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**Testimony of Peter Youngbaer
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**U.S. House of Representatives
Committee on Natural Resources
Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs**

“Why We Should Care About Bats: Devastating Impact White-Nose Syndrome Is Having on One of Nature’s Best Pest Controllers”

Chairman Fleming and Members of the Subcommittee. Thank you for the opportunity to return to speak with you today about the status of White-Nose Syndrome, or WNS.

My name is Peter Youngbaer, and I am testifying for the National Speleological Society as its Liaison on White-Nose Syndrome, a position I have held since April of 2008.

This year, the NSS is celebrating its 70th Anniversary as the nation’s oldest and largest organization dedicated to the study, exploration, and conservation of cave and karst resources, protection of access to caves, responsible management of caves and their unique environments, and promotion of safe and responsible caving.

Our Conservation Policy states that Caves have unique scientific, recreational, and scenic values; that these values are endangered by both carelessness and intentional vandalism; that these values, once gone, cannot be recovered; and that the responsibility for protecting caves must be formed by those who study and enjoy them.

As we stated a little more than two years ago, our membership, numbering more than 10,000 in all fifty states, cares deeply about bats and the cave environment which is used at times by many of America’s bat species. The NSS itself, and numerous affiliated cave conservancies, both own and manage dozens of caves throughout the country, including those managed as bat habitat. Some of our own preserves have been infected with WNS, and we have had to respond as land managers and conservationists.

The NSS operates under several Memoranda of Understanding with several federal agencies, including the U.S. Fish and Wildlife Service, the U.S. Forest Service, the Bureau of Land Management, and the National Park Service. Under these auspices, the NSS has provided thousands of hours of volunteer value time, labor, and expertise in identifying, surveying, mapping, studying, and protecting cave resources throughout the country.



Regarding WNS, we operate one of the most referred to websites on WNS. We provided funding for 13 WNS research projects, developed training videos on cleaning and disinfecting protocols, and developed outreach materials for educating both cavers and the public. These include the WNS brochures produced by the U.S. Forest Service and the National Caves Association, the trade group of commercial, or show caves in the U.S. Our individual members have assisted with field surveys of bat hibernacula, summer acoustical monitoring surveys, and in the hard science research directly related to the fungus implicated in the disease, among many other activities.

We care deeply about bats. We use them as the universal symbol of caving. We also understand from decades of first-hand experience how they interface with the overall cave ecosystem, a key to developing appropriate and comprehensive cave conservation practices in the context of this disease, which affects just one user of the cave environment.

Current State of Knowledge

When we last testified to you, we were literally at the front end of this investigation. Much was unknown. No specific public funding had been dedicated to WNS. Management was taking an approach of “an abundance of caution.” We were all scrambling to try to get ahead of the disease curve. We had just come from the second Science Strategy Meeting, held in Austin, Texas, that had spent three days prioritizing research needs for WNS, and developing a budget request that was presented to you and your appropriations colleagues.

Today, we still can't say for certain that the fungus *Geomyces destructans*, is the cause of WNS, despite it being implicated in some of the physiological effects of the disease, and with bat mortalities. It has been found on a few bats in the U.S. (Missouri and Oklahoma) without concurrent histology (no WNS). The fungus is also widespread in Europe, but again without the mass mortalities seen in some U.S. colonies.

We know that the disease is transmitted bat to bat. This has been proven in the laboratory (USGS), and the spread of the disease to bat colonies in many caves and mines which are gated and closed to public access demonstrates the efficiency of bat to bat transfer in the field.

There is no proof of any human transmission of the disease – by people, clothing, or gear.

There is a single, unpublished experiment in two mines where purportedly healthy bats from another state were placed into sites where the previous year's local bats had died from WNS. Nearly a quarter of the bats died at the outset, suggesting some trauma or adjustment issues, but others did contract the disease. This suggests that at least for some period, the fungus remains viable in the environment.

