

# Myra C. Hughey

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## Appointments

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2016-2017. Visiting Scholar, Vassar College, Biology Department

2015-2016. Adjunct Assistant Professor, Vassar College, Biology Department

## Post-doctoral Experience

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2012-2015. Virginia Tech, Department of Biological Sciences

Advisor: Dr. Lisa Belden

Funded on NSF DEB 1136640: Diversity and Symbiosis: Examining the Taxonomic, Genetic, and Functional Diversity of Amphibian Skin Microbiota (Co-PIs: Leanna House and Roderick Jensen, Virginia Tech; Reid Harris, James Madison University; Kevin Minbiole, Villanova University)

## Education

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2011. Ph.D. Boston University (Biology)

Advisor: Dr. Karen Warkentin

Dissertation: Integrating species interactions and spatial dynamics to explain insect distribution and abundance on a patchy resource

2003. B.Sc. Loyola University New Orleans (Major: Biology, Minor: Chemistry)

Advisor: Dr. Frank Jordan

Thesis: Reproductive life history of blackbanded darters in two Florida streams

## Publications (\* indicates undergraduate or post-graduate co-authors here and throughout)

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Hughey, M.C., J.B. Walke, M.H. Becker, T.P. Umile, E.A. Burzynski, K.P.C. Minbiole, A.A. Iannetta, C.N. Santiago, W.A. Hopkins, and L.K. Belden. Short-term exposure to coal combustion waste has little impact on the skin microbiome of spring peepers, *Pseudacris crucifer*. *Applied and Environmental Microbiology*. Published online 1 April 2016.

Rebollar, E.A., M.C. Hughey, D. Medina, R.N. Harris, R. Ibanez, and L.K. Belden. The effects of habitat, host species, and presence of the pathogen *Batrachochytrium dendrobatidis* on the skin bacterial community structure of Panamanian frogs. *The ISME Journal*. Published online 8 January 2016.

Gratwicke, B., H. Ross, A. Batista, G.C. Cordero, A.J. Crawford, L. Elizondo, A. Estrada, M. Evans, R. Gagliardo, J. Guerrel, A. Hertz, M.C. Hughey, C. Jaramillo, B. Klocke, M. Mandica, D. Medina, C. Richards-Zawacki, M.J. Ryan, A. Sosa, J. Voyles, B. Walker, D.C. Woodhams, and R. Ibanez. Evaluating the probability of avoiding disease-related extinctions of Panamanian amphibians through captive-breeding programs. *Animal Conservation*. Published online 4 January 2016.

