

Peter D. Billman

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EDUCATION

Ph.D., Ecology & Evolutionary Biology University of Connecticut, Storrs	Aug 2021 – Current
Graduate Certificate in Applied Statistics Montana State University, Bozeman	Aug 2020 – Nov 2020
Master of Science, Earth Sciences Montana State University, Bozeman	Aug 2017 - May 2020
Bachelor of Science, Fish and Wildlife Ecology Minor: Water Resources Montana State University, Bozeman	Jan 2013 - May 2016

RESEARCH INTERESTS

Global change ecology • range limits • biogeography • evolutionary ecology • population ecology • landscape ecology • biophysical gradients • stress response and physiology • metapopulation ecology

PEER-REVIEWED PUBLICATIONS

1. Smith, A.B., Beever, E.A., Kessler, A.E., Johnston, A.N., Ray, C., Epps, C.W., Lanier, H.C., Klinger, R.C., Rodhouse, T.J., Varner, J., Perrine, J., Seglund, A., Hall, E., Galbreath, K., Anderson, C., **Billman, P.D.** et al. 2019. Alternatives to genetic affinity as a context for within-species response to climate. *Nature Climate Change*. 9(10): 787–794.
 - Featured in PBS NOVA, Nature (Asia), The Scientist, and Cosmos
2. **Billman, P.D.**, Beever, E.A., McWethy, D.B., Thurman, L.L., and K.C. Wilson. 2021. Factors influencing distributional shifts and abundance at the range core of a climate-sensitive mammal. *Global Change Biology*. 27(19): 4498–4515.
 - Featured in NPR Idaho, The Wildlife Society, and Colorado360
3. Beever, E.A., Wilkening, J.L., **Billman, P.D.** et al. 2023. Geographic and taxonomic variation in adaptive capacity among montane mammals: implications for conservation status and actions. *Biological Conservation*. 282: 1-11.
4. **Billman, P.D.**, Beever, E.A., Westover, M.L., and D.K. Ryals. 2023. Variability in the strength, directionality, and relative importance of climate on occupancy and population densities. *Frontiers in Ecology and Evolution*. 11:1-13.

5. Beever, E.A., Westover, M.L., Smith, A.B., Gerraty, F.D., **Billman, P.D.**, and F.A. Smith. 2024. Combining past and contemporary species occurrences with ordinal species distribution modeling to investigate responses to climate change. *Ecography*. e07382. 1-14.
6. **Billman, P.D.**, Carroll, K.A., Schleicher, D.J., and B.G. Freeman. 2024. Forecasting range shifts using abundance distributions along environmental gradients. *Frontiers in Ecology and the Environment*. e2820. 1-8.
7. Gould, E., Fraser, H., Parker, T. . . **Billman P.D.** et al. 2025. Same data, different analysts: variation in effect sizes due to analytical decisions in ecology and evolutionary biology. *BMC Biology*. 23(1) 35
 - Featured in Nature, Science and The Conversation

GRANTS, AWARDS, & FELLOWSHIPS (\$201,006) (*indicates undergraduate mentee co-writer)

2025	Pre-Doctoral Demi Fellowship, University of Connecticut \$8,406
	Summer Doctoral Dissertation Fellowship, University of Connecticut \$2,000
2024	Joint Fire Science Program Graduate Research Innovation Award \$25,000
	Lewis and Clark Fund for Exploration and Fieldwork, American Philosophical Society \$5,000
	Trainor Endowment Research Award, University of Connecticut \$1,500
	EEB Headship Award for Research Accomplishments, University of Connecticut \$500
2023	CCB Endowment Research Award, University of Connecticut \$1,500
2022	NSF Research Traineeship: Team TERRA (2022-2023) \$34,000
	American Society of Mammalogists: Grants-In-Aid of Research \$1,500
	Boulder County Nature Association, Colorado \$1,500
	EEB Graduate Student Research Award, University of Connecticut \$1,500
2021	Jorgensen Fellowship, University of Connecticut (2021-2026) \$100,000

