain to be answered. For example, have individuals of some bat species evolved resistance to the causative agent of WNS? Given the extraordinarily slow reproductive rates of most bat species (e.g., typically one or two offspring born each year), can significantly decimated populations recover? Some highly gregarious hibernating species with limited geographic ranges (e.g., Indiana bat, gray bat, Virginia and Ozark big-eared bats) face the threat of extinction in the coming years if WNS continues to spread geographically. Given the important role that insectivorous species play as predators and as prey in balancing the structure and function of temperate ecosystems, what ecological and economic impacts will their loss have on both natural and human altered ecosystems? Urgent attention and concerted efforts by the Federal Government are needed to develop a national plan to support research that will help identify the cause and consequences of WNS, and to mitigate the rapid decline in numbers and anticipated spread throughout the geographic ranges of species at risk.

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Appendix 1. Names of six species of hibernating, cave-dwelling bat species (out of nine) in the northeastern U.S. affected by WNS.

Little brown bat (Myotis lucifugus)
Northern long-eared bat (Myotis septentrionalis)
Small footed bat (Myotis leibii)
Indiana bat (Myotis sodalis)—U.S. Endangered Species
Tricolored bat (Perimyotis subflavus)
Big brown bat (Eptesicus fuscus)

Other hibernating cave-dwelling bat species likely to be affected by WNS if this disease spreads further south and westward from the northeastern U.S.

Gray bat (Myotis grisescens)—U.S. Endangered Species
Virginia big-eared bat (Corynorhinus townsendii virginianus)—U.S. Endangered Species
Ozark big-eared bat (Cornorhinus townsendii ingens)—U.S. Endangered Species

Estimated Funding Needs to Support Research and Mitigation Efforts to Address WNS Related Questions

Research	Year 1	Total
Mechanisms and modes of transmission of *Geomyces* sp.	300,000	1,200,000
Ecology, origins, and distribution of *Geomyces* sp. associated with WNS	400,000	775,000
Sequence genome of *Geomyces* sp.	200,000	400,000
Develop diagnostic tools for *Geomyces* sp.		
Genetic	300,000	300,000
Colorimetric	1,000,000	1,000,000
Evaluate immune responses to pathogens	120,000	600,000
Measure behaviorial and physiological responses to WNS	500,000	1,500,000
Slow and stop spread of WNS	400,000	1,200,000
Geographic surveillance for WNS	400,000	1,200,000
Epidemiology and modeling of WNS	400,000	1,000,000
Communication/meetings (1 group meeting/year)	250,000	1,000,000
Sub Total	**$4,270,000**	**$10,175,000**
Mitigation/Control		
Develop biocontrol/vaccine		6,000,000
Implementation of biocontrol/vaccine		1,000,000
Total		**$17,175,000**

Response to questions submitted for the record by Dr. Thomas Kunz, Director, Center for Ecology and Conservation Biology, Professor of Biology, Boston University, Boston, Massachusetts

Questions from Ranking Republican Member Henry E. Brown, Jr. (R-SC)

(1) How much federal money is now required to effectively address the White-nose syndrome?

Following lengthy discussions with colleagues from academia and state and federal wildlife biologists, we propose a budget of $55,875,000 over a 5-year period (FY10 through FY14). This amount is a minimum estimate of the direct cost needed to address White-Nose Syndrome. This budget only includes budgets for DOI (USFWS and USGS) and NPS. Other agencies that could potentially contribute to this budget include USDA (USFS), DOD, DOE, EPA, NSF, and NIH.

(2) Are we finding the disease in caves or mines that are not exposed to human activity?

This is an excellent question that we are currently addressing with funds provided by the National Speleological Society, in collaboration with USGS (National Wildlife Health Center in Madison, WI). To date, sediment and soil samples have been collected from over 200 caves and mines in the eastern US. Samples are currently being analyzed from these sites, and we hope to have an answer to this question by the end of the summer.

(3) Has the federal government taken sufficient steps to address the serious and growing problem of the White-nose syndrome? What additional steps need to be taken immediately?

USFWS is the primary federal agency that has taken steps to address this growing problem. Over the past 2 years, they have allocated approximately $5 million, mostly for management, with limited funding available for critical research. $950,000 of this amount was allocated for the State Wildlife Grant Program, and was to be distributed to 11 participating states in the northeastern US. However, it is my understanding that these funds are not yet available. Because release of these funds requires matching funds from non-government sources, this severely restricts who will be able to use these funds, and thus extends the time before research and monitoring studies can be conducted. Following the recent joint congressional subcommittee hearing, USFWS announced a funding competition from the FY09 budget, with proposals due July 15, and announcements of awards by September 30, 2009. $800,000 dollars are available through this program, but will not require matching funds.

(4) Should all commercial caves and mines be closed to help stop the spread of this disease and who has the authority to mandate their closure?

