

*Bsal* Task Force

# 2020 Annual Report

Sept 2021



salamander  
fungus  
.org

# 2020 Bsal TAC Annual Report



*Desmognathus sp. ochrophaeus*. © Twan Leenders

## Background

*Batrachochytrium salamandrivorans* (Bsal) is an emerging fungal pathogen that infects amphibian skin. It was discovered in 2013 in Europe, following the discovery of ongoing mortality of Fire Salamanders (Martel et al. 2013). It appears to be expanding in distribution (Spitzen-van der Sluijs et al. 2016). A 2014 experiment (Martel et al. 2014) revealed susceptibility of salamanders from around the world to the pathogen, including some North American species. At a 2015 workshop in Colorado, researchers and managers discussed approaches to learn more about the Bsal and the related emerging infectious disease caused by it and to forestall potential biodiversity losses in the Americas where it was not known to occur (Grant et al. 2016).

The Bsal Task Force was initiated in June 2015 and continues to meet in specialized working groups. Updates from each of the following Working Groups are highlighted below: 1) Data Management, 2) Decision Science, 3) Diagnostics, 4) Research, 5) Surveillance and Monitoring, 6) Clean Trade, 7) Response and Control, and 8) Communications and Outreach.

Working Group leads serve on the Technical Advisory Committee, which also includes representatives from concerned partner groups such as the Pet Industry Joint Advisory Council (PIJAC), Amphibian Survival Alliance, and US federal agencies. An Executive Oversight Group was envisioned for consultation. Related tasks have been taken up by the Disease Task Team founded by Partners in Amphibian and Reptile Conservation (PARC), and an independent working group in Canada, the Canadian Herpetological Health Working Group. National amphibian disease contacts in Mexico have been identified. An update from PARC is also provided below.

Actions to forestall Bsal transmission have been undertaken by three key partners. In 2015, the PIJAC instituted a moratorium on Asian salamander imports. In early 2016, the US Fish and Wildlife Service implemented an Interim Rule of the Lacey Act, naming 201 salamanders as injurious. They used an evidence-based approach prohibiting importation of any salamander genus whose members were shown to be carriers or to be lethally affected by Bsal in published papers. In the summer of 2017, Canada implemented import restrictions on all salamanders (Customs Notice 17-17; <http://www.cbsa-asfc.gc.ca/publications/cn-ad/cn17-17-eng.html>).

This report compiles activities conducted by the Bsal Task Force and their partners from January 2020 to December 2020. The global SARS-CoV-2 pandemic in 2020 slowed progress from the Bsal Task Force, but group members continued to meet and contribute when possible.



*Siren lacertina*. © Twan Leenders

## Key Accomplishments in 2020

- Amphibian disease repository and website ([amphibiandisease.org](http://amphibiandisease.org)) is now fully operational
- Continued working with National Wildlife Managers to create Bsal specific management plans
- Secured funding for a second ring test of Bsal diagnostic laboratories
- Continued ongoing research into transmission pathways and susceptible species
- Began trial runs of the Student Network for Amphibian Pathogen Surveillance (SNAPS)
- Assembled a Clean Trade Working Group of researchers and industry professionals
- Continued working towards Categorical Exclusion for Bsal
- Redesigned [salamanderfungus.org](http://salamanderfungus.org)

## Bsal Task Force Organization

The Bsal Task Force is an ad hoc group of scientists, managers, and citizens who are helping to understand and forestall the threat of Bsal in North America. Although a central focus is to coordinate strategic planning and efforts in the USA, there is participation from both Canada and Mexico, and also with European and Australian scientists. Below is a brief summary, please consult the Bsal Strategic Plan for a more detailed description of the organization (found at [www.salamanderfungus.org](http://www.salamanderfungus.org))

### Organizational Progress:

Working Groups were initially formed in June 2015. Since then, they have met via conference calls on a regular basis to outline new tasks and discuss progress on existing efforts. Group membership is open and inclusive, but was initially founded with persons involved with disease research, natural resource management in state and federal agencies, environmental or conservation groups, nongovernmental organizations, and the pet industry. Each group has one to three leads, who help to coordinate personnel, manage the workload, and report to the Technical Advisory Committee. The Technical Advisory Committee (TAC) is populated by the Working Group leads and representatives from selected partner groups including federal agencies, the IUCN Amphibian Survival Alliance (ASA), and the Pet Industry Joint Advisory Council (PIJAC). The TAC meets by conference call monthly, with a focus on new items and round-robin reporting by participants. New items have included tasks to be assigned or delegated to others, opportunities for products and grant proposals, and communication-outreach and networking needs. Monthly meeting notes are routed to TAC members, then to their working group members, to ensure communication. A lead for the TAC is determined by the TAC and is rotated each year. The incoming and outgoing leads serve as co-leads. Decisions of the TAC are made by consensus.



*Plethodon glutinosus*. © Twan Leenders

## Data Management Working Group

### Leads

Michelle Koo (UC Berkeley and AmphibiaWeb)  
Deanna Olson (US Forest Service, Pacific Northwest Research Station)

### Members

Diana Lovette (website developer, UC Berkeley); Vance Vredenburg (AmphibiaWeb steering committee, San Francisco State University); David Wake (AmphibiaWeb director, UC Berkeley); Kathryn Ronnenberg (US Forest Service, Bd-maps data manager); John Deck (developer, UC Berkeley).

### Summary Statement

The Amphibian Disease repository and website ([amphibiandisease.org](http://amphibiandisease.org)) is fully operational for archiving and sharing aggregated Bd and Bsal data from published and unpublished sources and is poised for its next phase of expanding data visualizations and outreach to the research community. While objectives with initial funding are completed, the AmphibiaWeb project (UC Berkeley) is supporting ongoing maintenance and working to expand data visualizations of the Bd and Bsal data such as country- and species-summary charts and custom query interfaces. The Working Group leads are focusing on outreach to the research, management, and public communities.

### Key Point

- Bsal data are accessible for queries to inform science and management decisions and for metadata analyses of host-pathogen-geographic dynamics.

### Key Need

- Future funding is needed to further develop publicly digestible data visualizations, expanding mapping capabilities, and creating additional support for modeling of diseases. These new features will support collaborations to create curricula and facilitate use of these data in undergraduate and high school courses. We also need outreach to academic journals to promote its use as a data repository.

