



## THE WILDLIFE SOCIETY

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Division of Policy and Directives Management  
U.S. Fish and Wildlife Service  
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The Wildlife Society (TWS) appreciates the opportunity to submit comments on the U.S. Fish and Wildlife Service's inquiry regarding whether the fungus *Batrachochytrium dendrobatidis* (*Bd*) is harmful to wildlife and whether all live amphibians and their eggs should be regulated under the Lacey Act, (Docket #: FWS-R9-FHC-2009-0093).

The Wildlife Society was founded in 1937 and is a non-profit scientific and educational association of nearly 10,000 professional wildlife biologists and managers, dedicated to excellence in wildlife stewardship through science and education. TWS's mission is to represent and serve the professional community of scientists, managers, educators, technicians, planners, and others who work actively to study, manage, and conserve wildlife and its habitats worldwide.

Amphibians are an important factor in ecosystem health, as they lie at the center of multiple trophic interactions. They serve as prey for birds and snakes, and depredate insects, providing natural pest control. However, many amphibians are currently under threat, due both to habitat loss and to this devastating pathogen. The 2008 Global Amphibian Assessment conducted by The World Conservation Union found that over 30 percent of amphibians can be categorized as threatened or endangered. The World Wildlife Fund's 2010 *Living Planet Report* showed a 60 percent decline in tropical biodiversity, a trend that may predicate further amphibian decline.

The fungus *B. dendrobatidis* is affecting amphibians on a global scale and is the leading the cause of amphibian population decline. *Bd* causes chytridiomycosis, a condition that in some infected populations can result in 100 percent mortality. This fungus is already known to have been the cause of extinction for at least one species of amphibian.<sup>1</sup> Although the behavior and treatment of *Bd* may not be fully understood, the devastation caused to amphibians and ecosystem health is clear.

TWS urges the Service to accept the petition submitted by the Defenders of Wildlife and adopt science-based regulations to ensure the trade of live amphibians and eggs remains *Bd* free. Answers to the questions posed by the Service in the above-referenced Notice of Inquiry are below.

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<sup>1</sup> A.D. Hyatt *et al.* (2007). Diagnostic assays and sampling protocols for the detection of *Batrachochytrium dendrobatidis*. *Diseases of Aquatic Organisms*. 73: 175–192.

## 1. What Federal, State, or tribal regulations exist to prevent the spread of chytrid fungus?

Currently, no laws or regulations exist to prevent the spread of chytrid. However, a voluntary plan to develop an efficient and safe protocol for preventing disease transference in the aquatic animal trade, the National Aquatic Animal Health Plan (NAAHP), was developed by the USDA and commissioned by the Joint Subcommittee of Aquaculture. On an international scale, work is underway to manage the spread of chytrid:<sup>2</sup> the OIE (World Organization for Animal Health) is currently developing an Aquatic Manual on methods to survey and test for chytrid, and Australia is working on “abatement plans” to hinder chytrid spread.<sup>3</sup>

There is precedent for controlling wildlife disease through the Lacey Act. Salmonid disease in fish is regulated through the Lacey Act (50 CFR 16.3(a)), which prevents the shipment of the animals with the disease. This can serve as a model for *Bd* regulation.

## 2. Are there any known mechanisms in the United States to test for, control, or regulate movement of interstate transport of chytrid fungus?

**Testing:** There is no consensus amongst the scientific community on a test for chytrid, but the following methods have been successful in detecting the fungus:

Polymerase chain reaction (PCR) - the most popular method to test on live animals. PCR is used to amplify and copy small portions of DNA. Once a significant amount of DNA has been replicated, it can be sequenced to determine whether the sample is *Bd*. See Hyatt *et al.* 2007 for more information.