- Rebollar, E.A., R.E. Antwis, L.K. Belden, M.H. Becker, M.C. Bletz, R. Brucker, X. Harris, M.C. Hughey, J. Kueneman, A.H. Loudon, V. McKenzie, D. Medina, K.P.C. Minbiole, L. Rollins-Smith, J.B. Walke, D.C. Woodhams, and R.N. Harris. 2016. Using “omics” and integrated multi-omics approaches to guide probiotic selection to mitigate chytridiomycosis and other emerging infectious diseases. *Frontiers in Microbiology* 7:68.
- Hedman\*, H.D. and M.C. Hughey. 2015. Body size, humeral spine size, and aggressive interactions in the Emerald Glass Frog, *Espadarana prosoblepon* (Anura: Centrolenidae) in Costa Rica. *MesoAmerican Herpetology* 2: 500-508.
- Belden, L.K., M.C. Hughey, E.A. Rebollar, T.P. Umile, S.C. Loftus, E.A. Burzynski, K.P.C. Minbiole, L.L. House, R.V. Jensen, M.H. Becker, J.B. Walke, D. Medina, R. Ibáñez, and R.N. Harris. 2015. Panamanian frog species host unique skin bacterial communities. *Frontiers in Microbiology* 6:1171.
- Hughey, M.C., J.R. Rogge\*, K. Thomas\*, M.W. McCoy, and K.M. Warkentin. 2015. Escape-hatching responses of individual treefrog embryos vary with threat level in wasp attacks: a mechanistic analysis. *Behaviour* 152: 1543-1568.
- Woodhams, D.C., R.A. Alford, R.E. Antwis, H. Archer, M.H. Becker, L.K. Belden, S.C. Bell, M. Bletz, J.H. Daskin, L.R. Davis, S.V. Flechas, A. Lauer, A. Gonzalez, R. N. Harris, W.M. Holden, M.C. Hughey, R. Ibáñez, R. Knight, J. Kueneman, F. Rabemananjara, L.K. Reinert, L.A. Rollins-Smith, F. Roman-Rodriguez, S.D. Shaw, J.B. Walke, and V. McKenzie 2015. Antifungal isolates database of amphibian skin-associated bacteria and function against emerging fungal pathogens. *Ecology* 96: 595–595.
- Walke J.B., M.H. Becker, M.C. Hughey, M.C. Swartwout\*, R.V. Jensen, and L.K. Belden. 2015. Most of the dominant members of amphibian skin bacterial communities can be readily cultured. *Applied and Environmental Microbiology* 81: 6589–6600.
- Ellison, A.R., T. Tunstall, G.V. DiRenzo, M.C. Hughey, E.A. Rebollar, L.K. Belden, R.N. Harris, R. Ibáñez, K.R. Lips, and K.R. Zamudio. 2015. More than Skin Deep: Functional Genomic Basis for Resistance to Amphibian Chytridiomycosis. *Genome Biology and Evolution* 7: 286-298.
- Hughey, M.C., M.H. Becker, J.B. Walke, M.S. Swartwout\*, and L.K. Belden. 2014. *Batrachochytrium dendrobatidis* in Virginia amphibians: within and among pond variation in infection. *Herpetological Review* 45(3): 428-438.
- Rebollar E.A., M.C. Hughey, R.N. Harris, R.J. Domangue, D. Medina, R. Ibáñez, and L.K. Belden. 2014. The lethal fungus *Batrachochytrium dendrobatidis* is present in lowland tropical forests of far eastern Panamá. *PLoS ONE* 9(4): e95484.
- Hughey, M.C., A. Nicolás\*, J.R. Vonesh, and K.M. Warkentin. 2012. Wasp predation drives the assembly of fungal and fly communities on frog egg masses. *Oecologia* 168(4): 1057-1068.
- Hughey, M.C., M.W. McCoy, J.R. Vonesh, and K.M. Warkentin. 2012. Spatial contagion drives colonization and recruitment of frogflies on clutches of red-eyed treefrogs. *Biology Letters* 8(5): 887-889.
- Hughey, M.C., B. Ory, H. Jelks, D. Heins, and F. Jordan. 2012. Variation in reproductive life history traits between two populations of Blackbanded Darters (*Percina nigrofasciata*). *Copeia* 2012(4): 714-721.

**Submitted Publications** (manuscripts available upon request)

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Hughey, M.C., E.R. Sokol, J.B. Walke, M.H. Becker, and L.K. Belden. Pathogen prevalence linked to large-scale variability in the amphibian skin microbiome. Submitted to *Environmental Microbiology*.

Loftus, S., L. House, M.C. Hughey, J.B. Walke, M.H. Becker, and L.K. Belden. Dimension Reduction for Multinomial Models Via a Kolmogorov-Smirnov Measure (KSM). Submitted to *Methods in Ecology and Evolution*.

**Teaching Experience**

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**2015-2016. Adjunct Assistant Professor, Vassar College.**

I taught four courses at the introductory and advanced levels (two per semester): BIOL 106 Introduction to Biological Investigation (with lab) and BIOL 379 Today's News in Biology. The latter is a new course that I developed.

**2014. Guest Instructor, Smithsonian Tropical Research Institute, Integrative Graduate Education and Research Traineeship**

My participation in this field course, which was offered to students from McGill University (Canada), included presenting information about my research and leading students on natural history excursions.

**2006-2012. Guest Instructor, Smithsonian Tropical Research Institute, Introducción a las ciencias biológicas de campo**

My participation in this field course, which is offered to biology students from Latin American universities, included presenting information about amphibian diversity and conservation; leading students on natural history excursions; and assisting students in the design, implementation, and presentation of short-term research projects. Presentations and instructions were conducted in both Spanish and English.

**2009-2012. Guest Lecturer, Butler University, Loyola University New Orleans, Virginia Commonwealth University, Boston University**

I have given presentations about amphibian diversity and conservation, predator-prey interactions, and the value of gaining research experience as an undergraduate.

**2007-2009. Teaching Fellow, Boston University**

I taught the following courses as a graduate student at Boston University: BI 108 Biology II (2 sections, Spring 2007) and BI 303 Evolutionary Ecology (2 sections, Spring 2008, 2009). My responsibilities included delivering brief overview lectures at the beginning of lab, facilitating labs, writing and grading quizzes and exams, grading lab reports and term papers, and assisting students outside of class.