I don't believe that all commercial caves and mines should be closed to the public, partly because there are many such structures that do not house either hibernating, transient, or summer colonies of bats. However, I do believe that all caves and mines that house bats at any time of year should be closed to the public until such time as we have a better understanding of how the fungus is transmitted. If the fungus is spread by human activities, cave closure could reduce the likelihood of introducing the fungus to previously unaffected caves and mines. Given that bats most likely spread the fungus, closing caves and mines to human traffic would not stop the spread of the fungus to areas outside its existing range. Authority for closing caves would involve private owners, non-government agencies, and private and federal agencies responsible for their protection and management.

(5) Is the White-nose syndrome the direct result of climate change? If yes, please justify this finding?

In my professional judgment, climate change is not the direct cause of White-nose syndrome. However, climate change, along with other conditions in our environment, such as increased use of potent pesticides throughout the eastern U.S. to control gypsy moths (which bats do not eat), and West Nile virus may compromise the immune system of bats, making them more vulnerable to such exposure. Notwithstanding, climate change may be a factor to which bats may not be able to adapt.

(6) It appears that the White-nose syndrome is similar to a cold-loving fungus found in European countries. In those cases, bats got the disease but are not dying of it. What have we learned from the European experience?

Preliminary studies by European and American scientists suggest that the fungus observed in Europe is very closely related to the recently described Geomyces destructans in the US, suggesting that this fungus may have been introduced near the epicenter of WNS in the vicinity of Albany, NY.

(7) Several witnesses mentioned that the White-nose syndrome has affected six species of insect-eating bats in the Northeastern and Southern U.S. Are there bat species in this region, that have not been affected by the disease and do we know why they have been spared?

To date, six species of insect-eating bats known from six northeastern states (New York, Vermont, New Hampshire, Massachusetts, Connecticut, New Jersey), and three mid-Atlantic states (Pennsylvania, Virginia, and West Virginia) have been affected by White-Nose Syndrome, but to different degrees. The highly gregarious little brown bat has been most severely affected—with losses up to 100% in some hibernacula, and losses ranging from 70 to 100% in some maternity roosts in the

northeastern states. At least two other hibernating bat species—Virginia long-eared bat and gray bat (both listed as endangered and known to be at risk in the mid-Atlantic region)—can be expected to show evidence of WNS in the winter of 2009-2010. One cave in Virginia was identified in the winter of 2008-2009 as having bats with WNS, and it is located within 6 miles of a major gray bat hibernaculum. Given the rate of spread of WNS (ca 200 km per year) from its epicenter in New York State in 2006, we would expect that gray bats and Virginia long-eared will show symptoms of WNS in the winter of 2009-2010. Given the high mobility of flying bats and their tendency to form swarming colonies in early autumn before they enter hibernation, it is likely that WNS will spread rapidly into the South and Mid-West—regions of the U.S. that support major hibernating colonies of Indiana and gray bats, both of which are federally listed endangered species. Three other bats species that have a continental scale distribution—eastern red bat, hoary bat, silver-haired bat—are migratory tree-roosting species that seldom interact with the hibernating species that have been adversely affected by WNS.

Proposed Budget Justification for Research, Surveillance, and Management of White-Nose Syndrome (WNS), FY10-14

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SUBMITTED: JUNE 30, 2009

Determine mode of transmission of *Geomyces destructans*

Funds are needed to establish whether and how and in what form the fungus *Geomyces destructans* is transmitted from bat to bat and from cave to cave. This information is critical for developing sound intervention and/or management strategies.

Document the origin, ecology, and distribution of *Geomyces destructans*

Funds are needed to understand the ecology, origin and distribution of *Geomyces destructans* in North America. This information is essential for understanding where, when, and how this fungus may have been introduced into the US, and how it its spread can be slowed or stopped.

Develop diagnostic tools for field identification of WNS

Funds are needed to develop field-based diagnostic tools for researchers to design reliable experiments with the knowledge that bats either are not or are infected—especially at early stages of infection—and for use by state and federal agency personnel for monitoring the spread of *Geomyces destructans*.

Assessment of immune responses of bats with and without WNS

Funds are needed to compare the immune system of bats that are infected and unaffected by WNS. Thorough knowledge of the immune system of bats is critical for understanding the epidemiology of WNS and also for developing mitigation strategies.

Assess behavioral responses of bats with symptoms WNS

Funds are needed to assess the physiological responses of bats to infections from *Geomyces destructans*. Knowledge of how bats respond behaviorally to infection from white-nose syndrome (e.g. arouse more frequently than normal, emigrate from infected hibernacula, transmit fungal infections socially or by grooming) will be valuable for testing alternative hypotheses for the cause of frequent winter arousals and depletion of fat reserves.

Assess physiological responses of bats with symptoms of WNS

Funds are needed to quantify physiological responses of bats to infections from *Geomyces destructans*, especially during hibernation. It is expected that this knowledge will lead to be better understanding of the underlying causes and consequences of infection from this fungus.

Assess epidemiology of WNS in the US

Funds are needed to develop epidemiological models of bats that have been exposed to *Geomyces destructans*. Information needed for making this assessment includes timing and rates of infection, and rates of spread from single or multiple sites of origin. This information will be needed to effectively manage bat populations affected by WNS.