### Accomplishments

- 1) The [amphibiandisease.org](http://amphibiandisease.org) chytrid data portal was further developed in 2020. We completed substantial infrastructure changes to enhance our data validation process by collaborating and aligning the portal with the GEOME platform (<https://geome-db.org>). GEOME is the Genomic Observatories Meta-Database which is a web-based database that captures the who, what, where, and when of biological samples and associated genetic sequences. GEOME ensures the metadata from bio-samples are discoverable, accessible and useful in research by adhering to global metadata standards and provides API access. It is currently supported by the Berkeley Natural

History Museums, Smithsonian National Museum of Natural History and NSF's iDigBio efforts. We also updated the public website for the Amphibian Disease portal to provide a more uniform and robust user interface, which will also make the website easier to maintain. A manuscript is in preparation summarizing [amphibiandisease.org](http://amphibiandisease.org) development (Koo et al.; June 2021 submission, *Front. Vet. Sci.*).

- 2) Data visualizations at the [amphibiandisease.org](http://amphibiandisease.org) portal include:
  - Taxa snapshots and heatmaps of Bd-detection data (Bd detected, Bd not detected, Bd inconclusive data)
  - Project pages including DOI reference for data and project, links to paper DOIs, mapping data, and supplemental data
- 3) Bd data from the Global Bd Mapping Project and [Bd-maps.net](http://Bd-maps.net) database are in transition to [amphibiandisease.org](http://amphibiandisease.org), with a comprehensive data update through December 2019 completed. As a measure of world Bd data aggregation, the last functional download from the online database in 2013 contained 11,305 records (e.g., Bd sampling of a species at a site in a year), and the database now has 33,753 records; information has tripled in 6 years. This is a measure of the efficacy of global community to advance understanding of pathogen and represents a valuable database to inform science and management decisions and contribute to myriad novel metadata analyses of host-pathogen-geographic dynamics. A manuscript is in preparation summarizing taxonomic, geographic, and environmental associations of Bd occurrences (Olson et al.; January 2021 submission, *Front. Vet. Sci.*).

## Outcomes or impacts (including products and contribution to Strategic Plan) from workgroup activities

### a) Presentations:

- Koo, M.S. and D.H. Olson. 2020. The Bsal Data Management Working Group. North American Bsal Task Force webinar, 27 October 2020.
- Olson, D. 2020. Emerging Infectious Diseases in Freshwater Systems: Amphibian Perspectives. Graduate Student seminar: Unique Challenges of Marine Diseases, Oregon State University, Department of Integrative Biology, Corvallis, OR. Dr. Sarah Graven, lead, 4 February 2020.
- Olson, D.H. and K.L. Ronnenberg. 2020. World wide web portals for herpetofaunal pathogen data. World Congress of Herpetology, Dunedin, New Zealand, 5-10 January 2020.

### b) Interactions with Other Groups

The Data Management Working Group works closely with the Surveillance Working Group, the Diagnostics Working Group (e.g., mapping diagnostics laboratories), the Communications and Outreach Working Group, and the PARC Disease Task Team. In particular, the combined efforts of the working groups are collaborating on a joint project called **SNAPS: Student Network for Amphibian Pathogen Surveillance** in which college courses will spearhead student efforts to sample from field or collections chytrid swabs to be tested by the National Lab for Bd and Bsal as part of a STEM-based curricula. These data in turn will be deposited in the Amphibian Disease portal

and be available for student-led projects or other research. SNAPS based dynamic charting will be possible in the current Amphibian Disease portal. The Data Management Working Group and the Surveillance and Monitoring Working Group established the new website at <https://snaps.amphibiandisease.org>. The site is still in progress needing content from the SNAPS group but its domain name reflects the close collaboration between the working groups.

Communication is ongoing with the PARC Disease Task Team, which created a Bsal factsheet in 2020, and international scientists and managers to increase the breadth of Bsal data imports to the web portal.

Lessons-learned from Bd and Bsal global community database assembly and web portal development have informed other disease groups. In 2020, communication and program development occurred between the joint Bd and Bsal efforts and both the Global Ranavirus Reporting System of the Global Ranavirus Consortium (Brunner et al. 2021) and a new marine disease working group (C.K. Glidden et al. in prep.) modeled after the Sea Star Wasting Syndrome Task Force (Sea Star Wasting Syndrome Task Force 2018).

## References

Brunner, J.L., D.H. Olson, M.J. Gray, D.L. Miller, A.L.J. Duffus. 2021. Global patterns of ranavirus detections. *FACETS* 6:912-924. doi:10.1139/facets-2020-0013.

Sea Star Wasting Syndrome Task Force. 2018. Research and Management Priorities to Address Sea Star Wasting Syndrome: A Collaborative Strategic Action Plan. Issue 1. 35p.

<http://www.piscoweb.org/sites/default/files/Research%20and%20Management%20Priorities%20to%20Address%20Sea%20Star%20Wasting%20Syndrome%20%281%29.pdf>; accessed 7 June 2021.



*Notophthalmus viridescens*. © Twan Leenders

## Decision Science Working Group

### Lead

Evan Grant (USGS)

### Members

Robin Russell (USGS), Katie Richgels (USGS), Riley Bernard (USGS/Penn State University), Brittany Mosher (University of Vermont), Katrina Alger (USGS), Alex Wright (Michigan State University)

### Summary

The Decision Science Working Group provides problem framing, models, and analyses to support management decisions regarding *Bsal*.

### Key Points

This group evaluated problems facing US protected area managers in responding to the threat of *Bsal* and identified the decisions that can be solved via research (reduction of uncertainties) and decision analysis (e.g., trade-off with other non-amphibian objectives). The group has been asked by resource managers to help further refine their decision problems and to help identify possible proactive management solutions that can be implemented immediately to reduce the threat of *Bsal* invasion and post-introduction consequences. This group completed a model to assess the effectiveness of importation bans of salamanders as a management strategy for *Bsal*, given the deep uncertainty in the processes leading to introduction of *Bsal* to wild and susceptible populations. The group also began work with international partners to develop a complete system diagram that may be used for modeling, research prioritization, and decision-making.

### Manuscripts in preparation or review

\*Author names in **bold** are members of the Decision Support Working Group.

1. **Bernard, Riley F.** and **Evan H. Campbell Grant.** *In Review*. Rapid assessment indicates context-dependent mitigation for amphibian disease risk. Wildlife Society Bulletin.
2. **Grant, EHC, RE Russell,** CL White, **KLD Richgels.** *In revision*. Biosecurity does not provide an acceptable level of protection against an emerging infectious disease

### Progress

Following the publication by Bernard & Grant (2019), we engaged with three USFWS National Wildlife Managers in Region 5 to work through their amphibian – *Bsal* decision problems. Using the refuges' most recent Comprehensive Conservation Plans

and Habitat Conservation Plans, we identified refuge specific management objectives, including amphibian- and disease-focused objectives and developed *Bsal*-specific means objectives. We are currently revising the decisions with each manager using a 'rapid prototyping' approach. Currently, we are working with each manager to finalize the rapid prototypes and will be incorporating the various management objectives into a manuscript that will help scientists identify which objectives and endpoints are most critical in determining if a treatment will be implemented by a manager.