We do not know what epidemiologists call the Multiplicity of Infection (MOI) for the disease. How much of that pathogen (fungus) is necessary to infect a host? Disease transmission requires not only a pathogen, but a critical mass of that pathogen. It also requires a critical mass of hosts. One hypothesis,



based on the European colony sizes, and observations at smaller sites in the U.S., is that the large, tightly massed colonies of certain species of bats help with disease transmission. This may mean that small bat colonies may not be vectors, or that small numbers of bats may die without significant impact. It also may have management implications for the Western U.S. where many known bat colonies are small and widely dispersed.

A third critical element for disease transmission is the environment. We have long observed a difference in WNS disease progression in caves and mines with varied microclimates. In February, 2010, a joint expedition of the USFWS, West Virginia Department of Natural Resources, and the NSS sent three teams of cavers, biologists, and photographers into Hellhole Cave, West Virginia's largest bat hibernaculum, and a more than 28-mile-long cave system. Thankfully, most bats roost within 3000 feet of the entrance – a dramatic 150' drop into a bell chamber.

Hellhole provided key information on a number of fronts. First, the population of Little Brown bats, *Myotis lucifugus*, was hard hit, as expected. Bats had been seen out and about on the winter landscape, a sure sign of infection. After the survey, we found nearly half the population had died – some 50,000 bats. However, several other species were doing well, including the federally-endangered Indiana bat, *Myotis sodalis*, whose population had nearly doubled to 10,000 in the three years since the prior survey. Although an estimated 1.7% of the bats showed signs of WNS, the population was clearly doing better than its cousins. These two bats tend to both prefer colder cave temperatures and higher humidity, but the species differences in WNS infection rates was striking, suggesting a genetic element to disease spread.

More striking, however, was the population of federally-endangered Virginia Big-eared bats, *Corynorhinus Townsendii Virginianus*. These bats showed no signs of WNS. They also roost in near freezing temperatures and low humidity. Unlike the *Myotis* species, they also have a different arousal pattern, suggesting their immune systems may not be in as deep a torpor and are thus able to mount a more immediate immune response. The population had also doubled since the last survey, suggesting a very healthy colony.

Finally, Hellhole provided strong evidence that the primary method of WNS transmission is bat to bat. The cave entrance is privately owned, and has been fenced and equipped with electronic monitors for years. The last human entrance was in September of 2007.

I will be bringing with me to the hearing the April, 2011 Conservation issue of the NSS News, in which I report in detail on the Hellhole trip. There is also a second, longer article where I report on the overall status of WNS.

One other area of research and investigation bears highlighting, that of potential treatment of the disease. While there are literally dozens of substances that can kill this fungus, most of them will also kill the bat. Further, bats are a key element in a cave ecosystem, providing essential nutrients to other cave-



dwelling creatures. Any treatment must also respect those species, some of which are also on federal and state endangered species lists.

Even if a vaccine or treatment were found to be effective, the logistical challenges of applying treatment to individual bats or colonies are staggering to contemplate. Caves can be immense and terribly complex. Bats can go places humans can't. Some treatments would need repeated applications. With more than 50,000 known caves in the U.S., and hundreds of thousands of mines, the mind boggles. It is highly unlikely that any mass cure or treatment will be found that could be effectively administered. If such treatment were developed, its application might best be focused on leading edge colonies or on small, declining populations of endangered species as a last-ditch effort, and as part of a longer-range conservation and recovery program.

The science that would inform such a recovery program is not there. While we are beginning to observe some population stability in sites that have been infected for three or four years, we don't know why these bats are surviving. This will take genetic and other study of the fungus and the disease progression itself, not simply field observation.

Why Americans Should Care

Bats are fascinating. They have provided us with knowledge of flight, echolocation, and medicine – such as the blood anti-coagulant in the saliva of vampire bats. More to the point, they are the primary nighttime predator of insects. Some of these insects are pests, such as mosquitoes, although most of these bats prefer larger, juicier prey, such as moths and beetles. Some of these are garden, farm, and forest pests, and also the transmitters of human diseases. Bats also are the primary source of energy and nutrients for cave ecosystems. Without bats, these unique environments and other species of animals are at risk.

