PROPOSAL FOR THE 2019 JOINT ANNUAL CONFERENCE OF THE AMERICAN FISHERIES SOCIETY AND THE WILDLIFE SOCIETY

Session Type = Symposium

- Preferred Session Length – 300 minutes
- Symposia – 13 20-min presentations (1-2 panel discussions)

Panel Discussions – Two 20-min panel discussions preferably after talks #6 and #13.

Session Title: *Batrachochytrium salamandrivorans*: The next threat to North American biodiversity

Organizers:

Matthew J. Gray, Center for Wildlife Health, University of Tennessee Institute of Agriculture, Knoxville, TN 37996; 865-974-2740; mgray11@utk.edu
Jamie Voyles, Department of Biology, University of Nevada-Reno, Reno, NV 89557; 720-883-2341; jvoyles@unr.edu

Supported by:

North American *Bsal* Task Force – Jake Kerby, Jacob.Kerby@usd.edu
Wildlife Disease Association –Dave Jessup, wda.manager@gmail.com
Wildlife Disease Working Group, The Wildlife Society – Krysten Schuler, ks833@cornell.edu

Abstract: (250-word limit)

The next great threat to North America's biodiversity is on the doorstep – an emerging fungal pathogen, called *Bsal* (*Batrachochytrium salamandrivorans*). This pathogen is believed to be from Asia and responsible for decimating salamander populations in Europe. The current lack of regulations that require clean trade of amphibians or translocation of zoospores by humans on fomites may result in the emergence of *Bsal* in North America, possibly within the next decade. Wildlife biologists in North America have the unique opportunity to prepare for the emergence of a pathogen before it can cause serious impacts on biodiversity and ecological processes. This symposium will review current plans of the North American *Bsal* Task Force to formulate effective options for *Bsal* detection, response, and management. A series of research talks by North American scientists will familiarize the audience with our current understanding of species susceptibility and risk, host immune defenses, possible ecological factors that could contribute to emergence, and different management strategies. This information will be key to effectively respond to and manage a possible *Bsal* outbreak event by providing the best available data, which can inform objective, science-based decision-making. The symposium will include 13 presentations by amphibian pathogen experts and two panel discussions for opportunities to interact with the audience.

Detailed Description: (1,000-word limit)

Emerging infectious diseases are a threat to global biodiversity. In the past several decades, emerging fungal pathogens have caused declines in several wildlife taxa. For example, the emergence of *Pseudogymnoascus destructans,* which causes of White nose syndrome in bats, has caused precipitous declines in at least nine bat species in North America. Similarly, the emergence of *Ophidiomyces ophiodiicola*, which causes Snake fungal disease, causes disfiguring malformations and mortality in multiple snake species in the United States. Finally, the most dramatic declines in global vertebrate biodiversity associated with a fungus have been caused by *Batrachochytrium dendrobatidis* (*Bd*). This pathogen is known to infect >700 amphibian species, and has caused population declines in at least 200 anuran species. Recently, a new species of chytrid fungus (*B. salamandrivorans*, *Bsal*) was discovered associated with die-offs of fire salamanders (*Salamandra salamandra*) in several European countries. Although *Bsal* can infect frogs, it appears to be most pathogenic to salamanders, causing necrotic skin ulcerations that likely disrupts cutaneous osmoregulation and respiration and facilitates secondary bacterial infections. The emergence of *Bsal* and other fungal pathogens in Europe has been attributed to international trade and subsequent pathogen spillover to naïve host populations. There is concern among scientists and managers that *Bsal* will be introduced in North America, because trade regulations are currently insufficient to prevent entry of *Bsal*. Therefore, many regard *Bsal* as the next major threat to vertebrate biodiversity on the North American continent.