2019	College of Letters & Science Student Research Travel Grant, MSU Bozeman \$750
	Northwest Scientific Association Research Grant \$1,500
	College of Letters & Science Student Research Travel Grant, MSU Bozeman \$300
2018	Sigma Xi Grant-in-Aid \$400
	American Society of Mammalogists: Grants-In-Aid of Research \$1,500
	MSU Undergraduate Scholars Program (LSD*) \$1,800
	Institute on Ecosystems Undergraduate Research Grant (LSD*) \$4,000
	Institute on Ecosystems Undergraduate Research Grant (AEH*) \$4,000
2017	Institute on Ecosystems Graduate Funding \$500
	American Alpine Club Research Grant \$250
2015	MSU Undergraduate Scholars Program \$1,800
2014	MSU Undergraduate Scholars Program \$1,800

CONFERENCE PRESENTATIONS *(*indicates undergraduate mentee)*

Billman, P.D. and Urban, M.C. Revisiting Darwin's Range-Limit Theory in a High-Elevation System. American Society of Mammalogists and NAPC, Boulder, CO.

Beever, E.A., **Billman, P.D.**, Maher, S., Abatzoglou, J., Albright, T., and Smith, A.B. Importance of drought and water availability to mammals in increasingly warmer and (effectively) drier climates. American Society of Mammalogists and NAPC, Boulder, CO.

Westover, M.L., Beever, E.A., Smith, A.B., Gerraty, F.D., **Billman, P.D.**, and Smith F.A. Climate drives patterns of occupancy and density more strongly than biogeography at the trailing edge. American Society of Mammalogists and NAPC, Boulder, CO.

- Billman, P.D.**, Dierickx, E.E., Urban, M.C., and Martinez-Martinez, J. 2024. Identifying the Local Factors that Increase Health Risks During Heatwave Events. NAC Society of Toxicology and Chemistry Annual Conference, Woods Hole, MA.
- Billman, P.D.** Revisiting Darwin's Range-Limit Theory in a High-Elevation System. Ecology and Evolutionary Biology Research Symposium, Storrs, CT.
- Billman, P.D.** and Urban, M.C. 2023. Competitive exclusion by pikas towards woodrats in the Southern Rockies. North American Pika Consortium, Virtual.
- Beever, E.A., **Billman, P.D.**, Ryals, D.K., Craighead, A., and Smith, A.B. 2023. Patterns and predictors of pika occupancy and density across the Greater Yellowstone Ecosystem. North American Pika Consortium, Virtual.
- Westover, M.L., Beever, E.A., Smith, A.B., Gerraty, F.D., **Billman, P.D.**, and Smith, F.A. 2023. Climate drives patterns of occupancy and density more strongly than biogeography. North American Pika Consortium, Virtual.
- Wilkening J.L. et al. (+49 authors including **Billman, P.D.**) 2023. Lower adaptive capacity among pikas than in other mountain-dwelling small mammals. North American Pika Consortium, Virtual.
- Beever, E.A., Maher, S., Abatzoglou, J., Albright, T., **Billman, P.D.**, and Smith, A.B. 2022. Importance of ecological water availability for terrestrial wildlife in an increasingly warmer and effectively drier climate. The Wildlife Society Annual Conference, Spokane, WA.
- Beever, E.A., **Billman, P.D.**, Ryals, D.K., Craighead, A., and Smith, A.B. 2022. Patterns, trends in, and drivers of occupancy and abundance of a climate-sensitive species across the GYE. Scientific Conference on the Greater Yellowstone Ecosystem.
- Billman, P.D.** Beever, E.A., McWethy, D., and Thurman, L.L. 2020. Assessing alternative drivers of abundance, occupancy, and elevational range retractions at the range core of a climate-sensitive mammal. Ecological Society of America (ESA) Annual Meeting, Salt Lake City, Utah.
- Billman, P.D.** Beever, E.A. and McWethy, D. June 2019. Investigating the impacts of contemporary climate change using a space-for-time approach in montane systems. American Society of Mammalogists Annual Meeting. Washington D.C.
- Billman, P.D.** Apr. 2019. Quantifying the Effects of Contemporary Climate Change on an alpine Mammal, Using a Space-for-Time Substitution. Earth Science Colloquium. Bozeman, MT.