Assess demographic variables of bat species that are currently affected and unaffected by WNS

Funds are requested to collect demographic variables such as reproductive rates, growth rates, and survival rates of bats that are affected by and not affected by WNS. This information is essential for the development of population models (see below).

Develop demographic population models of bats at risk from WNS

Funds are requested for developing predictive models of species that are affected by WNS and rates of spread among affected species, based on demographic traits. This information is critical for developing sound management strategies.

Identify and develop mitigation and possible biocontrol strategies for managing WNS

Funds are requested to develop and test ecologically sound mitigation and biocontrol methods—including testing use of different decontaminants and for developing a possible vaccine that can be deployed by wildlife managers.

Unknown/unexpected research needs

Contingency funds are requested to cover unexpected research needs that may be identified in the course of ongoing research.

Federal surveillance and monitoring

Funds are needed for federal agencies to protect wildlife by conducting surveillance and monitoring studies of critical hibernacula and summer roosts under their jurisdiction, both within and beyond the current distribution of WNS. This information will be critical for developing and implementing sound management strategies and for advising and assisting researchers on appropriate sites for field-based sampling and research.

State assistance for surveillance and monitoring

Funds are needed for state fish and wildlife agencies to conduct surveillance and monitoring of critical hibernacula and summer roosts, both within and beyond the current distribution of WNS. This information will be critical for developing and implementing sound management strategies and for advising and assisting researchers on appropriate sites for field-based sampling and research.

Coordination and disease management

Funds are requested for state and federal agencies responsible for wildlife diseases to manage these resources to help reduce adverse impacts of WNS on hibernating bats using adaptive management strategies throughout the known and expected range of WNS.

Conferences and communication

These funds will be used to convene one WNS Conference each year and one Webinar meeting each year, and for outreach and communications related to WNS.

Proposed Budget for Research, Surveillance, and Management of White-Nose Syndrome--FY 2010-2014*

FUNDING CATEGORIES	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
Research						
Mode of Fungal Transmission	600,000	150,000	150,000	150,000	150,000	1,200,000
Origin, Ecology and Distribution of Geomyces	600,000	150,000	150,000	150,000	150,000	1,200,000
Development of Diagnostic Tools						
Genetic	300,000	75,000	75,000	75,000	75,000	600,000
Colorimetric	500,000	250,000	75,000	75,000	75,000	975,000
Immune Responses	500,000	250,000	100,000	75,000	75,000	1,000,000
Behavior and Physiology	500,000	250,000	250,000	250,000	250,000	1,500,000
Epidemiology	500,000	200,000	200,000	200,000	200,000	1,300,000
Demography	500,000	200,000	200,000	200,000	200,000	1,300,000
Population Modeling	500,000	250,000	250,000	250,000	250,000	1,500,000
Mitigation and Biocontrol	6,000,000	1,000,000	1,000,000	1,000,000	1,000,000	10,000,000
Unknown/unexpected needs	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	7,500,000
SUBTOTAL (RESEARCH)	**12,000,000**	**4,275,000**	**3,950,000**	**3,925,000**	**3,925,000**	**28,075,000**
Surveillance and Monitoring						
Federal Agencies (USFWS, USGS, USFS, NPS)	2,790,000	2,790,000	2,790,000	2,790,000	2,790,000	13,950,000
State Fish & Wildlife Agencies	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000	6,250,000
SUBTOTAL (SURVEILLANCE)	**4,040,000**	**4,040,000**	**4,040,000**	**4,040,000**	**4,040,000**	**20,200,000**
Coordination and Disease Management						
Federal Agencies	700,000	700,000	700,000	700,000	700,000	3,500,000
State Fish & Wildlife Agencies	750,000	750,000	750,000	750,000	750,000	3,750,000
SUBTOTAL (MANAGEMENT)	**1,450,000**	**1,450,000**	**1,450,000**	**1,450,000**	**1,450,000**	**7,250,000**
Communication and Information Exchange						
Annual Meetings	60,000	60,000	60,000	60,000	60,000	300,000
Communication and Outreach	10,000	10,000	10,000	10,000	10,000	50,000
SUBTOTAL (OTHER)	**70,000**	**70,000**	**70,000**	**70,000**	**70,000**	**350,000**
TOTAL BUDGET NEEDS	**17,560,000**	**9,835,000**	**9,510,000**	**9,485,000**	**9,485,000**	**55,875,000**

Footnotes

*This budget does not include indirect costs, which varies among agencies and academic intitutions from 26-67% of modified direct costs. Modified direct costs includes all project costs except equipment.

Federal agencies who are not represented by this budget: DOE, DOD, EPA, NIH, NSF, USDA

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30-Jun-09

Ms. BORDALLO. Thank you, Dr. Kunz, for your testimony and your continued work in bat research, and I will now recognize myself and members of the Committee for questions that we have for the second panel.

My first question would be to you, Mr. Tuttle. What is your top priority in addressing White-Nose Syndrome?

