

# BRITTANY A. MOSHER

PENNSYLVANIA STATE UNIVERSITY, DEPARTMENT OF ECOSYSTEM SCIENCE AND MANAGEMENT  
NE AMPHIBIAN RESEARCH AND MONITORING INITIATIVE, USGS PATUXENT WILDLIFE RESEARCH CTR  
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## EDUCATION

**2012 – 2017. Ph.D., Fish, Wildlife, and Conservation Biology, Colorado State University, Fort Collins, CO.**

Dissertation: *Informing the ecology and conservation of amphibians imperiled by chytridiomycosis.*

Advised by Drs. Larissa Bailey and Kathryn (Kate) Huyvaert.

**2009 – 2011. M.S., Fish and Wildlife Management, Montana State University, Bozeman, MT.**

Thesis: *Implications of a recent mountain pine beetle outbreak for habitat and populations of birds.*

Advised by Drs. Jay Rotella (MSU) and Victoria Saab (USFS).

**2005 – 2009. B.S. Magna Cum Laude, Natural Resources, Cornell University, Ithaca, NY.**

## PROFESSIONAL APPOINTMENTS

**October 2017 – present. Postdoctoral Researcher, Pennsylvania State University, Turners Falls, MA.**

Supervisors: Drs. Evan Grant (USGS), David Miller (Penn State), and Jim Nichols (USGS). Conceive, formulate, and conduct research to support the USGS Amphibian Research and Monitoring Initiative's diverse program goals including assessing impacts of disease on amphibian distributions and demography, designing optimal sampling protocols for a variety of amphibians and pathogens, and developing novel statistical methods to aid in these pursuits. In this role I work closely with cooperating partner agencies to ensure their needs are met.

**May 2017 – September 2018. Postdoctoral Researcher, Conservation Science Partners, Fort Collins, CO.**

Supervisor: Dr. Jesse Lewis (Arizona State University). Developed a framework for the analysis of wild pig data from camera traps to address biological questions related to potential for pig disease transmission, pig habitat use, interactions with native fauna, and management intervention success.

## PUBLICATIONS

### Peer-reviewed Publications

#### 2018

**B. A. Mosher** et al. Estimating occurrence, prevalence, and detection of amphibian pathogens: insights from occupancy models. *Journal of Wildlife Diseases*. (In press).

**B. A. Mosher**, K. P. Huyvaert, and L. L. Bailey. 2018. Beyond the swab: ecosystem sampling to understand the persistence of an amphibian pathogen. *Oecologia*, 188(1): 319-330. DOI: [10.1007/s00442-018-4167-6](https://doi.org/10.1007/s00442-018-4167-6).

B. M. Brost, **B. A. Mosher**, and K. A. Davenport. 2018. A model-based solution for observational errors in clinical studies. *Molecular Ecology Resources*, 18:580-589. DOI: [10.1111/1755-0998.12765](https://doi.org/10.1111/1755-0998.12765).

B. D. Gerber, S. J. Converse, H. J. Crockett, **B. A. Mosher**, E. Muths, and L. L. Bailey. 2018. Identifying species conservation strategies to reduce disease-associated declines. *Conservation Letters*, 11(2): 1-10. DOI: [10.1111/conl.12393](https://doi.org/10.1111/conl.12393).

**B. A. Mosher**, L. L. Bailey, and K. P. Huyvaert. 2018. Host-pathogen metapopulation dynamics suggest high elevation refugia for boreal toads. *Ecological Applications*, 28(4): 928-937. DOI: [10.1002/eap.1699](https://doi.org/10.1002/eap.1699).

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**B. A. Mosher**, L. L. Bailey, B. A. Hubbard, and K. P. Huyvaert. 2018. Making inference using complex occupancy models with an unobservable state. *Ecography*, 41(1): 32-39. DOI: [10.1111/ecog.02849](https://doi.org/10.1111/ecog.02849).

K. A. Davenport, **B. A. Mosher**, B. M. Brost, D. Henderson, N. Denkers, A. Nalls, E. McNulty, C. Mathiason, and E. Hoover. 2018. Distinguishing the shedding and detection of chronic wasting disease prions in deer saliva using occupancy modeling. *Journal of Clinical Microbiology*, 56(1): e01243-17. DOI: [10.1128/JCM.01243-17](https://doi.org/10.1128/JCM.01243-17).

### 2017

**B. A. Mosher**, K. P. Huyvaert, T. Chestnut, J. L. Kerby, J. D. Madison, and L. L. Bailey. 2017. Design- and model-based strategies for detecting and quantifying an amphibian pathogen in environmental samples. *Ecology and Evolution*, 7(24): 10952–10962. DOI: [10.1002/ece3.3616](https://doi.org/10.1002/ece3.3616).