In 2020, we received support from the National Socio-Environmental Synthesis Center (SESYNC) to create a multi-disciplinary working group comprised of amphibian and disease experts from academia, governmental and non-governmental agencies, non-profit entities, and decision analysts. In order to gain traction in mitigating pervasive threats to amphibian populations, we began to develop a co-generated system model, or influence diagram, to improve opportunities for proactive management of *Bsal*. Using tools from decision theory, we have drafted a model that can be used to (1) quantitatively evaluate potential effects of alternative management actions, (2) generate novel actions for mitigation and control, and (3) improve communication with stakeholders and the public regarding *Bsal* and amphibian management decisions. Relevant to the mission of SESYNC, our approach will identify both ecological and social factors that influence the susceptibility and control of *Bsal* in native US amphibian populations. This project has been funded, but working groups have not met in 2020. The hope is to meet in person to work on these models in 2021.

## Challenges

Challenges remain, including engaging managers when immediate risk of *Bsal* infection is low (i.e., as *Bsal* has not been detected in the US). This effectively limits the ability to identify and implement proactive management – representing a major challenge for developing management strategies for *Bsal* and other emerging infectious diseases. Specific and measurable amphibian management objectives are not common among natural resource agencies and we are working with several agencies to set objectives for amphibians in communities vulnerable to *Bsal*. In addition, there have been no treatment options identified for *Bsal* (and limited options for other fungal diseases of wildlife), which limits the alternatives available to managers.

Better coordination among the *Bsal* working groups could lead to beneficial synergies and maximize efficient use of expertise. For example, models for population outcomes may be informed by both the available treatment options and the ability of managers to implement a treatment, which can be considered by merging knowledge and skills between the Research and Decision Science working groups.

## Outcomes / Manuscripts

\*Author names in **bold** are members of the Decision Support Working Group.

1. **Mosher, B.A., Bernard, R.F.**, Lorch, J.M., Miller, D.A., **Richgels, K.L.**, White, C.L. and **Grant, E.H.C.**, 2020. Successful molecular detection studies require clear communication among diverse research partners. *Frontiers in Ecology and the Environment*, 18(1), pp.43-51.
2. **Russell, RE**, GV DiRenzo, J Szymanski, **KA Alger, EHC Grant**. 2020. Principles and mechanisms of disease resistance and resilience in wildlife. *Frontiers in Ecology and Evolution*, 8, pp.344.
3. O'Donnell, K.M., and **E.H.C. Grant**. In press. Decision analysis and adaptive management: strategies to overcome challenges of uncertainty and inaction. Pages xx–xx in S.C. Walls and K.M. O'Donnell, editors. *Strategies for Conservation Success in Herpetology*. Society for the Study of Amphibians and Reptiles, University Heights, OH, USA.
4. **Wright, AD, RF Bernard, BA Mosher**, KM O'Donnell, T Braunagel, GV DiRenzo, JE Fleming, C Shafer, AB Brand, EF Zipkin, and **EHC Grant**. 2020. Moving from decision to action in conservation science. *Biological Conservation*, 249

## Interactions with Other Working Groups

Ongoing work includes collaboration with the USFWS to frame emerging disease problems for WNS local management and treatment decisions, with the intention to use insights to inform *Bsal* decision problems. We are working with the Research and Management working groups to detail a model of the *Bsal* system so that management actions may be identified and evaluated using a shared system model (SESYNC funded workshop). We continue to work with the Research working group and outside experts in amphibian disease ecology to populate a disease treatment table, which will provide options to resource managers considering actions, help to guide research priorities, and identify tradeoffs in other important objectives for resource management.

## Diagnostics Working Group

### Leads

María J. Forzán, Long Island University (2018-2020)

Jacob Kerby, University of South Dakota University (November 2020-onwards)

### Members

Julie Ellis, Dan Grear, Jeff Lorch, Robert Ossiboff, Kim Hamad-Schifferli, Carly Muletz Wolz, Matt Allender, Heather Fenton, Jacob Kerby, An Martel, Frank Passmans, Laura Sprague, John Wood, Cherie Briggs, Leon Grayfer, Steven Lloyd, Deb Miller, Allan Pessier, LeAnn White

### Summary

The Diagnostics Working Group (DxWG) promotes the development of standards for diagnosis and reporting of amphibian EIDs among the wildlife health community, with the salamander chytrid fungus, [\*Batrachochytrium salamandrivorans\* \(Bsal\)](#) as the primary focus. We serve as a forum to exchange ideas and work out the challenges involved in Bsal detection and to provide expert advice to the rest of the Bsal Task Force regarding the viability and pitfalls of traditional and new tools for Bsal detection and diagnosis.

The Diagnostics Working Group (DxWG) is composed of professionals with expertise in the application and interpretation of an array of diagnostic tools. Our members work in academia, diagnostic laboratories and government agencies throughout North America and are involved in detection and reporting of amphibian diseases, including BSal.

### Key points

The main priorities of the group are:

1. Establish a long-term program for inter-laboratory quality control and evaluation of protocols for the detection of wildlife pathogens, particularly *Batrachochytrium dendrobatidis* (Bd) and Bsal (DxWG's Goal 1 of the Strategic Plan).

2. Develop a standardized and replicable method that will allow comparison across studies and a reliable estimation of presence and/or prevalence and Bd and Bsal (DxWG's Goal 2 of the Strategic Plan).

## Outcomes or impacts and ongoing projects

Based on the group's goals and other initiatives:

1. Program for inter-laboratory quality control and evaluation of protocols for the detection of wildlife pathogens, particularly Bd and Bsal: Partially accomplished

Jennifer Provencher and her successor Cynthia Pekarik, Environment and Climate Change Canada (ECCC), were able to secure funding in 2020, so that María Forzán (MF), DxWG's past facilitator, and Nicholas Hollingshead (NH), Data Analyst, could establish the framework for a ring test, or round robin, designed to test laboratory proficiency in PCR tests for Bd and Bsal. Test material, consisting of inactivated cultures of Bd and Bsal, provided by collaborators at Vanderbilt University (Louise Rollins-Smith, Professor), were used to prepare blind and randomized samples at Pisces Molecular (John Wood, Director). Adding the ECCC funding to some research funds that MF had, the round robin expanded to include detection of Frog virus 3 (FV3), the type species of the *Ranavirus* genus. FV3 was provided by Cornell University (Diego Diehl, Virology Laboratory, Director). Blind samples were shipped during the month of November, to over 40 participating labs. Currently, the website portal to upload results is being finalized by NH and MF.