How the loss of bat populations will affect agriculture, forestry and other industries in this country

One of the other witnesses will speak in detail to this subject, but the short answer is, we don't know. We would expect that with the loss of such a significant number of bats, the effects would be noticeable. However, nature abhors a vacuum. To what extent other insectivores, such as birds or other insects, would move to fill the void, whether populations would increase and then crash, and at what trigger point farmers and foresters would make decisions on the increased use and cost of pesticides, would require more research. Frankly, that's not where we would urge you to put scarce research dollars.

There is another economic impact that we believe is being overlooked by current management responses. Numerous caving events have been cancelled, causing a loss of travel and tourism dollars to the local economy. For example, the Carter Caves Crawlathon in Kentucky has been cancelled for three years running. Typically, 600 people would arrive in winter – the off-season – and take up otherwise empty motel rooms and campgrounds, shop, dine, buy gas, and more – a clear boost to the region. In



Iowa, the Maquoketa State Park closed its popular family destination caves, resulting in annual paid visitation dropping from 250,000 to just 60,000.

The National Caves Association reports a depressed environment where people are calling to inquire if the caves are open, or worse, asking why they are open. In an economic impact report commissioned by the NCA, show cave visitation is more than 6.5 million visitors a year, with @ \$118 million in revenues, and employing over 4,000 people. The economic multiplier effect varies by size of the cave operation, but ranges from 1.1 to 1.5 times the revenues. Every new headline that trumpets “Government Closes Caves” is harmful to commerce, and does little to help the bats.

How taxpayer money is being spent on various White-nose Syndrome grant proposals

Taxpayer money has actually funded a minority of the WNS research to date. An appendix to this testimony is a list of Peer-Reviewed Published Papers on or Directly Related to White Nose Syndrome. We think that speaks volumes about how the federal agencies have handled appropriations for WNS.

The NSS believes that far too much of the money spent on WNS has gone to the bureaucracy. This includes significant increases in staff, meetings, conference calls, and various plans and documents. U.S. Fish and Wildlife, for example has hired a national coordinator, assistant coordinator, press person, and at least seven regional WNS coordinators. USFWS states that over \$11 million of their funds have been spent on WNS, with about \$3 million for research. That’s simply the wrong balance.

Further, our scientists and others are concerned that they do not know the criteria by which proposals are sought, reviewed, or awarded. In the first two years of the WNS investigation, the Albany conference and the Austin conference came away with clearly identified scientific research gaps and priorities. The Pittsburgh conference, in May of 2010, ended with no work product. There is nothing to date from this year’s May Symposium. As a research grantor, the NSS relies on clearly defined science research priorities to allocate our precious grant resources. We do not have that any more.

In 1996, the U.S. Geological Survey was separated out as the scientific research arm of the Department of the Interior. We have been very impressed with their work and supportive of specific studies undertaken and the quality of their work products. We suggest that Congress consider USGS as the lead research entity for the WNS investigation. We believe the WNS investigation, the academic scientific community, and perhaps other federal agencies would benefit from such a focus.

The committee may be aware of appropriations requests for WNS research and other activities before other committees of Congress. These requests suggest appropriating funding directly to other agencies, as well as USFWS as a more efficient and accountable way to use taxpayer funds. Half the funds we advocated for two years ago (\$1.9 million appropriated specifically for WNS) were used internally by USFWS; the rest weren’t awarded to grantees until this past fall. The frustration of many in the scientific and caving community is palpable.



Thoughts on the WNS National Plan

The WNS National Plan was more than two years in the making, and is little more than a broad outline. USFWS itself says it's not the plan that is important, but the Implementation Plan that follows will be the living document. This means there is little to hold anyone accountable to, and the vagueness of the document provides an umbrella under which virtually anything can happen.