S. J. Converse, L. L. Bailey, **B. A. Mosher**, W. C. Funk, B. D. Gerber, and E. Muths. 2017. A model to inform management actions as a response to chytridiomycosis-associated decline. *EcoHealth*, 14(S1): 144–S155. DOI: [10.1007/s10393-016-1117-9](https://doi.org/10.1007/s10393-016-1117-9)

### Book Chapters

B. Gerber, **B. A. Mosher**, D. Martin, T. Chambert, and L. L. Bailey. (2017). Occupancy models. In *A Gentle Introduction to Program MARK* (Chapter 21). Available from [phidot.org/software/mark/docs/book](http://phidot.org/software/mark/docs/book).

### Popular Press

**B. A. Mosher**, B. Gerber, and L. L. Bailey. (2017). “Saving amphibians from a deadly fungus means acting before we know all the answers”. The Conversation. Available at: <https://theconversation.com/saving-amphibians-from-a-deadly-fungus-means-acting-without-knowing-all-the-answers-81739>.

**B. A. Mosher**. (2016). “Love in the time of chytrid.” Guest post on the HumanNature blog. Available at: <http://blog.sustainability.colostate.edu/?q=mosher>.

### In Review or Revision

**B. A. Mosher**, R. F. Bernard, et al. Broadening the conversation: molecular detection, conservation, and communication. *Frontiers in Ecology and the Environment*. (In revision).

### In Preparation (to be submitted within ~3 months)

**B. A. Mosher**, et al. Pairwise misidentification of species biases species richness estimates.

**B. A. Mosher**, et al. Forest birds exhibit variable changes during a mountain pine beetle epidemic.

**B. A. Mosher**, et al. Multiple drivers threaten the long-term population persistence of an island endemic landbird. *Condor*.

J. H. Waddle, D. A. Gear, **B. A. Mosher**, et al. Risk of occurrence of *Batrachochytrium salamandrivorans* in North America based on national surveillance. *Nature Communications*.

R. E. Russell, B. J. Halstead, **B. A. Mosher**, et al. Effects of amphibian chytrid fungus on apparent survival of frogs and toads of the western USA. *Biological Conservation*.

P. Lendrum, **B. A. Mosher**, et al. Residual effects of energy development on carnivore community occurrence. *Biological Conservation*.

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## GRANTS, AWARDS, AND FELLOWSHIPS

**2017.** School of Global and Environmental Sustainability, Sustainability Leadership Fellow  
**2016-17.** John and Marietta Peters Fellowship, Warner College of Natural Resources (\$2,000)  
**2015-16.** Douglas Gilbert Memorial Scholarship, Warner College of Natural Resources (\$1,750)  
**2013-2015.** Hill Memorial Scholarship at Colorado State University (\$10,000)  
**2014.** The Wildlife Society Biometrics Working Group Travel Grant (\$600)  
**2014.** Colorado Mountain Club Academic Fellowship (\$900)  
**2011.** Best Student Presentation at The Wildlife Society Annual Conference  
**2011.** Best MS Presentation at the Montana Chapter The Wildlife Society Conference  
**2011.** Wynn G. Freeman Memorial Scholarship (\$500)  
**2010.** Best Student Poster at the Montana Chapter The Wildlife Society Conference  
**2009.** Montana Fish Wildlife and Parks Grant Recipient (\$3,200)  
**2009.** Cooper Ornithological Society Student Award  
**2009.** Montana Audubon Grant (\$400)  
**2009-10.** Montana State University Presidential Scholarship recipient (\$15,000 [two semesters of tuition waivers])  
**2008.** Quill & Dagger Senior Honor Society (117th Tapping Class) Cornell University  
**2008.** 1st Place NOAA Hollings Scholarship Presentation  
**2007-09.** NOAA Hollings Undergraduate Scholarship (\$16,000)

## SELECT PRESENTATIONS (\*invited presenter)

**Mosher, B.A.,** R.F. Bernard, J.M. Lorch, D.A.W. Miller, K.L.D. Richgels, C.L. White, E.H.C. Grant. Broadening the conversation: harnessing the full utility of molecular detection methods in disease ecology. The Wildlife Society annual meeting. Cleveland, OH (October 2018).

**Mosher, B. A.,** D. A. W. Miller, A. Wright, and E. H. Campbell Grant. I've made a huge (misidentification) mistake: accounting for detection errors in complex communities. Ecological Society of America annual meeting. New Orleans, LA (August 2018).