**2007-2009. Grader, Boston University**

CC 106 Core Natural Science II: Biodiversity and the Evolution of Life. I proctored exams and graded quizzes, exams, and lab reports for this non-majors course.

**Mentoring**

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**2016. Adjunct Assistant Professor, Vassar College**

I mentored two undergraduates: one carrying out independent research for credit and one conducting work study with me. The former carried out the field-based portion of an ongoing study aimed at characterizing ontogenetic shifts in the amphibian microbiome while the latter developed a culture collection of bacteria isolated from the skin of grey treefrogs.

**2012-2015. Post-doctoral Researcher, Virginia Tech**

I mentored seven undergraduates carrying out independent research projects in Panama and Virginia.

Two of these undergraduates—from Puerto Rico—came to work with us through the Dimensions of Biodiversity Workforce REU-Broadening Participation program. I also successfully facilitated the efforts of two Panamanians that were working with us to attend graduate school.

**2011–2012. Internship Liason, Smithsonian Tropical Research Institute, Office of Academic Programs**

Supervisor: Dr. Owen McMillan

My roles included designing activities to improve the internship experience, establishing metrics to assess the quality of the internship program, and generating content for the web.

**2011. Research mentor, Organization of Tropical Studies' Native American and Pacific Islanders Research Experiences (NAPIRE) program**

I guided two undergraduates, one Native American and one Pacific Islander, as they carried out individual research projects over the course of six weeks at Las Cruces Biological Station, Costa Rica. One of these students is now in graduate school.

**2005–2010. Graduate fellow, Boston University**

As a graduate student, I worked closely with ten students from five countries. At least six of these students now have Master's degrees or are currently enrolled in graduate school.

**Grants and Fellowships**

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*Research Grants*

**2009–2010. National Science Foundation, Doctoral Dissertation Improvement Grant** \$15,000  
DEB #0910270: Disentangling local and regional processes operating in a simple metacommunity

**2009. Animal Behavior Society, Student Research Grant** \$750  
Species interactions in a spatial context: prey cues and foraging patterns of three insects on red-eyed treefrog egg masses

**2006. American Philosophical Society, Lewis and Clark Fund for Exploration** \$4,000  
Consequences of interactions among red-eyed treefrog (*Agalychnis callidryas*) egg consumers: flies, fungi, and wasps

**2006. American Society of Ichthyologists and Herpetologists, Gaige Fund Award** \$500  
Interacting effects of red-eyed treefrog egg consumers: flies, fungi, and wasps

*Fellowships*

**2009–2010. Encyclopedia of Life, Rubenstein Fellowship** \$22,000  
The Amphibians of Panama

**2007. Smithsonian Institution, 10 Week Graduate Fellowship** \$3,050  
Predator disruption of natural hatching: Consequences of plasticity in hatching time

**2006. Smithsonian Tropical Research Institute, Short-term Fellowship** \$3,550  
Interacting effects of red-eyed treefrog egg consumers: flies, fungi, and wasps

**2006–2010. Boston University, Teaching and Research Fellowships** \$20,000 annually

**2005. Boston University, Dean's Fellowship** \$20,000

*Travel Grants for Professional Meetings*

**2006, 2008. Boston University, Biology Student Travel Award** \$1000

**2006. American Society of Ichthyologists and Herpetologists, Travel Award** \$250

### Proposals in preparation

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*I am currently working on two grant proposals that would fund my future projects in amphibian-microbial symbiont systems.*

**Assembly of the amphibian microbiome.** Pre-proposal submitted to NSF, Jan 2016.

**Impact of environmental contaminants on early development of the vertebrate microbiome.** Full proposal submitted to NIEHS, Oct 2014.

### Invited Seminars

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**2013.** Exploring the diversity and disease resistance function of amphibian skin microbiota. Smithsonian Tropical Research Institute Tupper Seminar Series. Panama City, Panama.

**2012.** Integrating species interactions and spatial dynamics to explain insect distribution and abundance on a patchy resource. Virginia Tech EEB Seminar Series. Blacksburg, VA.

**2011.** Integrating species interactions and spatial dynamics to explain insect distribution and abundance on a patchy resource. Loyola University Biology Seminar Series. New Orleans, LA.

**2010.** Processes influencing the distribution and abundance of insects living on the egg masses of red-eyed treefrogs. Smithsonian Tropical Research Institute Gamboa Seminar Series. Gamboa, Panama.