Histology - For formalin-fixed animals, such as museum specimens, researchers use histological methods that involve obtaining a small piece of skin from the pelvic region, cutting it into sections ~5microns thick, and fixing it to a microscope slide. The slide is then stained to permit easier viewing under a microscope. This method is not as accurate as PCR; researchers are currently working to develop methods of testing these formalin-fixed animals with genetic tools.

**Control:** Uncertainty regarding the spread of chytrid has prevented the establishment of a standard control protocol. However, current mechanisms for controlling/regulating chytrid spread include sanitizing field equipment with a solution of 10% bleach or 70% alcohol. However, this method only prevents spread if *Bd* zoospores adhere to the surfaces of equipment and materials. If *Bd* can be transmitted through water, tributaries, streams, rivers, and other flowing water bodies may spread it. Additionally, chytrid could

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<sup>2</sup> United States Department of Agriculture. Animal and Plant Health Inspection Service. [http://www.aphis.usda.gov/animal\\_health/animal\\_dis\\_spec/aquaculture/naah\\_plan.shtml](http://www.aphis.usda.gov/animal_health/animal_dis_spec/aquaculture/naah_plan.shtml). Accessed 13 December 2010.

<sup>3</sup> World Organization for Animal Health. Manual of Diagnostic Tests for Aquatic Animals 2010. [http://www.oie.int/eng/normes/fmanual/a\\_summry.htm](http://www.oie.int/eng/normes/fmanual/a_summry.htm). Accessed 13 December 2010.

be spread through ingestion and excretion by other organisms, in which case new decontamination and quarantine protocols would need to be established.

**Regulating Movement:** In order to regulate the movement of *Bd*, managers would first need to accurately identify infected animals by testing for *Bd* using the more-accurate PCR method. This type of testing protocol would require quarantine for animals undergoing testing until PCR results were received. However, multiple animals could be tested simultaneously, reducing the need for extended delays. Animals testing positive for the fungus could then be kept in quarantine until decontamination was completed.

3. **How many businesses import live amphibians or their eggs for interstate commerce?**
4. **How many businesses sell live amphibians or their eggs for interstate commerce?**
5. **What are the annual sales of these imported live amphibians and their eggs?**

We do not have any information regarding these questions.

6. **What are the species of amphibians, fish, or other class of animal have been affected by chytrid fungus in the United States and how they were infected?**

In 2009, Kriger and Hero affirmed 287 species of amphibians have been affected by *Bd*.<sup>4</sup> Fischer indicated that the number of species affected may be closer to 400.<sup>5</sup>

7. **What are the current and potential effects to species listed as threatened or endangered under the ESA that are contaminated with chytrid fungus?**

Threatened and endangered species are at higher risk since their populations are already often reduced in size, under pressure of genetic bottlenecks, or stressed from agents that caused their listing (e.g. unmitigated pollution). If their populations are reduced in size, then stochastic events (like disease) may have a greater impact on their survival. If populations are under genetic constraints (e.g. a limited gene pool), then the likelihood of adaptation to a chronic *Bd* infection is also limited, since they may not have the resources in their existing genetic pool. Finally, if individuals within an endangered population are already stressed due to pollution, habitat degradation, climate change, or other causes of ESA listing, then their immune systems may not be capable of handling a new stressor like *Bd*.<sup>6</sup>

Other threatened and endangered species may also be affected. Amphibians play a major role in the food web, therefore the removal amphibians from trophic levels would consequently impact the entire ecosystems. Many at-risk species prey on amphibians,

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<sup>4</sup> Kerry M. Kriger, & Jean-Marc Hero, (2009) Chytridiomycosis, Amphibian Extinctions, and Lessons for the Prevention of Future Panzootics. *EcoHealth*. 6(1): 148-151.

<sup>5</sup> Matthew C. Fischer, (2008). Molecular toolkit unlocks life cycle of the panzootic amphibian pathogen *Batrachochytrium dendrobatidis*. *Proceedings of the National Academy of Sciences of the United States*. 105(45): 17209–17210.