- Robinson, M.R.*, **Billman, P.D.**, Willey, D. and Beever, E.A. Feb. 2019. Investigation of the distribution of the American pika (*Ochotona princeps*) of Southwest Montana in relation to potential climate changes. MSU Student Research Celebration. Bozeman, Montana.
- Dudley, L.S.*, **Billman, P.D.**, McWethy, D.B., and Beever, E.A. Apr. 2019. Assessing the impacts of aridity and climate change on American pikas in the Northern Rocky Mountains. National Conference of Undergraduate Research (NCUR). Atlanta, GA
- Robinson, M.R.*, **Billman, P.D.**, Willey, D. and Beever, E.A. Feb. 2019. Investigation of the distribution of the American pika (*Ochotona princeps*) of Southwest Montana in relation to potential climate changes. Biology19. Zürich, Switzerland.
- Robinson, M.R.*, **Billman, P.D.**, Willey, D. and Beever, E.A. Apr. 2018. Investigation of the distribution and occupancy of the American pika (*Ochotona princeps*) of Southwest Montana in relation to potential climate changes. National Conference of Undergraduate Research (NCUR). Oklahoma City, OK.
- Billman, P.D.** and Lavin, M. Apr. 2016. Multi-Intron Analysis of *Aquilegia flavescens* in the Northern Rocky Mountains. National Conference of Undergraduate Research (NCUR). Asheville, NC.
- Billman, P.D.** and Lavin, M. Apr. 2016. Multi-Intron Analysis of *Aquilegia flavescens* in the Central and Northern Rocky Mountains. MSU Student Research Celebration. Bozeman, MT.
- Billman, P.D.** and Lavin, M. Apr. 2015. Microsatellite Analysis of the Biogeographical and Phylogenetic Relationships Within *Aquilegia flavescens* (Yellow columbine). National Conference of Undergraduate Research (NCUR). Cheney, WA.
- Billman, P.D.** and Lavin, M. Apr. 2015. Microsatellite Analysis of the Biogeographical and Phylogenetic Relationships Within *Aquilegia flavescens* (Yellow columbine). MSU Student Research Celebration. Bozeman, MT.

MENTORING

Undergraduate Research Mentees

Rhagov Srivastava- Biological Sciences	2025-Curr
Gage Rovelli- Biological Sciences	2024-Curr
Lyman Dudley- Geographic Information Systems	2018-2020
Megan Robinson- Conservation Biology	2016-2019
Kenny Wilson- Environmental Studies	2018-2019
Aimee Heffernan- Conservation Biology	2018

TEACHING EXPERIENCE

Lab Instructor: **Principles of Biology II** (BIO 1108), University of Connecticut

- Spring 2025
- two lab sections- 40 students

Lab Instructor: **General Ecology** (EEB 2244), University of Connecticut

- Fall 2024
- four lab sections- 42 students

Lab Instructor: **Principles of Biology II** (BIO 1108), University of Connecticut

- Spring 2024
- two lab sections- 47 students

Lab Instructor: **General Ecology** (EEB 2244), University of Connecticut

- Fall 2023
- four lab sections- 47 students

Instructor of Record: **Research in Ecology & Evolution** (EEB 3894), University of Connecticut

- Spring 2023
- one section- 10 students

Teaching Assistant: **Big Data Science for Biologists** (EEB 4100), University of Connecticut

- Spring 2022
- one section- 21 students

Teaching Assistant: **Current Issues in Envir. Science** (EEB 3205), University of Connecticut

- Fall 2021
- one section- 23 students

Teaching Faculty: **Principles of Biological Systems** (BIOB 170), Montana State University

- Spring 2021
- three lab sections- 51 students
- TA rating: 4.96/5

Lab Instructor: **Principles of Biological Systems** (BIOB 170), Montana State University