**2009.** Processes influencing the distribution and abundance of insects in a spatially-structured environment. Smithsonian Tropical Research Institute Behavior Seminar Series. Panama City, Panama.

### Presentations at Professional Meetings

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#### *Oral Presentations*

**2014.** Hughey, M.C., M.H. Becker, J.B. Walke, and L.K. Belden. Patterns of within and among site diversity of amphibian skin microbiota. Ecological Society of America meeting. Sacramento, CA.

**2013.** Hughey, M.C., M.C. Swartwout\*, M.H. Becker, J.B. Walke, and L.K. Belden. Patterns of disease and microbial diversity in an amphibian (*Pseudacris crucifer*) from the eastern United States. Ecological Society of America meeting. Minneapolis, MN.

**2011.** Hughey, M.C., M.W. McCoy, J.R. Vonesh and K.M. Warkentin. Patterns and mechanisms of spatial variation in patch use by egg-foraging social wasps, egg-mass-infesting flies, and eucoiline fly-parasitoids. Ecological Society of America meeting. Austin, TX.

**2010.** Hughey, M.C., M.W. McCoy, J.R. Vonesh and K.M. Warkentin. Disentangling pre- and post-colonization processes operating in a simple insect community associated with a spatially patchy resource. Ecological Society of America meeting. Pittsburgh, PA.

**2010.** Hughey, M.C., M.W. McCoy, J.R. Vonesh and K.M. Warkentin. Disentangling pre- and post-colonization processes operating in a simple insect community associated with a spatially patchy resource. Smithsonian Tropical Research Institute Fellows Seminar. Panama City, Panama.

**2009.** Hughey, M.C., J.R. Rogge, M.W. McCoy, and K.M. Warkentin. Deciding when to hatch: Predator and embryo cues in wasp-induced hatching of red-eyed treefrogs. Society of Integrative and Comparative Biology meeting. Boston, MA.

**2008.** Hughey, M.C., and K.M. Warkentin. Interactions among egg predators of red-eyed treefrogs

(*Agalychnis callidryas*) and consequences for both predators and prey. World Congress of Herpetology. Manaus, Brazil.

2007. Hughey, M.C., and K.M. Warkentin. Interactive effects of early life stage predators of red-eyed treefrogs. Smithsonian Tropical Research Institute Fellowships Seminar. Panama City, Panama.

#### Posters

2016. Hughey, MC, M Becker, T Bridges, B Gratwicke, R Harris, L House, R Ibanez, R Jensen, S Loftus, D Medina, K Minbiole, E Rebollar, T Umile, J Walke, and L Belden. 2016. Diversity and symbiosis: Examining the taxonomic, genetic, and functional diversity of the amphibian skin microbiota. Dimensions of Biodiversity PI meeting. Arlington, VA.

2013. Hughey, M.C, D. Medina, M. Becker, S. Loftus, J. Walke, E. Rebollar, T. Umile, G. Cormier, B. Gratwicke, R. Harris, L. House, R. Ibañez, R. Jensen, K. Minbiole, and L. Belden. Diversity and symbiosis: Examining the taxonomic, genetic, and functional diversity of amphibian skin microbiota. Virginia Tech Research Day Symposium. Blacksburg, VA.

2011. Hughey, M.C. The Amphibians of Panama Website. Smithsonian Tropical Research Institute Fellows Symposium. Panama City, Panama.

2006. Hughey, M.C., and K.M. Warkentin. Phorid fly predation of red-eyed treefrog eggs: do maggots induce hatching? American Society of Ichthyologists and Herpetologists meeting. New Orleans, LA.

2004. Jordan, F., M.C. Hughey, M.A. Kaintz, A. Roth, and S. Vincent. Nekton use of *Phragmites australis* in the Mississippi River Delta. American Fisheries Society (LA Chapter) meeting. Baton Rouge, LA.

2004. Jordan, F., M.C. Hughey, M.A. Kaintz, A. Roth, and S. Vincent. Nekton use of *Phragmites australis* in the Mississippi River Delta. Graduate Student Symposium. Ocean Springs, MS.

2003. Jordan, F., M.C. Hughey, M.A. Kaintz, A. Roth, and S. Vincent. Nekton use of *Phragmites australis* in the Mississippi River Delta. Estuarine Research Federation meeting. Seattle, WA.