<sup>6</sup> James P. Collins & Martha L. Crump. Extinction in Our Times: Global Amphibian Decline. (2009).

such as the San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) and the Puerto Rican broad-winged hawk (*Buteo platypterus brunnescens*), both listed as endangered.<sup>7</sup>

**8. What are the potential costs of recovering threatened or endangered species affected by chytrid fungus?**

We do not have data regarding the costs of recovering threatened or endangered species affected by chytrid fungus, but they would include costs associated with monitoring, testing for chytrid, and treating individual animals with the disease.

**9. What is the likelihood that wild amphibians would be affected by the importation of live amphibians or their eggs that harbor chytrid fungus?**

There is a high likelihood that wild amphibians would be affected by the importation of live amphibians or their eggs that harbor chytrid fungus. Scientists are still not sure whether *Bd* is transported through water, so tanks that have held infected frogs may contribute to *Bd* spread. In addition, it has been well documented that animals in the pet and food trade can easily escape or intentionally be released into wild population.

*Kraus* documented numerous amphibian introductions and identified the pet trade as the leading current cause of introductions, including many hundreds worldwide and a large number in North America<sup>8</sup> This “pet” pathway includes escapes from breeding operations as well as releases by individual pet owners. *Kraus* also connects new amphibian introductions and establishment to spread of disease.

**10. What would it cost to eradicate chytrid fungus?**

Currently, no reliable method of eradication exists. Therefore, this question cannot be answered until researchers determine a treatment that can be used on a large-scale in wild populations. We could, however, eradicate *Bd* from the pet and food trade.

**11. Are there any potential benefits to allowing the chytrid fungus pathogen to be imported?**

No, there are no benefits to allowing such import.

**12. What is the potential for the industries that conduct trade in amphibians to self-police through voluntary best practices; for example, how successful is the “*Bd*-Free ‘Phibs Campaign’” sponsored by the Pet Industry Joint Advisory Council?**

There is no indication of the penetration or effectiveness of the “Phibs” campaign, nor does it cover the large “non-pet” amphibian import sector at all. Self-regulation is encouraged, but for a highly infectious disease it is not sufficient--particularly given that

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<sup>7</sup> United States Fish and Wildlife Service. Endangered Species Program. <http://www.fws.gov/endangered/species/us-species.html>. Accessed 15 December 2010.

<sup>8</sup> F. Kraus. (2009) *Alien reptiles and amphibians: a scientific compendium and analysis*. Invading Nature - Springer Series in Invasion Ecology 4. Springer Science & Business Media B.V., Netherlands.

many smaller import companies remain unconnected to the larger pet industry. The “Phibs” campaign itself has recognized the validity and need for international trade standards.

**13. What are peer-reviewed methods for detecting chytrid fungus have been published?**

Hyatt *et al.* 2007 tested several methods to determine which protocol for indentifying *Bd* was the most accurate. The group tested the more common methods: histology, histochemistry, electron microscopy, and PCR Taqman. These methods were then compared to each other for “repeatability and reproducibility.” Hyatt *et al.* recommended swabbing specimens to collect samples, with detailed protocol, in the field and real-time Taqman PCR to ultimately test for *Bd*.

**14. Are there any other comments or information regarding the listing of live amphibians as injurious unless free of chytrid fungus?**

Some opponents of the rule argue that regulations would negatively impact the amphibian/reptile portion of the pet industry. However, there is no indication the proposal would do so; costs of testing and compliance presumably would be passed on to consumers in this trade, which largely consists of “luxury” pets. Indeed, the proposal has the potential to enhance employment in the domestic captive breeding industry for amphibians, and it may generate employment in related fields such as amphibian health certification.

Thank you for considering the views of wildlife professionals. If you have any additional questions or need more information, please contact Laura Bies, Director of Government Affairs (301-897-9770 x308; [laura@wildlife.org](mailto:laura@wildlife.org)).