**Mosher, B. A.,** D. A. W. Miller, A. Wright, and E. H. Campbell Grant. Pairwise misidentification in community occupancy models. International Statistical Ecology Conference meeting. St. Andrews, Scotland (July 2018).

**\*Mosher, B. A.** Using an arsenal of tactics to understand amphibian disease dynamics. Oral presentation at the USGS SO Conte Anadromous Fish Research Lab. Turners Falls, MA (November 2017).

**\*Mosher, B. A.,** L. L. Bailey, E. Muths, and K. P. Huyvaert. Identifying drivers of local extinction in an amphibian-pathogen system using multi-state occupancy models. Oral presentation at an organized symposium at The Wildlife Society annual meeting. Albuquerque, NM (September 2017).

Davenport, K. A., **B. A. Mosher,** and B. M. Brost. Non-random CWD pion shedding in the saliva of white-tailed deer. Oral presentation at the Front Range Student Ecology Symposium. Fort Collins, CO (February 2017).

**Mosher, B. A.,** L. L. Bailey, E. Muths, and K. P. Huyvaert. Identifying drivers of local extinction in an amphibian-pathogen system. Oral presentation at the joint Utah and Colorado/Wyoming chapters of the American Fisheries Society meeting. Grand Junction, CO (February 2017).

Gerber, B., L.L. Bailey, H. Crockett, **B.A. Mosher,** and E. Muths. Conservation decision-making via spatially-explicit metapopulation dynamics of an amphibian-pathogen system. Oral presentation at The Wildlife Society

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annual meeting. Raleigh, NC (October 2016).

\***Mosher B.A.**, K.P. Huyvaert, and L.L. Bailey. Hosts, pathogens, and species occurrence: using occupancy models to make inference in disease systems. Oral presentation at an organized symposium at The Ecological Society of America annual meeting. Baltimore, MD (August 2015).

\***Mosher B.A.**, W.E. Lanier, K.P. Huyvaert, and L.L. Bailey. A tale of toads in Rocky Mountain National Park. Science Behind the Scenery Seminar Series. Rocky Mountain National Park, Estes Park, Colorado (July 2015).

Converse S.J., L.L. Bailey, **B.A. Mosher**, E. Muths, and W.C. Funk. Decision analysis and expert judgement: implications for disease risk analysis in reintroductions. Oral presentation at Zoological Society of London Symposium. London, England (May 2015).

**Mosher B.A.**, K.P. Huyvaert, and L.L. Bailey. Evaluating factors that influence amphibian chytrid fungus detection via filtration. Oral presentation at The American Fisheries Society CO/WY Chapter annual meeting. Fort Collins, CO (February 2015).

**Mosher B.A.**, K.P. Huyvaert, and L.L. Bailey. Confounding of pathogen detection and host presence induces bias in occupancy estimation. Oral presentation at The Wildlife Society national annual conference. Pittsburgh, PA (October 2014)

**Mosher B.A.**, K.P. Huyvaert, and L.L. Bailey. *Bd* and chytridiomycosis in the boreal toads of Rocky Mountain National Park. Invited oral presentation at National Park Service/Colorado State University Wildlife Disease Short Course. Fort Collins, CO (March 2014)

**Mosher B.A.**, K.P. Huyvaert, and L.L. Bailey. Factors influencing boreal toad (*Anaxyrus boreas boreas*) and *Batrachochytrium dendrobatidis* disease dynamics in Colorado. Oral presentation at Boreal Toad Recovery Team Meeting. Fort Collins, CO (February 2013).

Saab, V.A., **B.A. Mosher**, Q. Latif, J. Rotella. 2012. Avian community responses to a mountain pine beetle outbreak in Montana. Presentation at the 5th North American Ornithological Conference, University of British Columbia, Vancouver, Canada. (August 2012).

**Mosher B.A.**, J.J. Rotella, and V.A. Saab. Avian community response to a mountain pine beetle epidemic. Oral presentation at The Wildlife Society national annual conference. Waikoloa, HI. (November 2011) **Awarded best student presentation.**

**Mosher B.A.**, J.J. Rotella, and V.A. Saab. Avian community response to a mountain pine beetle epidemic. Oral presentation at Montana chapter The Wildlife Society Meeting. Missoula, MT. (February 2011). **Awarded best MS presentation.**

**Mosher B.A.**, J.J. Rotella, and V.A. Saab. Beetles and birds in western forests. Poster presentation at Montana chapter Society for Conservation Biology meeting. Missoula, MT (October 2010).