The NSS submitted more than eleven pages of formal comments to the draft posted in the Federal Register. These were prepared by numerous people with varied backgrounds in the cave sciences and planning and management. Our comments are the second appendix.

The final document changed little, and USFWS tells us that they will not post replies or discussion in the Federal Register, but will produce some other document. This is a disservice to the public, some 12,000 of whom replied. A discussion of the rationale for choosing what to change and what not should be provided for open, honest, and scientific debate.

There are three major problems with the National Plan. First, it is largely absent any measures for evaluation. How do we know if any particular strategy or task is working without assessment? How will we know when to stop doing something because it's not working, or do more of it because it is?

Second, the National Plan has no budgetary component. Sure there are lots of ideas about a website, database, research, management, etc., but no price tag. There is no prioritization or prioritization process. We believe this is unrealistic in the current fiscal environment, and frankly, renders the plan virtually meaningless.

Finally, as cave conservationists, the NSS is concerned that a plan that is essentially a U.S. Fish and Wildlife document is narrowly focused only on biology, due to the mission of USFWS. Yes, WNS is a biological phenomenon, but it takes place within a context. Caves are laboratories for studies in a variety of sciences – geology, paleontology, archaeology, and hydrology – just to name a few. A national plan that focuses management entirely on bats, without acknowledging the legitimate variety of needs and uses of caves is short-sighted in its vision, and in its probability of success.

How closing hundreds of caves and abandoned mines has helped to stop the expansion of this devastating disease

Simply put, it hasn't. The NSS strongly opposes the blanket closure orders that have been issued across the country. We don't believe there is any evidence that they have done anything to slow WNS. In March of 2009, when USFWS issued its caving advisory (still unrevised today), many in the organized caving community were willing to call time-out, stop caving, or reduce caving to non-bat caves or dedicated project caves.



The message was, we don't know what's going on, and we need to give science time to catch up to the disease to get some answers. That was two years ago. People have grown impatient as they have not seen science catch up, despite all our efforts and in the face of significantly short funding. Instead, we continue to see closure orders across the country, all in the name of an abundance of caution, and in the absence of good science.

As we stated earlier, after all these years there is no documented evidence of human transmission, yet all the management is targeted there. The agencies themselves state they can't stop the bats from transmitting the disease yet, but they can control people. But not all people. Show caves and government-owned commercial caves continue to operate. And privately-owned caves – the vast majority in the Eastern U.S. - remain open.

The NSS acknowledges the possibility that humans might be a transmission vector, but after five years, if this were done easily the disease would have spread far beyond its current boundaries. Indeed, looking back to the bat hibernacula map that BCI's Merlin Tuttle presented to the committee two years ago, the progress of the disease has clearly mirrored the natural movements of bats.

We also unfortunately believe there is an element of “defensive” management taking place, as state and federal agencies are under legal pressure from advocacy organizations to close all caves and mines and radically alter the Endangered Species Act and Federal Cave Resources Protection Act. That is not good management, good science, nor good public policy. We suggest that Congress look at how the legal system is operating and demanding of the time and resources of particularly the USFWS to respond to and sometimes settle with taxpayer dollars that would better be directed to WNS research.

Further, there is a strong feeling among our members that cave resources on public lands are there for the enjoyment of the people who own them and generations to come. The USFS talks about “multiple uses,” and the National Park Service protects resources for the “enjoyment” of the public. As a sheer matter of fact, many caves are not used by bats, which can be quite particular about their roosts.

Our members have attended many meetings around the country working on state WNS response plans and with federal agencies. Often, the agencies say they feel they must “do something.” But blanket closures are the typical response. Thankfully, in some areas, collaborative efforts have led to targeting of key bat roosts. Sheer numbers of caves and mines make this a far more practical, supportable, and affordable approach.