Mr. TUTTLE. We have to conduct credible research to document clearly that the Geomyces is the primary cause or if something else is, what it is. We have to find out what the mode of transmission is, and then we can look for solutions. So far, we have spent a large amount of money almost exclusively on monitoring and surveillance.

Bat Conservation International takes this extremely seriously in just the first year or so under bad economic conditions we spent more than $125,000 in emergency research. It is critical that we understand what this is, how it is transmitted, and how to solve the problem, and as I said in my testimony, if we don't do that our other efforts at management may be ineffective, could be even counterproductive.

Ms. BORDALLO. Thank you. Thank you very much.

Dr. Darling, your testimony suggests developing creative means of getting people on the ground quickly. Can you please elaborate what exactly you mean by that?

Mr. DARLING. Well, unfortunately, state fish and wildlife agencies in these economic times have hiring constraints that literally

preclude any additional staffing, and what we are finding or what I am witnessing with my peers is, again, a single person with out duties trying to assist in research or be the boots on the ground, and I think there are creative ways where we could look at Federal and state partnerships through avenues where there may be ways that we can have interagency agreements that both agencies can be working together through common personnel distributed throughout the states.

Ms. BORDALLO. All of the witnesses this morning have mentioned the need for funding, and this is definitely something we are going to have to look at, but does anybody here have an estimate of what the funding would be, just a ballpark figure? Dr. Kunz.

Mr. KUNZ. Yes, Madam Chairman. There have been two science strategy meetings held over the last two years and the most recent one was last week in Austin, Texas, where a number of scientists and resource managers met to discuss research topics, and the needs that we felt were appropriate to address these issues, and our best estimate at this point is for over a five-year period ranges from 10 million to 17 million dollars, and this is basically research and monitoring within the area that is currently affected by White-Nose. It does not address the needs for monitoring outside this zone; that is, in the areas where Dr. Tuttle's map shows this could be extended into in the next few years.

Ms. BORDALLO. Very good. And what is the cost? Seventeen?

Mr. KUNZ. Ten to 17 million.

Ms. BORDALLO. Ten to 17 million.

Mr. KUNZ. And I would just add that difference is—range here really is made up by one potential mitigation control measure. There are a number of possible solutions that have been discussed: bio control, vaccines, we talked about using—people have discussed the possibility of spraying fungicides which are probably not realistic based on some of the ideas that Mr. Youngbaer had discussed, but to develop any kind of a vaccine, as many of you know, is not an inexpensive effort, and there are risks involved here because there are not very many vaccines that have been effectively developed against a fungus. Nonetheless, it is probably the most viable mitigation effort that we have.

Ms. BORDALLO. One further question, and I may have some for the second round. Do any of you know, do any bats that have developed this White-Nose Syndrome, do any of them recover?

Mr. KUNZ. Well, White-Nose Syndrome is manifested by a fungus on their face, and fungus on the wing membranes and ears. What we do see evidence of bats that presumably survived White-Nose Syndrome because in the spring of the year and at maternity colonies as they arrive in May and June, many of them have necrotic wings, scarred wings that suggest that they are the survivors.

Now, there are a lot of interesting questions there. They may survive but not be able to reproduce. They may not be able to feed effectively with damaged wings. We have seen wings that are just sloughed off—the major part of the wing membranes in June at maternity colonies with a sloughed off wing, and that is their life blood to the food that then also supports babies.

Ms. BORDALLO. Thank you. Thank you very much.

I would like now to recognize the Ranking Member, Mr. Cassidy.

Mr. CASSIDY. I guess my questions will probably be to Dr. Tuttle and Dr. Kunz. For all of you, I admire your passions and you have done a good job of convincing me of the importance of this issue.

It is unclear when these birds are falling into the ground, is that because of disruption of their wings or is that because of a neurologic issue?

Mr. KUNZ. Well, there is no evidence right now that neurologically they are affected.

Mr. CASSIDY. Except they are slow to awaken from their torpor and so——

Mr. KUNZ. Yes. This has to do with the amount and kind of fat they have. There are two kinds of fat. I mean, well, bats have basically three kinds of fat. White fat, which is depot fat, brown fat, and of the white fat they also have—they are made up of saturated and unsaturated fatty acids. And it turns out that a normal arousal from a bat, a bat that is healthy will arouse naturally or by stimulation within 45 minutes to an hour. When they don't have enough fat to arouse, they just simply don't arouse. They are unable—we have observed bats after physical stimulation in a cave. They are not arousing after five hours. So, there is something about the type of fat and the amount of fat that they have that makes them successfully arouse.

Mr. CASSIDY. And I had asked the gentleman earlier and he deferred to you guys, I just have to think there is some alternation of the immune system beyond what you have described, a T-cell abnormality or something, because I am sure that it is a T-cell response to the fungus it would normally protect, correct?