### PROFESSIONAL ACTIVITIES

**2019 – 2021.** Associate Editor Mentee, Journal of Applied Ecology.

**2017 – 2019.** Board Member, Biometrics Working Group. The Wildlife Society.

Reviewer for: *Biological Conservation*, *Diseases of Aquatic Organisms*, *Ecological Applications*, *Ecology and Evolution*, *Forest Ecology and Management*, *Journal of Applied Ecology*, *Journal of Avian Biology*, *Journal of Herpetology*, *Journal of Mammalogy*, *Scientific Reports*, *The Condor*, *US Geological Survey FSP*. (Reviews since 2017 verified at [Publons](#).)

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Member of: The British Ecological Society, The Ecological Society of America (Statistical Ecology Section), The Society for Conservation Biology, The Wildlife Society (Biometrics Working Group, Wildlife Diseases Working Group).

## DIVERSITY AND INCLUSION TRAINING

**2018.** Ensuring Diversity in Peer Review (webinar). Elsevier Researcher Academy.

**2018.** Inclusive Communication to Promote Diversity, Inclusion and Equity (2 hour workshop). Ecological Society of America.

**2017.** Unconscious Bias in STEM: Who, Me? (1 hour workshop). The Institute for Learning and Teaching. Colorado State University.

**2015.** Gender and Ethnicity in Science (2-credit class). Colorado State University.

## COMMUNICATION TRAINING

**2016 – 2017. Sustainability Leadership Fellow, Colorado State University, Fort Collins, CO.**

One of 20 early career scientists selected to complete a year-long program in being an effective communicator of science to a variety of audiences including the public and the media.

## TEACHING EXPERIENCE

**2018 & 2017. Co-instructor. Program R Workshop (1 day). The Wildlife Society.**

One of three instructors teaching a one-day Program R workshop for beginners at annual meetings of The Wildlife Society. Developed modules, code, exercises and advised students on individual research projects.

**2017. Graduate Teaching Certificate Program, Colorado State University, Fort Collins, CO.**

Completed >50 hours of teaching, participated in 10 pedagogical workshops, and prepared a sample teaching philosophy, mentoring philosophy, lesson plans, and other materials (portfolio can be viewed at: <http://bit.ly/2jgLmTz>).

**2017. Instructor, FW471: Wildlife Data Collection and Analysis. Colorado State University (Todos Santos, MX)**

Supervisors: Drs. Kate Huyvaert & Larissa Bailey. Responsible for teaching a senior-level fish and wildlife capstone course focused on wildlife data collection and associated quantitative methods. Course consisted of interactive lectures, hands-on field and computer labs, and interpreting/presenting scientific findings.

**2017. Assistant, 5 courses, Fish, Wildlife, and Conservation Education Abroad Program. Colorado State University (Todos Santos, MX).**

Supervisor: Dr. Kate Huyvaert. The sole teaching assistant for 5 classes taught as part of a 10 week semester abroad program. Held daily office hours, taught labs in R, lectured for several courses and topics, coordinated field data collection, facilitated discussion and group dynamics in a residential experiential learning environment. Courses: FW370: Experimental Design of Fish and Wildlife Projects, FW382: Conservation in Baja California Sur, FW471: Wildlife Data Collection and Analysis, FW472: Issues in Animal Conservation and Management, and FW482: Conservation of Desert and Marine Organisms.

**2017, 2015, & 2014. Introductory and Advanced Program MARK Workshop Assistant. Various locations.**

Supervisor: Dr. Gary White. Responsible for assisting instructor(s) in teaching material and lab exercises, taught occupancy modules, and consulted on individual research projects during 4-day workshops.

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**2015. Teaching Assistant, FW370: Design of Fish and Wildlife Projects. Colorado State University.**

Supervisor: Dr. Kate Huyvaert. Responsible for assisting in the design, delivery, and grading of semester research projects and computer exercises. Also held exam review sessions and gave one lecture.

**2014. Teaching Assistant, FW663: Sampling and Analysis of Vertebrate Populations. Colorado State University.**

Supervisor: Dr. Larissa Bailey. Held my own review sessions and weekly office hours in addition to giving two lectures. Assisted the instructors in overseeing lab exercises and creating quizzes and exams.

**2012. Adjunct Instructor, Culinary Mathematics. Culinary Institute of America**

Supervisor: Dr. Anette Graham. Responsible for teaching basic mathematics applied to the culinary arts.

**2010 & 2009. Laboratory Instructor, BIOB 260: Cellular and Molecular Biology. Montana State University.**

Responsible for teaching background material, designing and implementing lab exercises, and writing, administering, and grading lab quizzes for 50-75 students per semester.