1. Develop a standardized and replicable method that will allow comparison across studies and a reliable estimation of presence and/or prevalence and Bd and Bsal: Early stages

Funding to perform the round robin proficiency test also stretched to provide a few participating laboratories with a plasmid standard that included sequences for all 3 pathogens tested. Participants will report results with this plasmid standard as well as results using their routine standards, so an early comparison can be made and the precedent set for further methodological comparisons.

1. Ongoing project: Group members and other wildlife professionals are collaborating on a review manuscript, spearheaded by Kim Hamad-Schifferli, on diagnostic methods for infectious disease surveillance and monitoring in wildlife, pros and cons, as they are applied to Bsal detection.

## Obstacles

- As all group members are fully employed at academic, private or governmental institutions, their professional commitments make it difficult to dedicate time to the collaborative effort to produce a review manuscript.
- Needless to say, the current coronavirus pandemic has exacerbated all limitations experienced by group members, both in their own professional activities and in their participation in the group's initiatives.

## Interactions with other groups

Several members also serve in the Research, Management, Response, and Data Management groups. MF moved on to the position of chair of the Task Force in October 2020, and was replaced by Jacob Kerby as the lead for the DxWG.



*Ensatina eschscholtzii*. © Twan Leenders

## Research Working Group

### Leads

Douglas Woodhams, University of Massachusetts Boston  
Molly Bletz, University of Massachusetts Boston

### Members

Alessandro Catenazzi, Alexis Korotasz, An Martel, Andrianna Pompros, Alexa Warwick, Kenzie Pereira, Davis Carter, Debra Miller, Evan Grant, Riley Bernard, Grace Drenzo, Jessie Brunner, Jonah Piovia-Scott, Kristyn Robinson, Matthew Gray, Maria Forzan, Lilian Fritz-Laylin, Sarah Woodley, Louise Rollins-Smith, Mitch LeSage, Obed Hernandez, Evan Eskew, Léa Fieschi-Méric, David Lesbarreres

## Bsal Research Working Group Accomplishments

### I. Funding Secured for Bsal Research

#### A. Secured

1. March 2020 - Michigan State University College of Ag and Natural Resources Undergraduate Research Program, \$2000 [funded Oct 2020]

#### B. Applied

1. November 2020 - NSF EEID - Socioeconomic epidemiology of disease risk in wildlife trade networks (Gray, Fefferman, Poudyal, Brunner, Piovia-Scott, Bletz, Warwick, Miller, Lockwood, \$2,499,876?) [pending]
2. Dec 2019 - SSAR Roger Conant Grants in Herpetology Program, \$500 [not funded]
3. Oct 2020 - George and Mary Rabb Research Fellowship, \$5000 [not funded]
4. National Science Foundation BII-Design: Amphibian Disease Institute – Proactive Science in the Age of Globalization and Rapid Environmental Change (Kerby, Gray, Bletz, \$171,541, not funded).

#### C. Ongoing

1. NSF EEID, Grant # 1814520. Transmission pathways and immunological factors that affect invasion potential of the recently discovered pathogen, *Batrachochytrium salamandrivorans*. PIs: Gray, Miller, Woodhams, Rollins-Smith, Briggs, Peace, Pessier (\$2,494,511 funded).

2. U.S Fish and Wildlife Service, Competitive State Wildlife Grant, #TN-U2-F19AP00047. Threat of *Batrachochytrium salamandrivorans* (Bsal) to species of greatest conservation need and proactive development of disease management strategies. PIs: Gray, Woodhams, Piovio-Scott, Sutton (\$499,167, funded).

## II. Research Activities

- A. **Goal 1:** Understand the role of human behavior and the pet trade in the spread and spillover of Bsal.
  1. Susceptibility trials for common species in the pet trade
    - a) Piovio-Scott Lab: *Kaloula pulchra* (chubby frog)
    - b) Bletz: *Bombina orientalis* (fire bellied toad)
  2. Developed human dimensions research interview protocols and completed three interviews (Warwick lab group).
- B. **Goal 2:** Identify critical transmission pathways and conditions under which Bsal is likely to emerge in amphibian host populations in North America (e.g., compartmental disease models).
  1. Completed research on temperature dependent susceptibility of Bsal and possible regulating mechanisms; manuscript submitted to PLOS Pathogens.
  2. Completed research on the functional form of Bsal transmission; manuscript in preparation.
  3. Ongoing research investigating transmission of Bsal given contact with live infected hosts and exposure to dead infected hosts in aquatic environments.
  4. Ongoing research estimating the shedding rate of zoospores by hosts among different stages of infection.
  5. Ongoing research on the influence of micropredators on zoospore persistence in aquatic environments.
  6. Ongoing research estimating contact rates of adult and juvenile salamanders in aquatic and terrestrial habitats.
- C. **Goal 3:** Produce more informed Bsal risk models for North America through improved, objective classification of species susceptibility and tolerance to Bsal infection (e.g., integral projection models).
  1. Susceptibility trials for North American species
    - a) Piovio-Scott Lab:
      - (1) Oct 1 2019 - Sept 30 2020: *Rhyacotriton variegatus* (Oct-Nov 2019)
      - (2) Started Nov 2020: *Dicamptodon tenebrosus* (Pacific giant salamander), *Aneides ferreus* (clouded salamander)

- b) Gray Lab completed Bsal susceptibility trials on 8 additional species.
- D. **Goal 4:** Identify effective methods to manage Bsal-induced disease and clear Bsal infections in captive and field settings.
  1. Completed 3-way factorial disease mitigation experiment with aquatic eastern newts - Probiotics, Vaccine, and Micropredators.
  2. Ongoing research on the effectiveness of plant-derived fungicides at inactivating Bsal.
  3. Ongoing research evaluating the effectiveness of bacterial compounds at inactivating Bsal (in collaboration with University of Massachusetts-Boston and Liberty University).
- E. **Goal 5:** Quantify innate and adaptive immune responses to Bsal across species and environmental conditions.
  1. Ongoing research on secondary exposure and primed immune responses
  2. Ongoing research on skin mucus components including peptides and TTX and activities against Bsal.
- F. **Goal 6:** Identify the mechanisms of Bsal pathogenesis.
  1. Ongoing research on mechanisms of Bsal pathogenesis - role of bacteremia.
- G. **Goal 7:** Establish effective methods for detecting Bsal infections.
  1. Completed research relating genomic copies of Bsal DNA estimated by qPCR to zoospore equivalents; manuscript in preparation.
  2. Methods for detection of Bsal (and Bd) from mucosome washes (Woodhams)
- H. **Goal 8:** Estimate the interactive effects of Bsal with natural and anthropogenic stressors.
  1. No active research

### III. Delivered Research Presentations on Bsal

- A. The Wildlife Society & American Fisheries Society joint meeting, Reno, NV.
  1. Brunner, J.L. Detecting infections in trade with individual samples, pooled samples, and environmental DNA.
  2. Yarber\*, C., Goldberg, C. Pessier, A., Romansic, J., Piovio-Scott, J., & Brunner, J.L. Using eDNA technology to detect Bsal: Implications for surveillance.
  3. Piovio-Scott, J., Carter, D., Romansic, J., Cusaac, J.P., Rollins-Smith, L., Reinert, L.K., Miller, D., Pessier, A., Harris, R.N., Williams, L.A. and Upchurch, A., 2019, September. Susceptibility of North American Amphibian Species to Batrachochytrium Salamandrivorans. In *American Fisheries Society & The Wildlife Society 2019 Joint Annual Conference*. AFS.