Mr. KUNZ. Yes. The immune system in bats is very poorly known. In my lab and in another lab, Dr. Dianne Reader at Bucknell University, we are the two labs that are primarily focusing on the immune system of these bats. It is compromised as Dr. Blehert mentioned that these are not normal mammals. These are mammals that go into torpor and so when an animal is in torpor their immune system is compromised. They don't respond. They only have immune system——

Mr. CASSIDY. But wouldn't that be relative to baseline. So, assume that you have some bats. You mentioned 95 percent die, but 5 percent live.

Mr. KUNZ. Right.

Mr. CASSIDY. And I think what they do in Africa for the 5 percent that survive from HIV even though they have HIV antibody, those are a different person. So, it seems like you could sacrifice a few of the 5 percent that live and look at their baseline. Are you with me?

Mr. KUNZ. Yes. We are doing this, and the data are not available at this point. We are looking at T-cell complements. We are looking at complement proteins. But this, again, I can only emphasize that the limited funding, the funding for this research——

Mr. CASSIDY. OK, I only have—I am with you on that.

Do mosquitos carry the fungus?

Mr. KUNZ. We are not aware that they do.

Mr. CASSIDY. Because someone said that they are below a normal temperature so it seems like that would be an obvious source.

And the surviving bats that you are sacrificing I am sure you have already cultured them to see if they have the fungus on them. Some that do not have scarred wings or mucus membranes, et cetera. So, do the surviving bats that you sacrifice have the fungus on them?

Mr. KUNZ. I would actually call on David Blehert, who has actually done some of this work and is more familiar with the histopathology and the presence of the fungus during—is David here? OK.

Dr. BLEHERT. Should I come up to a microphone?

Ms. BORDALLO. Yes. You can come forward. No objection.

Dr. BLEHERT. Thank you. The question of surviving bats is somewhat complicated. We can culture the fungus from live but sick bats. We have not cultured the fungus from bats that appear otherwise healthy, but then the question remains if we have a healthy bat, what would happen to it next year. We haven't seen any evidence that bats develop resistance to it.

Mr. CASSIDY. Except that they are still alive?

Dr. BLEHERT. Right. Although if we were to mark that bat, for example, and then allow it to naturally go back into a cave next year, we are doing some of those experiments right now, does it remain resistant or was it just a matter of luck?

Mr. CASSIDY. Are you tagging those bats?

Dr. BLEHERT. Yes. That work is being done.

Mr. CASSIDY. And last, it seems like it would be very easy to have some post-doc go out there and go to all the caves across Canada and the Southwest, et cetera, and just culture caves for this fungus. I guess I was just curious why we still apparently don't know the prevalence of the fungus.

Dr. BLEHERT. No, that work is underway right now. All of those samples were collected during the last hibernation season. They are in my laboratory right now, and we are developing the technology to test those samples, and so there is another set of results that we should have by the end of this summer.

Mr. CASSIDY. Good. Thank you.

Mr. TUTTLE. If I could interrupt just a second. Dave isn't speaking up for himself. I heard him speak at the meeting last week. A lot of the things that we would love to see done would have been done already except that he is incredibly understaffed relative to what is expected of him in his lab. Thank you.

Mr. YOUNGBAER. Could I just respond to that question too? The sediment sampling that Dr. Blehert was talking about is a project that he, Dr. Kunz, Dr. Al Hicks, the wildlife biologist, mammalogist for the State of New York, Department of Environmental Conservation, and the NSS organized and funded, and we used a score, a volunteer trained caver labor, plus some of the state biologists and their teams who were already going into caves, taking advantage of the fact that this was the scheduled time for the bi-annual Indiana bat surveys, and that got us the geographic distribution in a 30-state area.

You should understand, in my testimony I said some of the funding was cumbersome, we arranged to do this by using an external fiscal agent rather than the funding through the U.S. Geological Survey because it would not have occurred this past winter other-

wise, and so that is one of the things that we have all scrambled to try and get this information so that we could do that analysis this year.

Mr. CASSIDY. Thank you.

Ms. BORDALLO. I thank the Ranking Member, and now I would like to recognize the Co-Chair of this hearing, The Honorable Grijalva from Arizona.

Mr. GRIJALVA. Thank you, Madam Chair.

Mr. Tuttle, based on the large number of unanswered questions that we have heard about today, how has Bat Conservation International prioritized giving out the funding for research? I am just curious as to how you prioritize that.

Mr. TUTTLE. Thank you, sir.

We early recognized that we cannot make really credible progress on this without serious prioritization and research that is peer reviewed. We funded both the first and the second science strategy meetings with help from a variety of others, but we organized the funding and hosted those science strategy meetings, and when we give out money all of our funds are peer reviewed through an outside panel of expert scientists. We do not just give out money because somebody wants to do a project. We make sure that it goes to the most credible people that already have the best reputations in relevant fields, and then we make sure that a peer review process occurs. That is really important for these funds. Everybody knows that anywhere there is money available it can go down a lot of strange places without peer review, and that is something I think we need.

Mr. GRIJALVA. Thank you. Mr. Darling, of the comments, 600 or so that you have received from the public on this particular issue, have you noticed a particular concern that comes up repeatedly?