Blanket closures don't work. Knowledgeable caving organizations are aware of them, but many orders aren't followed up with signage, and little, if any expensive gating is done. Thus, we see unaffiliated people – locals, scouts, church groups, college outing clubs, etc. continuing to visit caves. While perhaps administratively attractive to issue a paper order, unless followed up with resources for enforcement, they are practically unworkable. We have seen vandalism and landowner reactions that fly in the face of good cave conservation. While there are quite a few great and long-standing partnerships between the NSS, cave conservancies, local grottos (chapters) and other affiliated caving organizations



in some parts of the country, in others, agencies issuing closure orders have alienated their most natural allies, our members. Not only do the closures not work, they are counterproductive.

Similarly, closing caves and mines only addressed underground roosts. Bats also roost in buildings, in culverts, under bridges, and in trees. Attempting to contain a disease on only public lands, with little practical enforcement, only underground, and with a myriad of exceptions, and where the known predominant means of transmission is bat to bat, we believe is folly.

Arguments have been made that blanket closures can buy time, but continuing them where WNS has already marched through seems pointless. Implementing them where WNS is nowhere near seems equally futile. In those cases, if there is a human vector, the single best strategy is to inform any cave visitor – caver, tourist, or scientist – to leave any gear used in a WNS site at home.

The one area where an argument may still have some validity is on the leading edge of the disease. Enforcing cleaning and disinfecting protocols and temporarily barring visitation, may temporarily delay the disease, but if the bats are going to get it, they will spread it, closure order or not.

Rather than continuing in this manner, and absent a major scientific breakthrough in treating the disease, we believe the most productive course of action may be to focus on the science and management of conservation and recovery. We may ultimately be able to do little to stop the disease from running its course, but we can focus on the survivors and doing all we can to help them recover and populations grow again. Funding research that targets understanding how and why those bats do survive should be a priority. Funding management actions that target significant habitat, both above and below ground, and mechanisms to enhance survivability would be critical. Let's not waste our efforts doing "something" that is of questionable value with negative collateral consequences.

Conclusion

These are tough times for some of our bats, and the NSS remains deeply concerned and committed to doing what is possible to help mitigate the impact of the disease. However, we do insist that the decisions on funding for research and management be based on hard evidence, and prioritized use of human and financial resources. The impacts of WNS have begun to be felt in the economy, both from the disease itself, and from our response to it. We may not be able to control the former; we can control the latter. We clearly need a better focus to our management decisions, and a way to objectively evaluate and prioritize those decisions. We also need a significant increase in funding for research. We ask that Congress insist on hard science, evaluative measures, and transparency in accountability.

Finally, we ask that you listen to the people who know caves best and have a 70-year history of working to study and protect our country's cave resources, including its bats. Working with the organized caving community has proven mutually beneficial, and continues even in this era of WNS. Examples include the NSS' Mammoth Cave Restoration Project – more than 20 years of critical work, the Fort Stanton Cave Study Project with the Bureau of Land Management, the Windeler Cave Project with the Western



Cave Conservancy, which manages that cave for the U.S. Forest Service, and the Mark Twain National Forest work with the Cave Research Foundation, which has provided an immense amount of baseline research on many of the 600 some caves in that unit, including a recently-added WNS monitoring component.

Some of these efforts require cavers with certain levels of expertise in areas such as cartography, sciences, technical caving skills, and management, but others make use of interested people of all skill levels. That is key, for future cave scientists, world-class explorers, and even career wildlife managers come from the humble beginnings of a first step into a dark void. Maintaining access to that experience for future generations helps build an appreciation for the resource, and fosters the development of the conservation ethic that is needed to wisely protect both caves and bats.

Thank you again for the opportunity to testify. We'll leave you with our mottos, which reflect our long-standing conservation ethic and respect for our caves and the things that dwell within.

Cave softly. Cave cleanly.

Take nothing but pictures. Leave nothing but footprints. Kill nothing but time.