## B. New Zealand

1. Bletz, M. Confronting Amphibian Diseases: Frontiers in Effective Mitigation (ASA), World Congress of Herpetology (Amphibian Conservation Research Symposium), Dunedin, New Zealand. January 2020
2. Bletz, M, Woodhams, D, Hamad-Schiifferi, K. Proactive Conservation: Developing Strategies to Combat the Salamander-eating fungus, World Congress of Herpetology, Dunedin, New Zealand. January 2020
3. Bajo, B. A., E. D. Carter, M. Bohanon, D. Malagon, B. Augustino, R. Kumar, P. Watcharaanantapong, D. L. Miller, and M. J. Gray. 2020. Changes in Eastern Newt Behavior Associated with *Batrachochytrium salamandrivorans* (Bsal) Chytridiomycosis. 9th World Congress of Herpetology, Otago, Dunedin, New Zealand.
4. Carter, E.D., D. L. Miller, B. A. Bajo, A. Peterson, M. Bohanon, K. Ash, P. Watcharaanantapong, and M. J. Gray. 2020. Winter is coming: Temperature dependent virulence of *Batrachochytrium salamandrivorans*. 9th World Congress of Herpetology, Otago, Dunedin, New Zealand.
5. Gray, M. J., E. D. Carter, J. P. W. Cusaac, A. C. Peterson, L. Rollins-Smith, L. Reinert, M. Bohanon, B. A. Bajo, K. Ash, D. A. Malagon, B. Augustino\*, R. Kumar, L. Williams, A. Upchurch, P. Nanjappa, R. N. Harris, and D. L. Miller. 2020. Broad host range of *Batrachochytrium salamandrivorans* equates to high invasion probability in North America. 9th World Congress of Herpetology, Otago, Dunedin, New Zealand.
6. Grzelak, A., R. Kumar, C. Cray, E. D. Carter, P. Watcharaanantapong, K. Ash, B. A. Bajo, M. Bohanon, A. C. Peterson, M. J. Gray, and D. L. Miller. 2020. Clinical pathology of Bsal chytridiomycosis: hematological, biochemical, and serum protein analyses of infected *Taricha granulosa*. 9th World Congress of Herpetology, Otago, Dunedin, New Zealand.
7. Miller, D. L., A. Grzelak, A. Towe, R. Ossiboff, C. Cray, E. D. Carter, B. Bajo, M. Bohanon, A. Peterson, and M. Gray. 2020. Look, that salamander is being eaten alive! 9th World Congress of Herpetology, Otago, Dunedin, New Zealand.
8. Peterson, A. C., M. Bohanon, E. D. Carter, B. A. Bajo, P. Watcharaanantapong, D. L. Miller, J. G. Surlles, and M. J. Gray. 2020. Estimating contact rates of Eastern newts (*Notophthalmus viridescens*) at differing temperatures, densities and habitat structure. 9th World Congress of Herpetology, Otago, Dunedin, New Zealand.
9. Towe, A., M. Gray, E. D. Carter, K. Ash, M. Bohanon, B. Bajo, and D. L. Miller. 2020. *Batrachochytrium salamandrivorans* (Bsal)

chytridiomycosis it's not just for salamanders! 9th World Congress of Herpetology, Otago, Dunedin, New Zealand.

C. Southeast PARC

1. Carter, E.D., D. L. Miller, B. A. Bajo, A. Peterson, M. Bohanon, K. Ash, P. Watcharaanantapong, A. Tompros, and M. J. Gray. 2020. Winter is coming: Temperature dependent virulence of *Batrachochytrium salamandrivorans*. Annual Meeting of the Southeast Partners in Amphibian and Reptile Conservation, Nauvoo, AL.
2. Siniard, W. C., A. K. Grzelak, R. Kumar, C. Cray, E. D. Carter, P. Watcharaanantapong, K. Ash, B. Bajo, M. Bohanon, A. C. Peterson, M. J. Gray, and D. L. Miller. 2020. Clinical pathology of *Bsal* chytridiomycosis: hematological, biochemical, and serum protein analyses of infected *Taricha granulosa*. Annual Meeting of the Southeast Partners in Amphibian and Reptile Conservation, Nauvoo, AL.
3. Tompros, A., E. D. Carter, A. Fenton, M. Wilber, M. Bohanon, P. Watcharaanantapong, K. Ash, D. L. Miller, and M. J. Gray. 2020. Density-dependent mortality of eastern newts exposed to *Batrachochytrium salamandrivorans*. Annual Meeting of the Southeast Partners in Amphibian and Reptile Conservation, Nauvoo, AL
4. Towe, A., D. L. Miller, E. D. Carter, K. Ash, M. Bohanon, B. Bajo, and M. J. Gray. 2020. *Batrachochytrium salamandrivorans* in the Cuban tree frogs (*Osteopilus septentrionalis*). Annual Meeting of the Southeast Partners in Amphibian and Reptile Conservation, Nauvoo, AL.

**IV. Delivered Outreach Presentations on *Bsal***

- A. Bletz, MC, Guest Lecture Conservation Biology Course, University of Mass Boston, "*Proactive Policy and Management for Wildlife Diseases*" November 2020

**V. Multimedia Presentation**

- A. Symposium (if not reported previously):
  1. Gray, M. J., and J. Voyles. 2019. First North American Symposium on *Batrachochytrium salamandrivorans*. Joint Meeting of the American Fisheries Society and The Wildlife Society, Reno, NV (9/30/19). Videos: <https://itunes.apple.com/itunes-u/ut-forestry-wildlife-fisheries/id494866284>
- B. Interviews:
  1. Prevention and Mitigation of a Dangerous Amphibian Pathogen (podcase by graduate students, A. Tompros and D. Carter: <https://anchor.fm/utiag/episodes/Step-Outside-Prevention-and-Mitigation-of-a-Dangerous-Amphibian-Pathogen-emeapc>