- Fall 2020
- three lab sections- 45 students
- TA rating: 4.57/5

Lab Instructor: **Earth System Sciences** (ERTH 101), Montana State University

- Spring 2020
- three lab sections- 55 students
- TA rating: 4.77/5

Lab Instructor: **Mammalogy** (BIOO 475), Montana State University

- Fall 2019
- three lab sections- 46 students
- TA rating: 4.93/5

Lab Instructor: **Intro. to GIS Science & Cartography** (GPHY 284), Montana State University

- Spring 2019
- lab section of 17 students
- TA rating: **4.80/5**

Lab Instructor: **Yellowstone: Scientific Lab** (ERTH 212), Montana State University

- Fall 2018
- three lab sections- 57 students
- TA rating: **4.67/5**

Lab Instructor: **Earth System Sciences** (ERTH 101), Montana State University

- Spring 2018
- Taught three lab sections- 60 students
- TA rating: **4.76/5**

INVITED ORAL PRESENTATIONS

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|-------------|---|
| 2024 | <p>Billman, P.D. Ecological and Evolutionary Responses of Montane Species to Press and Pulse Disturbances. University of Rhode Island, RI.</p> <p>Billman, P.D. Cutting Through the Complexity: Back to the Basics in Predicting Species' Range Shifts. University of Connecticut, CT.</p> |
| 2023 | <p>Billman, P.D. Identifying Climate Change Winners and Losers within Small Mammals in the Southern Rockies. Boulder County Nature Association, CO.</p> |
| 2022 | <p>Billman, P.D. Montane Mammals Exhibiting Opposing Responses to Recent Warming in the Southern Rocky Mountains. Colorado Pika Project, CO.</p> <p>Billman, P.D. A Peek into American Pikas: How Climate Change is Impacting Their Distributions. Colorado Endangered Species Week.</p> |
| 2021 | <p>Billman, P.D. Drivers of Distributional Shifts of American Pikas (<i>Ochotona princeps</i>) at Their Range Core in the Northern Rocky Mtns. Colorado Pika Project, Denver, CO.</p> <p>Billman, P.D. Alpine Wildlife and Shifting Climates. Friday Summer Speakers Seminar. Lewis and Clark Caverns State Park, Cardwell, MT.</p> |
| 2019 | <p>Billman, P.D. What Climate Change Means for American Pikas and Other Wildlife in the Northern Rocky Mountains. Mammalogy BIOO 475. Montana State University, Bozeman, MT.</p> <p>Billman, P.D. Microplastics: A Microscopic Local and Global Problem. Inland Ocean Coalition, Montana State University Chapter, Bozeman MT.</p> |

Billman, P.D., Anderson, M.E. Wildlife and Climate Change in the Northern Rocky Mountains. Restoration Ecology in Greater Yellowstone (NRSM 311), Wild Rockies Field Institute, University of Montana, Gravelly Mountains, MT.

Billman, P.D. What can we learn from studying climate change in montane systems? Biogeography (GPHY 411), Montana State University, Bozeman, MT.

2018 **Billman, P.D.**, Beever, E.A., McWethy, D.B. Quantifying the Impacts of Aridity on American Pikas in the Northern Rockies, Using Space-For-Time Substitution. USGS Northern Rocky Science Center EcoLunch, Bozeman, MT.

Billman, P.D., Wilson, K.C., Dudley, L.S. Wildlife and Climate Change in the Northern Rocky Mountains. Restoration Ecology in Greater Yellowstone (NRSM 311), Wild Rockies Field Institute, University of Montana, Tobacco Root Mountains, MT.