2003. Jordan, F., M.C. Hughey, M.A. Kaintz, A. Roth, and S. Vincent. Nekton use of *Phragmites australis* in the Mississippi River Delta. Environmental Research Consortium of Louisiana meeting. New Orleans, LA.

#### Co-Authorships on Professional Presentations

2016. Jenifer B. Walke, Matthew H. Becker, Myra C. Hughey, Meredith C. Swartwout, Roderick V. Jensen, Lisa K. Belden. Culturability and pathogen inhibition of the amphibian skin microbiome. ASM Conference on Beneficial Microbes. Seattle, WA. (Poster)

2016. Hughey, MC, M Becker, T Bridges, B Gratwicke, R Harris, L House, R Ibanez, R Jensen, S Loftus, D Medina, K Minbiole, E Rebollar, T Umile, J Walke, and L Belden. 2016. Diversity and symbiosis: Examining the taxonomic, genetic, and functional diversity of the amphibian skin microbiota. ASM Conference on Beneficial Microbes. Seattle, WA. (Poster)

2016. Medina, D., J. Franklin, M.C. Hughey, J.B. Walke, M.H. Becker, S. Sun, B. Badgley, and L.K. Belden. The skin mycobiome of temperate and tropical amphibians in relation to *Batrachochytrium* infection status. Mycological Society of America meeting. Berkeley, CA. (Oral presentation)

2016. Sarmant\*, L., M.C. Hughey, S. Zemmer, and L.K. Belden. Parasites and Microbes: The Symbiotic Communities of Spring Peepers (*Pseudacris crucifer*). Joint meeting of the Southeastern Society of Parasitologists and the Helminthological Society of Washington. Blacksburg, VA. (Poster)

2015. Rebollar Caudillo, E.A., M.C. Hughey, D. Medina, S. Loftus, L.L. House, R.N. Harris, L.K. Belden. Amphibian-Microbial Symbiosis: Unraveling the Role of Host Species, Habitat, and the Pathogen *Batrachochytrium dendrobatidis* on Skin Bacterial Community Structure. American Society of Microbiologists meeting. New Orleans, LA. (Oral presentation)
2014. Belden, L.K., M.C. Hughey, E.A. Rebollar, T. Umile, S.C. Loftus, E. Burzynski, K.P.C. Minbiole, L.L. House, R.V. Jensen, M.H. Becker, J.B. Walke, D. Medina, R. Ibáñez, and R.N. Harris. Structure-function relationships in the amphibian skin microbiome. Ecological Society of America meeting. Sacramento, CA. (Oral presentation)
2014. Walke, J.B., M.H. Becker, M.C. Hughey, M.C. Swartwout\*, L.K. Belden. Linking culture-dependent and -independent characterizations of amphibian skin microbial communities: important insights into the use of probiotics in amphibian conservation. Ecological Society of America meeting. Sacramento, CA. (Oral presentation)
2014. Swartwout\*, M.C., M.H. Becker, J.B. Walke, M.C. Hughey, D. Medina, and L.K. Belden. Structure and function of bacterial communities on spring peeper skin (*Pseudacris crucifer*) in Virginia. American Society of Ichthyologists and Herpetologists meeting. Chattanooga, TN. (Poster)
2014. Rebollar E.A., M.C. Hughey, M.H. Becker, R.N. Harris, and L.K. Belden. Skin microbial diversity of tropical frogs from the rainforest of Panamá. International Symposium on Microbial Ecology. Seoul, South Korea. (Poster)
2014. Rebollar E.A., M.C. Hughey, M.H. Becker, R.N. Harris, and L.K. Belden. Skin microbial diversity of tropical frogs from the rainforest of Panamá. American Society for Microbiology meeting. Boston, MA (Poster)
2013. Rebollar, E.A., M.C. Hughey, D. Medina, R. Ibáñez, R.N. Harris, and L.K. Belden. The lethal fungus *Batrachochytrium dendrobatidis* is prevalent in lowland tropical forests of eastern Panamá. Amphibian Disease meeting. Arizona State University, Tempe, AZ (Oral Presentation)
2013. Swartwout\*, M.C., M.C. Hughey, M.H. Becker, J.B. Walke, and L.K. Belden. Diversity and protective function of bacteria on the skin of spring peepers (*Pseudacris crucifer*). Ecology and Evolution of Infectious Disease meeting. Pennsylvania State University, PA. (Poster)
2013. Hughey, M.C., D. Medina, M. Becker, S. Loftus, J. Walke, E. Rebollar, T. Umile, G. Cormier, B. Gratwicke, R. Harris, L. House, R. Ibáñez, R. Jensen, K. Minbiole, and L. Belden. Diversity and symbiosis: Examining the taxonomic, genetic, and functional diversity of amphibian skin microbiota. Smithsonian Tropical Research Institute Fellows Symposium. Panama City, Panama. (Poster, presented by D. Medina)
2011. Hedman\*, H. and M.C. Hughey. Male-male interactions in the emerald glass frog (*Espadarana prosoblepon*). American Indian Science and Engineering Society meeting. Minneapolis, MN. (Poster)
2011. Hedman\*, H. and M.C. Hughey. Male-male interactions in the emerald glass frog (*Espadarana prosoblepon*). Society for Advancing Hispanics, Chicanos, and Native Americans in Science meeting. San Jose, CA. (Poster)
2011. Yamase\*, N. and M.C. Hughey. Calling sites of the tink frog (*Diasporus vocator*) at Las Cruces Biological Station and Wilson Botanical Garden, Costa Rica. Society for Advancing Hispanics, Chicanos, and Native Americans in Science meeting. San Jose, CA. (Poster)
2011. Vonesh, J.R., M.W. McCoy, M.C. Hughey and K.M. Warkentin. Sequential predator effects across life stages: Predicting phenotypic and density effects of egg predators on larval survival and growth. Society for Integrative and Comparative Biology meeting. Salt Lake City, UT.