**2011. SmartyCats Tutor, STAT511: Methods of Data Analysis I. Montana State University.**

Responsible for tutoring four graduate students in an introductory graduate-level statistics class.

**2007. Teaching Assistant, NTRES210: Field Biology. Cornell University**

Responsible for leading field activities, identification walks, holding review sessions, and writing and grading exams.

## **SERVICE AND OUTREACH**

**2017 – present. Scientist Pen Pal, Letters to a Pre-Scientist**

Serve as a pen pal to middle school students with budding interests in science. Correspondence is every other month during the school year, with the goal of engaging students in low-income schools in science.

**2016 – 2017. Steering Committee Member, Expand Your Horizons Northern Colorado and Wyoming**

Organized hands-on workshops and a full day of events for 150 attendees of Expand Your Horizons, a conference for middle school girls interested in science, technology, engineering, and math.

**2015 – 2017. Assistant Naturalist, Bird Conservancy of the Rockies**

Volunteered at least 25 hours annually at Bird Conservancy of the Rockies education and outreach events.

**2013 – 2016. Department Representative, Colorado State University Graduate Student Council**

Served as the Fish, Wildlife, and Conservation Biology representative on the Graduate Student Council. Duties included representing my department's views as a voting member, attending faculty meetings, and planning social and professional development events for graduate students.

**2010. Invited Speaker, Science and Inquiry Learning in the Classroom (SILC), Montana Learning Center**

Presented a research-based seminar on insect life cycles, the scientific method, and native avian species ecology to middle and high school teachers interested in integrating place-based ecology with state curriculum.

**2009 – 2010. Mentor, Montana Science Olympiad.**

Developed and administered avian identification and ecology exam at state Olympiad meeting. Created an exam that included bird calls, stuffed specimens, and knowledge of habitats and behaviors.

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## OTHER RELEVANT PROFESSIONAL EXPERIENCE

**2017 – present.** Wild Pig Research Consultant. Arizona State University. Tempe, Arizona  
**2007-09.** White-tailed Deer Research Assistant, Cornell University Dept. of Natural Resources, Ithaca, New York  
**2008.** National Marine Fisheries Service Hollins Intern. NOAA Auke Bay Laboratory, Juneau, Alaska  
**2007.** Field Assistant, Syracuse University, Gardiner, Montana  
**2005-07.** Lab Assistant, Bruckner Laboratory of Biological Sciences Ithaca, New York  
**2007.** Participant, NOAA Marine Resources Population Dynamics Workshop Summerland Key, Florida  
**2006.** Research Assistant, Cornell University Dept. of Natural Resources, Ithaca, New York

**Interests:** farming fanatic, outdoor enthusiast, culinarian.

## REFERENCES

Dr. Larissa Bailey

Associate Professor of Fish, Wildlife, and Conservation Biology, Colorado State University  
Ph.D. co-advisor and teaching supervisor. Email: [larissa.bailey@colostate.edu](mailto:larissa.bailey@colostate.edu)

Dr. Kathryn (Kate) Huyvaert

Associate Professor of Fish, Wildlife, and Conservation Biology, Colorado State University  
Ph.D. co-advisor and teaching supervisor. Email: [kate.huyvaert@colostate.edu](mailto:kate.huyvaert@colostate.edu)

Dr. David Miller

Associate Professor of Ecosystem Science and Management, Pennsylvania State University  
Postdoctoral supervisor. Email: [dxm84@psu.edu](mailto:dxm84@psu.edu)

Dr. Evan H. Campbell Grant

Research Wildlife Biologist, US Geological Survey, NE Amphibian Research and Monitoring Initiative  
Postdoctoral supervisor. Email: [ehgrant@usgs.gov](mailto:ehgrant@usgs.gov)

## RESEARCH SUMMARY

I am a quantitative disease ecologist who factors that influence local and landscape-scale distributions of hosts and their pathogens. I use a combination of empirical data, laboratory experiments, and computational approaches (e.g., simulation) to explore both theoretical and applied research hypotheses. I sometimes apply existing methods to new questions in disease ecology, and other times develop new statistical methods to suit a particular research question. To date, my research has focused on three themes: pathogen distributions, metapopulation ecology, and collaborative disease ecology.

Much of my research stems from collaborations with state and Federal resource management or conservation organizations. In my current position as a postdoctoral researcher with Pennsylvania State University and the US Geological Survey's Amphibian Research and Monitoring Initiative, I have worked closely with diverse interagency teams to conceive of and implement novel disease ecology. Research findings from my projects have been used in endangered species recovery efforts and in the design of long-term monitoring and surveillance projects.