2. A skin-eating fungus from Europe could decimate Appalachia's salamanders (interview of D. Miller and M. Gray): <https://theconversation.com/a-skin-eating-fungus-from-europe-could-decimate-appalachias-salamanders-but-researchers-are-working-to-prevent-an-outbreak-149418>
  3. To prevent the next pandemic, it's the legal wildlife trade we should worry about (M. Gray and others interviewed): <https://www.nationalgeographic.com/animals/2020/05/to-prevent-next-pandemic-focus-on-legal-wildlife-trade/>
- C. Websites:
1. UTIA Amphibian Disease Laboratory: <https://ag.tennessee.edu/fwf/adl>
  2. UTIA *Batrachochytrium salamandrivorans* Project: <https://bsalproject.tennessee.edu>

## VI. Peer-refereed Publications

- A. Robinson, K.A., Pereira, K.E., Bletz, M.C., Carter, E.D., Gray, M.J., Piovato-Scott, J., Romansic, J.M., Woodhams, D.C. and Fritz-Laylin, L., 2020. Isolation and maintenance of *Batrachochytrium salamandrivorans* cultures. *Diseases of Aquatic Organisms*, 140, pp.1-11.
- B. Brunner, J. L. 2020. Pooled samples and eDNA-based detection can facilitate the “clean trade” of aquatic animals. *Scientific Reports* 10:10280.
- C. K Barnhart, MC Bletz, B LaBumbard, A Tokash-Peters, CR Gabor, & DC Woodhams. 2020. *Batrachochytrium salamandrivorans* elicits stress response in spotted salamanders but not mortality. *Animal Conservation*.
- D. S Horan, C McDonald, MC Bletz. 2020. *Batrachochytrium dendrobatidis* is widespread and associated with water temperature in the Eastern United States. *Herp Review*. 53.
- E. MC Bletz, BC LaBumbard, AY Basco Martinez, RN Harris & DC Woodhams. Fighting microbes with microbes: First steps in developing probiotic mitigation tools to combat salamander chytridiomycosis in eastern newts. In S.C. Walls and K.M. O'Donnell (eds). *Strategies for Conservation Success in Herpetology*. Society for the Study of Amphibians and Reptiles, University Heights, OH, USA. *In Press*
- F. Canessa, S., A. Spitzen-van der Sluijs, T. Stark, B. Allen, P. Bishop, M. Bletz, C. Briggs, D. Daversa, M. J. Gray, R. Griffiths, H. Richard, H. Reid, X. Harrison, J. Hoverman, P. Jervis, E. Muths, D. Olson, and D. Olson, S. Price, C. Richards-Zawacki, J. Robert, G. Rosa, B. Scheele, B. Schmidt, T. Garner. 2020. Conservation decisions under pressure: lessons from an exercise in rapid response to wildlife disease. *Conservation Science and Practice*, e141. <https://doi.org/10.1111/csp2.141>.
- G. Carter, E. D., D. L. Miller, A. C. Peterson, W. C. Sutton, J. P. W. Cusaac, J. A. Spatz, L. Rollins-Smith, L. Reinert, M. Bohanon, L. A. Williams, A. Upchurch, and M. J. Gray. 2020. Conservation risk of *Batrachochytrium salamandrivorans* to endemic lungless salamanders. *Conservation Letters*, 13;

- e12675. <https://doi.org/10.1111/conl.12675>.
- H. Kumar, R., D. A. Malagon, E. D. Carter, D. L. Miller, M. Bohanon, J. P. Cusaac, A. C. Peterson, and M. J. Gray. 2020. [Experimental methodologies can affect pathogenicity of \*Batrachochytrium salamandrivorans\* infections](#). PLOS ONE, 15(9): e0235370.
  - I. Islam, R. M., M. J. Gray, and A. Peace. 2020. Identifying the dominant transmission pathway in a multi-stage infection model of the emerging fungal pathogen *Batrachochytrium salamandrivorans* on the eastern newt. *Mathematics of Planet Earth (Infectious Diseases of Our Planet)*, Springer, New York, USA.
  - J. Malagon, D. A., L. A. Melara, O. F. Proper, S. Lenhart, E. D. Carter, J. A. Fordyce, A. C. Peterson, D. L. Miller, and M. J. Gray. 2020. [Host density and habitat structure influence host contact rates and \*Batrachochytrium salamandrivorans\* transmission](#). Scientific Reports.
  - K. Pereira, K. E., M. J. Gray, J. L. Kerby, E. H. Campbell Grant, and J. Voyles. 2020. [The next threat: how do we stop fungal disease from devastating North American salamanders?](#). *Wildlife Professional*, Vol. 14(2): 41-46.
  - L. *In Review* ~ Carter, E. D., M. C. Bletz, M. Le Sage, B. LaBumbard, L. Rollins-Smith, D. C. Woodhams, D. L. Miller, and M. J. Gray. In review. Winter is Coming – Temperature Affects Immune Defenses and Susceptibility to *Batrachochytrium salamandrivorans*. PLoS Pathogens.
  - M. *In Review* ~ Gray, M. J., E. D. Carter, J. P. D. Cusaac, A. C. Peterson, R. Whetstone, A. Hertz, M. C. Bletz, D. C. Woodhams, J. Piovio-Scott, J. Romansic, G. Parra Olea, R. Hardman, C. D. McCusker, and D. L. Miller. In review. Broad host susceptibility of North American amphibian species to *Batrachochytrium salamandrivorans* suggests high invasion potential. *Nature Communications*
  - N. *In Review* ~ Towe, A. E., M. J. Gray, E. D. Carter, R. J. Ossiboff, K. Ash, M. Bohanon, B. A. Bajo, and D. L. Miller. In review. *Batrachochytrium salamandrivorans* can devour more than salamanders. *Journal of Wildlife Diseases*.
  - O. *In Review* ~ Wilber, M. Q., E. D. Carter, M. J. Gray, and C. J. Briggs. In revision. Putative resistance and tolerance mechanisms have little impact on disease progression for an emerging salamander pathogen. *Functional Ecology*.