2010. Hite, J.L., M.C. Hughey, M.W. McCoy, K.M. Warkentin and J.R. Vonesh. Terrestrial predators and abiotic conditions affect hatching phenotype and survival of arboreal frog eggs: Implications for aquatic food web dynamics. Ecological Society of America meeting. Pittsburgh, PA.

2010. Warkentin, K.M., J.C. Touchon, M.W. McCoy, M.C. Hughey and J.R. Vonesh. Consequences of hatching timing in red-eyed treefrogs: timescale, currency and context-dependence of trade-offs. American Society of Ichthyologists and Herpetologists meeting. Providence, RI.

## Outreach

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### 2015. Wasp Wrangling

I spent one week assisting a BBC crew filming glass frogs defending their eggs from predatory wasps for the Jungles episode of their series, "One Planet".

### 2011. Wasp Wrangling

I spent two weeks assisting a National Geographic Channel crew filming glass frogs defending their eggs from predatory wasps at the Costa Rican Amphibian Research Center in Costa Rica for their series, "The Secret Lives of Predators". <http://channel.nationalgeographic.com/channel/secret-life-of-predators/videos/ninja-frog>

### 2010–2014. Volunteer, Panama Amphibian Rescue and Conservation Project (PARC)

In addition to assisting with the captive maintenance of several endangered and critically endangered frogs, I worked with PARC's volunteer coordinator and the Office of Public Programs at the Smithsonian Tropical Research Institute to develop PARC's outreach program and related materials to inform the general public about amphibians and raise awareness about the ongoing amphibian conservation efforts in Panama. In addition, I was actively involved in the planning and implementation of PARC's annual Golden Frog Week celebration.

### 2009–2011. Amphibians of Panama Website (<http://biogeodb.stri.si.edu/amphibians>)

Co-Advisors: Steve Paton and Dr. Andrew Crawford

I worked with Encyclopedia of Life and the Smithsonian Tropical Research Institute to create a website highlighting the diversity of amphibians in Panama. I created detailed species pages for 217 species of amphibians known to occur in the country.

### 2003–2010. Preschool, Elementary School, and High School Outreach

I participated in >30 visits with students, from preschoolers to high school students, to educate them about scientific research and introduce them to the local fauna, both in the US and Panama.

### 2006. Wasp Wrangling

I spent 10 days assisting a BBC crew filming wasp predation of red-eyed treefrog eggs. Some of the footage can be viewed in the episode Land Invaders of David Attenborough's "Life in Cold Blood" series.

## Service and Society Memberships

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Ad-hoc peer reviewer for: American Midland Naturalist, Conservation Physiology, Diseases of Aquatic Organisms, EcoHealth, Environmental Toxicology and Chemistry, Herpetologica, Herpetological Review, The Journal of Insect Science, Naturwissenschaften, and PLoS ONE.

Member: Ecological Society of America, American Society for Microbiology