North America is home to the greatest biodiversity of salamanders in the world. Preliminary risk analyses based on environmental suitability of *Bsal* suggests that the United States and Mexico are areas that could be highly suitable for *Bsal* emergence. In 2015, the U.S. Geological Survey organized a group of 30 experts from around the globe to discuss the threat of *Bsal*. From that meeting, the North American *Bsal* Task Force was formed. The Task Force is composed of a Technical Advisory Committee and several Working Groups that work together to plan and prepare for an invasion of *Bsal* in North America. The Task Force maintains a website (http://www.salamanderfungus.org) with various resources about *Bsal*, including a 2018 Response Plan that provides a template that natural resource agencies can follow if a suspected or confirmed case of *Bsal* is detected in captivity or the wild. The Task Force will finalize a Strategic Plan in 2019 that outlines goals and action items for each Working Group. Three of the Working Groups (Research, Management, and Decision Support) are collaboratively developing a decision support tool. This tool will enable natural resource biologists to probabilistically compare *Bsal* management options under different scenarios. The proactive efforts of the North American *Bsal* Task Force are providing the foundation necessary to respond effectively to a *Bsal* invasion using objective, science-based decision-making. There have been few times in history when natural resource agencies have had the opportunity to proactively plan for invasion of a wildlife pathogen before it emerges on a continent.

The goal of this symposium will be for leading experts to review the current status of research and preparations for a *Bsal* invasion in North America. The symposium will begin with an overview of the North American *Bsal* Strategic Plan followed by research

discussions on the susceptibility of North American species to *Bsal*, host immune defenses, and how *Bsal* causes disease in amphibians based on controlled experiments involving >30 species. The second group of talks will focus on research that is attempting to unravel the possible ecology and epidemiology of *Bsal* in North American systems based on experiments and mathematical simulations using the eastern newt (*Notophthalmus viridescens*) as a model organism. The symposium will end on insights about detecting *Bsal* using eDNA sampling, possible management strategies to combat emergence of *Bsal* in the wild, and development of a decision support tool for natural resource agencies. Two 20-min panel discussions will provide opportunity for the audience to ask experts about the risk of *Bsal* invasion, possible host treatment and population management options, or other questions that are generated during the symposium.

Names, Affiliations, Emails, and Working Presentation Titles:

1. Jacob Kerby, University of South Dakota, Jacob.Kerby@usd.edu, "North American *Bsal* Strategic Plan: Plans to prevent an invasion."
2. Jonah Piovia-Scott, Washington State University, jonah.piovia-scott@wsu.edu, "Susceptibility of North American amphibian species to *Batrachochytrium salamandrivorans*".
3. Louise Rollins-Smith, Vanderbilt University, louise.rollins-smith@vanderbilt.edu, " Studies of the skin secretions of Eastern Newts in defense against *Batrachochytrium salamandrivorans* ".
4. Doug Woodhams, University of Massachusetts-Boston, douglas.woodhams@umb.edu, "Testing the adaptive microbiome hypothesis in eastern red-spotted newts exposed to *Batrachochytrium salamandrivorans*."
5. Kenzie Pereira, Duquesne University, bozemank@duq.edu, "Investigating anti-chytrid properties of salamander skin secretions using in-vitro assays".
6. Debra Miller, University of Tennessee, dmille42@utk.edu, "Clinical and anatomical pathology of *Bsal*."
7. Davis Carter, University of Tennessee, ecarte27@utk.edu, "Winter is coming: Temperature dependent virulence of *Batrachochytrium salamandrivorans*."
8. Matthew Gray, University of Tennessee, mgray11@utk.edu, "Host density and habitat structure influence contact rates and transmission of *Batrachochytrium salamandrivorans*."
9. Angie Peace, Texas Tech University, A.Peace@ttu.edu, "Multiple Transmission Pathways in Mathematical Models of *Bsal*."
10. Ana Longo, University of Florida, ana.longo@ufl.edu, "Chytrid fungal co-infections in amphibians: what do we know and what should we expect?"
11. Delia Basanta, Universidad Nacional Autónoma de México, delibasanta@gmail.com, "Chytridiomycosis in Mexico: strains, infection and vulnerable amphibian species."
12. Christian Yarber, Washington State University, christian.yarber@wsu.edu, "Using eDNA technology to detect *Bsal* – implications for surveillance."
13. Molly Bletz, University of Massachusetts- Boston, molly.bletz@gmail.com. "Possible management strategies for combating a *Bsal* invasion."
14. Evan Grant, U.S. Geological Survey, ehgrant@usgs.gov, "Disease decisions can be rational choices."