## VII. Other Achievements

- A. M. Gray awarded a 2020 University of Tennessee Research and Creative Achievement Award, <https://honorsbanquet.utk.edu/2020-research-and-creative-achievement/>

# Surveillance and Monitoring Working Group

## Leads

Olya Milenkaya (Warren Wilson College)  
Jenifer Walke (Eastern Washington University)

## Members

Michael J. Adams, Daniel Grear, Sasha Greenspan, Oliver Hyman, Michelle Koo, Brittany Mosher, Eria Rebolgar, Lenny Shirose Vance Vredenburg

## Outcomes

- The working group changed its name to include Bsal monitoring in addition to surveillance. The working group includes about a dozen colleagues across academia and federal agencies, with a core group of about ten members who meet monthly or twice monthly.
- Our primary focus for ongoing and coordinated Bsal surveillance continues to be the development of a student-powered surveillance network: Student Network for Amphibian Pathogen Surveillance (SNAPS). Through this new program, we leverage the passion and people-power of students to surveil broadly for Bsal, while also leveraging the challenge of responding to the Bsal threat as an opportunity for active student learning. The primary accomplishment in 2020 was that SNAPS had its first trial-run, although it was limited in scale due to COVID-19. At the start of this year, we had five instructors at different institutions ready to do SNAPS with their classes, but only one was able to complete the exercise. We secured collecting permits and IACUC approval, obtained equipment and supplies, developed lesson plans, prepared assessment tools for assessing student learning outcomes, and we secured IRB approval for that. We are hopeful for a more extensive trial run in spring 2021, so that we can recruit more broadly for fall 2021.
- We are in the process of drafting guidelines for Bsal monitoring in the event of a Bsal detection in North America. The objective of the guidelines document is to provide information related to sampling for Bsal after Bsal is detected, with a goal of understanding the distribution and spread of Bsal in the vicinity of the detection. We note that a detection in one part of North America increases the need for surveillance in other parts of North America but our focus in the guidelines is on the vicinity of a detection.
- We revised the SNAPS mission and vision statements.
- We are in the process of developing a website for SNAPS.
- We developed an animal care memorandum of understanding (MOU) for the entire SNAPS project that is hosted through the University of Vermont (Brittany Mosher). This will lower the barrier to entry for many participants and will streamline the process of

obtaining animal handling approval, especially at institutions without research offices. Therefore, we expect that this will increase participation while ensuring a consistent adherence to approved protocols, ethical animal use, and expectations.

- We continue to evaluate options for the visual identity for SNAPS, with the goal of having the program branded when we recruit for participants more broadly. We have also recruited assistance for our website interface development.
- We have begun coordinating efforts for a Bsal results round-up, where we will compile and publish negative Bsal surveillance data from researchers across North America that likely would otherwise go unpublished. The goal is to publish an annual paper.
- The Surveillance and Monitoring Working Group collaborates with four other Working Groups. We work closely with Data Management because of the interaction between SNAPS and [amphibiandisease.org](http://amphibiandisease.org) (Michelle Koo). We also worked with Diagnostics in the development of our sampling protocols for SNAPS (Dan Grear). We also share members of our working group with Response and Control (Mike Adams) and Decision Science (Brittany Mosher), providing a link and increased communication among groups.
- We have broadened our Working Group participation with new members in Canada and Mexico.

### Working Group Products (Working Group members in **bold**):

**Adams MJ**, RN Harris, EHC Grant, MJ Gray, MC Hopkins, SA Iverson, R Likens, M Mandica, DH Olson, A Shepack, and H Waddle. 2018. Prepublication communication of research results. *EcoHealth*. 15:478-481.

**Adams MJ**, Harris MC, and **DA Grear**. 2017. Early action to address an emerging wildlife disease: U.S. Geological Survey Fact Sheet 2017-3013, 2 p., <https://doi.org/10.3133/fs20173013>.

Campbell Grant EH, **Adams MJ**, Fisher RN, **Grear DA**, Halstead B, Hossack BR, Muths E, Richgels KLD, Russell RE, Smalling KL, Waddle JH, Walls SC, and CL White. 2018. Identifying management-relevant research priorities for responding to disease-associated amphibian declines. *Global Ecology and Conservation* 16:e00441. <https://doi.org/10.1016/j.gecco.2018.e00441>.

Hopkins MC, **MJ Adams**, PE Super, DH Olson, CR Hickman, P English, L Sprague, IB Maska, AB Pennaz, and KA Ludwig. 2018. Bsal in Appalachia: Using scenario-building to proactively prepare for a wildlife disease outbreak caused by an invasive amphibian chytrid fungus. Open File Report 2018-1150. [doi.org/10.3133/ofr20181150](https://doi.org/10.3133/ofr20181150).

**Mosher BA**, KP Huyvaert, T Chestnut, JL Kerby, JD Madison, and LL Bailey. 2017. Design-and model-based recommendations for detecting and quantifying an

amphibian pathogen in environmental samples. *Ecology and Evolution*. 7(24): 10952-10962.

**Mosher BA**, KP Huyvaert, and LL Bailey. 2018. Beyond the swab: ecosystem sampling to understand the persistence of an amphibian pathogen. *Oecologia*. 188(1):319-330.

**Mosher BA**, AB Brand, AN Wiewel, DA Miller, MJ Gray, DL Miller, and EHC Grant. 2019. Estimating occurrence, prevalence, and detection of amphibian pathogens: insights from occupancy models. *Journal of Wildlife Diseases*. 55(3):563-575.

**Mosher BA**, RF Bernard, JM Lorch, DAW Miller, KLD Richgels, CL White, and EHC Grant. 2020. Successful molecular detection studies require clear communication among diverse research partners. *Frontiers in Ecology and the Environment*. 18:1 43-51. doi: 10.1002/fee.2141.

Richgels KLD, RE Russell, **MJ Adams**, CL White, and EHC Grant. 2016. Spatial variation in risk and consequence of *Batrachochytrium salamandrivorans* introduction in the USA. *Royal Society Open Science*. 3:150616.

Waddle H, **DA Grear**, **BA Mosher**, EHC Grant, **MJ Adams**, AR Backlin, W Barichivich, AB Brand, GM Bucciarelli, DL Calhoun, T Chestnut, JM Davenport, AE Dietrich, RN Fisher, B Glorioso, BJ Halstead, MP Hayes, RK Honeycutt, BR Hossack, PM Kleeman, JA Lemos-Espinal, JM Lorch, RW Atkinson, EL Muths, C Pearl, K Richgels, CW Robinson, MF Roth, J Rowe, W Sadinski, BH Sigafus, I Stasiak, S Sweet, CB Walls, GJ Watkins-Colwell, CL White, LA Williams, and ME Winzeler. 2020. *Batrachochytrium salamandrivorans* (Bsal) not detected in an intensive survey of wild North American amphibians. *Scientific Reports*. 10: 1-7. doi: 10.1038/s41598-020-69486-x.

Wright AD, FB Riley, **BA Mosher**, KM O'Donnell, T Braunagel, GV DiRenzo, JE Fleming, C Shafer, AB Brand, EF Zipkin, and EHC Grant. 2020. Moving from decision to action in conservation science. *Biological Conservation*. 249:108698. doi: 10.1016/j.biocon.2020.108698.