Mr. DARLING. There are basically two concerns that I hear from the public. The first is, and not necessarily in any order of priority, the first concern or worry is about rabies exposure. These are behaviors that bats are exhibiting that people tend to relate to as a bat sick with rabies: flopping on the ground, dropping from the ceiling.

And the second concern that I hear is just a public concern for what is going on. This should not be happening. Bats are important to us in Vermont where we do have buggy summers, and this is just not right.

So, those are the two primary comments and concerns I get from the public.

Mr. GRIJALVA. Thank you. Mr. Youngbaer, do we have the peer science to indicate which caves should be closed and which ones should stay open? Is it your opinion that all caves should be open?

Mr. YOUNGBAER. No, it is not our opinion that all caves should be open, and as I mentioned in my comments, NSS board of Governors adopted a policy on White-Nose Syndrome which enunciates a number of strategies, including honoring any of the state or Federal or private closure orders that are out there; strict decontamination; and also educating the public about the possible human vector here, although that is unknown. But as I said, those are prophylactic actions.

I think where the nuances come from very experienced cavers is to the broadness of some of the orders and some of the moratorium suggestion that cover non-bat caves, for example, that bats just don't go in, why they are closed, and you will see, if you look at our online chat rooms, for example, quite a bit of discussion about why those things might be——

Mr. GRIJALVA. If you could very quickly, just because I really believe there is an economic component to this——

Mr. YOUNGBAER. Yes.

Mr. GRIJALVA [continuing]. The multiplier effect, less visits, less access to these caves.

Mr. YOUNGBAER. I will give one example that I can think of off the top of my head.

Mr. GRIJALVA. OK.

Mr. YOUNGBAER. Southeastern Kentucky holds the Carter Cave Crawlathon, I think they call it. This is attended by six to seven hundred people in the dead of winter. It is a time when local hotels, motels and restaurants aren't seeing business, and this has been an annual event that goes on for—it was canceled this year. There is a tremendous economic fallout from that.

The fact that events are canceled is going to be demonstrated. There is confusion about what is going on with the commercial caves. The public are asking questions when they come there and you will see visitation fall off. So, I think there is economic impact there, not to mention the agricultural issue.

Mr. GRIJALVA. Madam Chair, I have one more.

Ms. BORDALLO. Go ahead.

Mr. GRIJALVA. Thank you. Mr. Kunz, we have heard previous testimony that there is no real proof that humans carry the syndrome from cave to cave. How do you respond to that conclusion?

Mr. KUNZ. Mr. Chairman, it is my contention that there are two modes of transmission, and that is humans as well as bats. I think there is fairly clear evidence that bats are moving this around, and we can't simply rule out the fact that cavers or researchers who have not effectively decontaminated themselves could move fungus around. The fungus can also be distributed by air. The spores are transmitted. So, there are multiple routes or modes of transmission. This is one of the primary research needs that needs to be addressed.

Mr. GRIJALVA. In the research puzzle, in your opinion what is the biggest missing piece where agencies should be focusing the research right now?

Mr. KUNZ. Well, I have a list of 10 here, and they are not necessarily in any particular order. But I think we need—what we just mentioned here, is the mechanism of transmission needs to be known.

Mr. GRIJALVA. Thank you.

Mr. KUNZ. We also need to know the ecology, the origin, and distribution of Geomyces, the fungus, which is a newly described species. There are many species of Geomyces, but the ecology of this one is not known. Where it came from, if it indeed in fact may have come from Europe. There is ongoing work in Europe, there is ongoing work in Dave Blehert's lab in collaboration with those folks.

Mr. GRIJALVA. OK, thank you.

Madam Chair, thank you for the indulgence. I appreciate it very much, and thank you for the hearing.

Ms. BORDALLO. I thank the gentleman, and now I would like to recognize the gentlelady from Massachusetts, Mrs. Tsongas.

Ms. TSONGAS. This has really been fascinating and I too have been persuaded of the urgency of this. Are you all confident that with the additional funding, 10 to 17 million, that you can get ahead of it, and that you have a cohort of professionals in place who can take advantage of that funding and really begin to sort this out in a timely fashion? And I direct this to whoever wants to go first.

Mr. DARLING. Well, let me start by suggesting that the existing cohort of professionals is not sufficient in size to get this work done. We need to expand the pie both within the Federal and stage agencies working on it, but clearly within the other institutions, academic and nonprofits that are participating in it as well, and often funding can help make that happen.

Ms. TSONGAS. But there are people trained who could quickly sort of take this on and begin to do the work in a way that is very meaningful.

Mr. DARLING. Yes and no. Again, in particular where we are looking at alternative hypotheses, if in fact it is not the fungus, we do need to make our pie larger on the number of people and the expertise that is needed in order to find a solution to this problem.

Ms. TSONGAS. Are there any others like—Dr. Kunz?

Mr. KUNZ. Yes. My contention would be that we do have a cohort of trained scientists that are out in the field or out in—they are available, and would be capable of addressing many of these issues. The funding simply hasn't been sufficient to encourage them to even consider working. Some of the research, the research in the immune system, determining mechanisms of transmission, even identify the genome of Geomyces, these are not inexpensive operations.

