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Testimony on "WHY WE SHOULD CARE ABOUT BATS: DEVASTATING IMPACT WHITE-NOSE SYNDROME IS HAVING ON ONE OF NATURE'S BEST PEST CONTROLLERS"
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Thank you for allowing me to testify today. I have conducted research on bats for nearly 10 years and have been involved with research on white-nose syndrome (WNS) since shortly after it was discovered.

There are 45 species of bats in the United States, 42 of which are insectivorous. The bat species affected by WNS are the primary predators of night flying insects and are the top predators in their respective food webs. Insectivorous bats in the United States are well-known predators of pest insects including cotton bollworms, corn rootworms, spotted cucumber beetles, leafhoppers, cutworms, and spruce budworms, among many others. These pests attack a multitude of agricultural, horticultural, and forest products, including cotton, corn, potatoes, tomatoes, cucumbers, squash, melons, pumpkins, apples, strawberries, beans, celery, eggplant, beets, roses, and spruce and fir trees. Two studies illustrate how many insects are consumed by bats. A study in Indiana reports that an average-sized colony of 150 big brown bats (*Eptesicus fuscus*) may consume 1.3 million pest insects over a summer. Big brown bats are ubiquitous in the natural and man-made landscape – for instance, researchers estimated that approximately 20,000 big brown bats summer in Fort Collins, Colorado – meaning the species confers these benefits throughout our environment. A study from the northeastern United States suggests that a single little brown bat (*Myotis lucifugus*), the species most commonly affected by WNS, can consume 4-8 grams of insects each night during summer. Extrapolating these values to the 1 million bats that have died from WNS to date means that between 1.5 and 3 million pounds of insects are uneaten each summer in the area affected by WNS. Economic estimates of the value of bats are rare, but two studies from cotton-dominated landscapes in central Texas suggest bats are worth between $12 and $174 per acre, depending on a number of factors including the density of crop pests in a given year. While these values will obviously vary across the United States because of differences in the monetary value of crops, the amount of pesticides used, the bat and insect communities in the area, and several other factors, a simple extrapolation of these values to the whole of agriculture in the United States suggests bats may be worth between $3 and $53 billion/year to the national economy. Bats have been shown to exert strong top-down control on insect populations in both tropical and temperate forests and importantly, these estimates do not consider the value of bats to forestry or secondary effects of pesticide use on the ecosystem and public health. Thus, all available evidence suggests that bats are extremely valuable to the economy and I would venture that bats are the most economically important non-domesticated mammals in the United States. While there are significant ecological and economic reasons to be deeply concerned about the impact of WNS on bat populations, in my opinion, we

also should be concerned with bat conservation based on moral and ethical responsibilities to conserve our natural resources.

The closing of caves and mines has been a controversial step in management of WNS. While I agree that bats are likely the most common distributor of the fungus, I believe cave closures are both necessary and justified because evidence implicates human-facilitated movements. During my research, I have spent considerable time in caves and mines in the eastern United States. Therefore, I understand the draw of caving and sympathize with the standpoint of the National Speleological Society. However, as a scientist, I must respectfully disagree with their views on cave closures. They have argued that little evidence exists that cave closures have slowed or will slow the spread of WNS. While this statement may be factually correct, it is misleading because, in my opinion, it is a proposition that is impossible to test and thereby either support or refute. If *Geomyces destructans*, the fungus associated with WNS, is verified to have originated in Europe as the circumstantial evidence and emerging data on the genetics of the fungus suggest, human-facilitated movements are very likely the explanation for the appearance of *G. destructans* in the United States in the first place. Thus, long-distance movements of *G. destructans* by humans are likely possible. Further, research has shown that *G. destructans* can survive in and on clothing and caving gear, providing a possible path for long-distance, human-facilitated expansion of the disease. Human-facilitated dispersal events may be disproportionately more devastating than bat-facilitated dispersal events because of the distances humans can move the fungus. Even a single introduction of *G. destructans* by humans in the western United States could lead to the devastation of an entirely new bat community. Such a collapse is unlikely in the next 5 years given the current rate of bat-driven expansion of WNS. More than a dozen species of hibernating bats occur in the western United States and are currently unaffected by WNS. There may be natural geographic barriers to the movement of hibernating bats, such as the Great Plains, that limit bat-facilitated, but not human-facilitated dispersal of *G. destructans*. Further, cave disturbances are implicated as one of the driving factors behind historical declines in bat populations because they upset the delicate energy balance that bats must maintain to survive winter. Given that WNS also appears to upset this delicate balance, the added stress caused by cave visitation could compound the effects of the disease. Thus, in my professional opinion, the risks of cave visitations to both ecosystems and the economy far outweigh the possible benefits gained by relatively few people and I believe the cave closure policies currently implemented by Federal and State agencies are both warranted and prudent.

In the roughly five years since WNS emerged, a tiny number of researchers has amassed an impressive body of knowledge about the disease. Given the scale of the problem, very little research funding has been available to researchers and we have done a lot with very little. Still, large gaps remain in our understanding of the putative pathogen, the physiology of bat hibernation, and how the two interact to result in the patterns of mortality seen in WNS-affected populations. Many of these information gaps are vital to attempts to control *G. destructans* and conserve and restore populations of insectivorous bats. The only way to fill these knowledge gaps is through well-targeted and well-coordinated scientific research, a process that is unfortunately neither quick nor cheap. To be frank, limited funding and a lack of coordination have hindered our progress to date. The recently released National Plan by the US Fish and Wildlife Service addresses many of these shortcomings, especially those related to

communication between the various parties involved. However, as is often the case, funding has been and will remain the most limiting factor in our research on WNS. I believe the economic and ecological ramifications of collapsing bat communities are so severe as to warrant a larger investment of personnel and funding to develop a better understanding of this devastating wildlife disease. Only with an increased understanding will we be able to develop solutions to the problem in time to make a difference.