## Clean Trade Working Group

### Lead

Joshua Jones

### Members

Matthew Gray, Jesse Brunner, Jonah Piovio-Scott, Alex Shepack, Craig Watson, James Collins, Joe Hiduke, Josh Willard, Zach Brinks, Scott Hardin

### Summary Statement

This working group is comprised of experts in the care, husbandry, and/or disease research of amphibians. Our task is to explore and identify the potential components of a comprehensive, North American clean trade program to help prevent Bsal from entering North America while allowing for the legal and responsible importation of amphibians to be cared for as pets. Discussions on funding things like research that may be needed to test certain aspects of the program, as well as any discussions on realizing legislative/regulatory changes necessary for implementing the program are outside the scope of this workgroup.

### Key Points

- 1.This working group's mission is to foster collaboration among participants to determine the potential components for a comprehensive North American clean trade program and report findings back to the Bsal Task Force Technical Advisory Committee.
- 2.The ever-evolving situation with COVID-19 and government orders meant to help stop the spread of the disease and the virus that causes it has been a significant challenge for the group to overcome throughout 2020.
- 3.The group continues working on a description of the North American trade in pet amphibians using the best available data and information.

### Outcomes/impacts

The Clean Trade Working Group began organizing in the fall of 2019 with the drafting a framework for the group which included a mission, vision, purpose and structure best suited for achieving the goals outlined in the document. The working group then held its first call in March 2020 where it was agreed that

the first steps for the group would be for stakeholders to gather information on the current status of the amphibian pet trade across North America.

As a result of COVID-19 and local or regional efforts to stop the spread, work on the initial description of the amphibian trade was delayed until later in the year when stakeholders were able to devote the time, energy, and resources needed to work on our most-immediate step, which is an accurate description of the trade in amphibians for pets across North America utilizing the best information available. This information is currently in its 2<sup>nd</sup> draft and will be discussed on the final workgroup call for 2020 in December.

## Obstacles

Evolving situation with COVID-19: The workgroup's initial momentum from the beginning of March 2020 was slowed due to the ever-evolving situation with COVID-19 and the subsequent stay-at-home orders and rules from all levels of U.S. government being established to stop the spread of the virus. For example, the pet care community's main priorities as the situation with COVID developed included ensuring that the animals in our care could be taken care of, that employees could take the necessary precautions and visit care facilities to provide for the needs of the animals, and working with officials to make sure they understood that pet care is essential for citizens and their pets since there are many special care or food items that may only be available at a pet care retailer. These challenges left stakeholders with little time, energy, or resources to devote to the workgroup and this effort until the fall of 2020.



*Pseudotriton ruber*. © Twan Leenders

## Response and Control Group

### Leads

Laura Sprague, U.S. Fish and Wildlife Service

### Members

Susan Jewell, Betsy Howell, Mike Adams, Evan Grant, Riley Bernard, Matthew Gray, Molly Bletz, Brittany Mosher, Riley Bernard, Doug Woodhams

## Bsal Response and Control Working Group Summary

The purpose of the Response and Control Group is to facilitate efficient and rapid response for managers in the event Bsal is detected.

### Key Points

1. Review and update the Rapid Response Template as new information becomes available
  - a. Help managers to customize a Rapid Response Plan using the template.
2. Facilitate and improve a natural resource agency's ability to take proactive and reactive actions to prevent occurrence and transmission of Bsal in North America.
  - a. Help determine the lead agency for best rapid response based on
    - i. Approved existing categorical exclusions
    - ii. Approved Environmental Assessment, programmatic or local that covers the area of concern
    - iii. Determine if Section 7 permits are required
    - iv. Determine if Section 18 permits are required
3. Provide information and build understanding of Bsal, the Bsal Task Force, the Strategic Plan, and available management/ mitigation options for Federal agencies at the National levels.
  - a. Provide briefing documents and White Papers to high level management from Head Quarters up to the Secretaries in the National Administration.
  - b. Provide briefing documents to Regional administration for review and dispersal.
4. Brief and offer training to local-to-regional natural resource agencies about the North American Bsal Task Force and available management and mitigation options.
5. Working closely with other Bsal working groups.
  - a. Research Group: through listing management actions and categorizing them we can determine information gaps, which helps determine or justify applicable priorities.
  - b. Decisions Group: Help to develop additional branches on decision tree.

## Bsal Response and Control Working Group Accomplishments

1. Susan Jewell has been working on a DOI-Wide Categorical Exclusion (CatEx), and with the help of Molly Bletz included pathogens like Bsal. This year significant progress to move the CatEx forward has been achieved.
2. Su and Laura were able to meet with NEPA personnel in Head Quarters to help understand the best options for certain actions to move in a rapid manner if a manager chooses to use a particular option. In addition, it was recommended that the group develop or use current programmatic documents to moved actions forward.
3. Team started an evaluation of currently approved Categorical Exclusions. Each CatEx is approved for a specific agency and by cross referencing actions, it can be determined which agency should take the lead.
4. Team began searching for existing programmatic and localized Environmental Assessments that can be used for management actions.
5. Team is developing contact list for Section 7 consultations and is developing a mock run through of the process for better understanding of processes if a management action could impact Endangered Species in the treatment area.



*Amphiuma means*. © Twan Leenders

## Communications and Outreach Working Group

### Leads

Mark Mandica, Amphibian Foundation  
Alex Shepack, University of Notre Dame

### Participants

Arlene Buchholz, Heather Fenton, Kenzie Pereira, Megan Serr

### Summary

The Bsal Task Force Communications and Outreach Working Group manages Bsal-related communication and products for outreach, especially relative to providing informational materials for a myriad of interested groups and people with concern for salamander health and well-being.

### Key Points

- Compiled, Formatted, Designed and Published the Bsal Task Force Annual Report
- Assisted with the redesign of the salamanderfungus.org website for the Bsal Task Force.
- Assisted with the revising, editing, and formatting of the Bsal Strategic and Implementation Plans.
- Social Media: We continue to maintain and utilize Twitter (@salamanderfungi) and Facebook ([www.facebook.com/salamanderfungus/](http://www.facebook.com/salamanderfungus/)). As of Dec 17 we have 943 followers on Twitter and 277 on Facebook. Twitter followers have increased by almost 50 since last year, while the Facebook page has decreased by 11.

### Challenges

Maintaining active membership has been a challenge. The intermittent nature of the tasks of this working group make it hard to keep members involved. Additionally, increased communication is necessary between Task Force participants and the communication group so that media releases can be prepared in advance prior to the release of publications. Maintaining an active social media presence is necessary to continue growing our following on the platforms.

### Outcomes

As we continue to post updates, articles, and information, we are increasing our chance of engaging with individuals, groups, and organizations to make them aware of what is occurring with Bsal. This gives us the opportunity to share what work the Bsal Task Force has accomplished, and what work is currently occurring.