What I would say is that we shouldn't just have single labs operating on this, working on this. They need to be multiple labs; not just Department of the Interior or USGS laboratories. We need academic researchers involved in this, which there are, and I would also extend the need to approach other agencies: National Science Foundation, National Institutes of Health, which are the primary biological institutions that could in fact assist in this kind of funding.

I know there is often competition between institutions for funding, but I think this is a clear need for cooperation among Federal agencies to address this important issue.

Mr. TUTTLE. In answer to your original question, no, we cannot guarantee that we are going to find a solution if we get the money, but I can virtually guarantee that we won't find the solution if we don't, and there is reasonable prospect. There is very significant research that we already know needs to be done. It could have already been done if the funds were available. We just aren't going to have a chance if we don't get those funds to the right people very quickly.

Bat Conservation International has had to help fund multiple projects where Federal funds were supposed to do it but were so

tied up in red tape that they couldn't be allocated in time to do the research.

Ms. TSONGAS. Well, thank you. Another question, you suggested a vaccine might be the—not perfect, but a potential solution. How does one administer a vaccine to a bat?

Mr. KUNZ. With a needle.

Ms. TSONGAS. So, it is individual by individual bat?

Mr. KUNZ. We wouldn't be able to vaccinate every bat, but I can tell you over the time that I have studied bats and even within a given year, we could mount a number of different researchers out there, it wouldn't be unrealistic to be able to immunize tens of thousands of bats.

Ms. TSONGAS. When they are in hibernation?

Mr. KUNZ. No, when they are active. Again, I think the problem—you know, we don't want to disturb them any more during hibernation. Sticking a needle in a bat during hibernation will cause it to——

Ms. TSONGAS. OK. Thank you.

Ms. BORDALLO. I thank the gentlelady from Massachusetts. That was a very interesting question. I kind of wondered about it myself.

I want to thank all of the witnesses for their participation in the hearing today, and members of the Subcommittee may have some additional questions for the witnesses, and we will ask you to respond to those in writing. The record will be open for responses for 10 days.

If there is no further business before the Subcommittee, as Chairwoman I again thank the members of the Subcommittee and our witnesses for their participation here this morning, and the Subcommittee now stands adjourned.

[Whereupon, at 11:38 a.m., the Subcommittee was adjourned.]

[Additional material submitted for the record follows:]

[A letter submitted for the record by Mollie Matteson, Conservation Advocate, Center for Biological Diversity, follows:]

CENTER for BIOLOGICAL DIVERSITY

Rep. Madeleine Bordallo, Chair
House Subcommittee on Insular Affairs, Oceans and Wildlife
U.S. House of Representatives, Washington, D.C 20515

Rep. Raul Grijalva
House Subcommittee on National Parks, Forests and Public Lands
U.S. House of Representatives, Washington, D.C 20515

Re: Joint Oversight Hearing on "White-Nose Syndrome: What's Killing Bats in the Northeast?"

June 10, 2009

Dear Rep. Bordallo and Rep. Grijalva:

Thank you for sponsoring last week's hearing on white-nose syndrome. It was gratifying to see the concern expressed by all members of the subcommittees regarding this tragic, unprecedented wildlife die-off. We at the Center for Biological Diversity are hopeful that with the recent congressional attention given to this important conservation issue, there will soon be more resources and focused coordination applied to the white-nose syndrome situation.

In particular, we ask that Congress:

- Appropriate **$5 million** per year for five years to the **U.S. Geological Survey** for white-nose syndrome research and dissemination of findings to other biologists, agencies, and institutions, as well as continued updating of the USGS "white-nose syndrome" web page.

- Appropriate **$2 million** per year for five years to the **U.S. Fish and Wildlife Service** for coordination among state and federal agencies and research institutions, including the hire of at least one full-time coordinator position; for field biologists doing survey and monitoring work; and for public outreach.

- Appropriate **$1.3 million** per year for five years to the **National Park Service** for white-nose syndrome management, monitoring, education, and research.

- Appropriate **$1 million** per year for five years to the **U.S. Forest Service** for cave closure management and public education.

- **Request a plan of action and specific timeline** in writing from the **Department of Interior** about the department's response to white-nose syndrome, which should include:

Arizona • California • Nevada • New Mexico • Alaska • Oregon • Montana • Illinois • Minnesota • Vermont • Washington, DC

P.O. Box 188, Richmond, VT 05477 • (802) 434-2388 • mmatteson@biologicaldiversity.org • www.biologicaldiversity.org

- ✓ Hire of a full-time national white-nose syndrome coordinator, within the next three months.
- ✓ Budget for nationwide white-nose syndrome response over the next five years.
- ✓ Establishment of a national comprehensive research program on white-nose syndrome's cause and potential cures, within the next five months.

- Commission a **GAO study** on the need for, feasibility, and potential means of creating a national "**Center for Disease Control" for wildlife.**

The Center for Biological Diversity stands ready to provide additional support and outreach to help move an appropriation in Congress and effect stepped-up governmental action on this matter. On April 10 of this year, the Center sent a letter to Interior Secretary Salazar requesting increased funding and intensified, coordinated action on white-nose syndrome. (We have not yet received a response; the letter is attached).

In addition, over the last two months, Center online activists have sent 20,218 letters to the Interior Secretary requesting increased funding and coordinated action on the bat crisis. These same activists also sent 40,519 letters regarding the need for action on white-nose syndrome to their members of Congress. (A summary of the nationwide call for action on white-nose syndrome is attached).

And, at the end of last month, the Center along with 60 other groups representing conservation, agriculture, business, public health, and scientists, sent a letter to every member of Congress, asking for their attention and action on the bat pandemic. (A copy of the letter is attached).

The Center has been actively engaged in this issue from the beginning. We have approached it from several different angles, including pressing for cave closures beginning in January 2008, seeking coordinated action and increased funding since spring of last year, and calling on federal agencies to re-visit actions and plans with the potential to cumulatively, in conjunction with white-nose syndrome, do irreversible harm to listed bat species.

Last week's hearing highlighted a key point about the relative lack of preparedness of our wildlife agencies and other government entities, in terms of responding to major, fast-moving catastrophes like white-nose syndrome. We were pleased to hear both of you, and others at the hearing, express interest in the creation of a rapid response system, or even more ambitiously, the equivalent of a "Center for Disease Control" for wildlife. As mind-boggling as white-nose syndrome has been in its lethality and rapidity of spread, we can expect more such sudden, disastrous episodes among our nation's wildlife populations in the future, as climate change, habitat destruction, and the general degradation of our natural habitats outpace the ability of biological systems to adjust.

Again, we thank you for hosting the hearing and for helping to put a spotlight on the gravity of this unprecedented wildlife crisis. We hope your subcommittees will make sure the information gathered during the hearing is passed on to the full Natural Resources Committee.

We ask that the Committee promptly submit a request to Appropriations for white-nose syndrome funding as outlined above; that you obtain a plan of action from the Department of Interior; and commission a study to explore the need for a "CDC" for the nation's fish and wildlife.

The Center looks forward to hearing about your future good work on this issue. Please let me know how we can be of help.

Respectfully,

Mollie Matteson, Conservation Advocate

mmatteson@biologicaldiversity.org

Attachments:

- Letter to Salazar, April 10, 2009
- Summary of Responses to WNS Action Alert by State, June 10, 2009
- Group Sign-On Letter to Congress re WNS, May 20, 2009

[A statement submitted for the record by Nina Fascione, Vice President for Field Conservation Programs, Defenders of Wildlife, follows:]

Statement submitted for the record by Nina Fascione, Vice President for Field Conservation Programs, Defenders of Wildlife

Chairwoman Bordallo, Chairman Grijalva and members of the Subcommittees, thank you for the opportunity to submit written testimony for the record on white nose syndrome and the need for further research on the devastating impact of this disease on North America's bats.

Defenders of Wildlife was founded in 1947 and is a national non-profit organization with more than one million members and supporters dedicated to the protection and restoration of all wild animals and plants in their natural communities.

As you are aware, North American bats are facing a crisis of tremendous proportions. An emerging disease called white-nose syndrome is killing hibernating bats in large numbers and has spread through a number of eastern states in the past two years. To-date, this disease has killed an estimated one million bats.

Discovered in cave system near Albany, New York over two years ago, the disease has now rapidly moved on to cave systems in Vermont, Massachusetts, Connecticut, New Jersey, Pennsylvania, New Hampshire, West Virginia and Virginia.

White nose syndrome predominantly affects the six species of hibernating bats, which includes the federally-listed Indiana bat. These already sensitive species are feeling the effects of the disease and researchers are seeing significant declines in their numbers.

Researchers believe the disease is a Geomyces fungus that gets into the bats' skin and creates a white fuzzy growth around their muzzles and wings. How the fungus spreads is still a mystery, as is the means to prevent bats from contracting it. Scientist and wildlife managers currently working to fill this informational void are hampered by financial constraints, and any delay in determining ways to halt the spread of the disease will severely affect bat populations across the country and the ecosystem services they provide.

Bats play a vital role in the environment and serve as natural insecticides. They eat large numbers of insets, including pest species like mosquitoes and crop-eating insects, thereby significantly reducing damage to crops. Losing these insect-eating bats could trigger massive insect explosions that impact agriculture and human health.

Urgent funding is needed to avert the catastrophic out come of white nose syndrome should it progress unchecked. A current Congressional letter from Representative Shea-Porter requests $5 million for research, management, coordination and outreach to be included in the Interior, Environment and Related Agencies Appropriations bill to assist the U.S. Fish and Wildlife Service, the U.S. Geological Survey, the National Parks Service and the U.S. Forest Service as they work to combat white nose syndrome. While we support this request, we believe that $5 million will not be sufficient to combat this disease. We are aware that scientists may suggest funding in the range of $30 million to address the issue—we believe this to be a more accurate figure and would support funding in this amount.