PROFESSIONAL MEMBERSHIPS

Member, American Alpine Club

Member, American Meteorological Society

Member, American Society of Mammalogists

Member, Ecological Society of America

Member, Northwest Scientific Association

Member, Society of Conservation Biology

Member, Wildlife Society-Montana State Chapter

Member, National Society of Collegiate Scholars

SERVICE AND OUTREACH

Journal Reviews: *Ecography, Ecological Modelling, Ecology and Evolution, Ecology, Journal of Mammalogy, Journal of Wildlife Management, Rangeland Ecology & Management, Risk Analysis, The Canadian Field-Naturalist, and Western North American Naturalist.*

Press Release Writer for The American Naturalist

- 2025-current

Global Mountain Biodiversity Assessment (GMBA) member and collaborator

- 2024-current

Working Group Leader (Field Methods)- North American Pika Consortium

- 2024-current

Working Group Co-Leader (Habitat and Distribution)- North American Pika Consortium

- 2024-current

Species Expert for Montana's State Wildlife Action Plan (SWAP)- Columbia Spotted Frogs

- 2024-2025

President, Graduate Student Association of Ecology and Evolutionary Biology, UConn
 - 2023-2024

EEB Grad Student Outreach Event at Natchaug Elementary School, Willimantic, CT
 - 2023

Vice President, Graduate Student Association of Ecology and Evolutionary Biology, UConn
 - 2022-2023

National Conference of Undergraduate Research (NCUR) – Abstract Reviewer
 - 2022-2025

University of Connecticut, Storrs - Graduate Student Panel for EEB undergraduates
 - 2021

St. John's University, Minnesota (virtual) - Graduate Student Panel Invited Member
 - 2021

Montana Science Olympiad, Event Captain - Water Quality & Long-Term Climate Change
 - 2018, 2019, and 2021

National Conference of Undergraduate Research (NCUR)-Program Steering Committee
 - 2019-2020

Montana State University Orientation Leader
 - 2015-2016

RESEARCH EXPERIENCE

Graduate Research Assistant **Aug 2017-May 2020**

Department of Earth Sciences, Montana State University

- Project aim: to identify the direct and indirect environmental drivers influencing abundance, occupancy, and elevational shifts in montane-dwelling mammals, using the American pika (*Ochotona princeps*) as a model species. We used a space-for-time design encompassing 64 elevational transects across the Northern Rocky Mountains, USA.
- Designed and executed field-based study of 760 remote field sites over three years.
- Used information-theoretic approaches to investigate of physiological mechanisms
- Recruited and mentored three undergraduate students in data collection and analysis for their independent research projects relating to this species and climate change.

Research Assistant **May 2016-Aug 2017**

U.S. Geological Survey-Northern Rocky Science Center, Bozeman MT

- Responsible for extensive database management and analysis
- Conducted field surveys in California, New Mexico, and Montana for American pika evidences to document local extirpations.
- Mapped field locations (talus fields), using GIS programs, to be surveyed by field crews across all of northern New Mexico, Grand Teton National Park, Yellowstone National Park, and several national forests in the West.
- Assisted in literature reviews and preparation of numerous publications.

Undergraduate Researcher-Independent Research**May 2014-May 2016***Montana State University, Bozeman MT*

- Project aim: to explore alpine plant migrations in mountain systems using phylogenetic approaches.
- Coordinated and performed two-year study of *Aquilegia flavescens* (yellow columbine) across six western states and two Canadian provinces to understand migration of this species since the latest Quaternary Glaciation.
- Analyzed numerous DNA intron regions, quantifying and comparing genetic substitutions, additions, and deletions.
- Collaborated with professors, national park staff, and museum staff to obtain both fresh specimens as well as herbarium specimens in the United States and Canada.
- Disseminated results orally at four conferences in three different states, as well as through written reports for the appropriate agencies.

Research Assistant**Oct 2015-May 2016***Craighead Research Institute, Bozeman MT*

- Responsible for data entry, database management and creation, as well as QC/QA
- Conducted statistical analyses on climate-vegetation-occupancy relationships for various sites in the Gallatin Range, Montana.
- Explored interactions between microclimates and occupancy using climate sensors.
- Processed camera trap images to document pika behavior.

Aquatic Field Technician**Sept 2014-June 2015***Adventurers and Scientists for Conservation, Bozeman MT*

- Project Aim: to investigate, document, and quantify microplastic abundance in the Gallatin River in Yellowstone National Park, in the first-of-its-kind study of freshwater rivers
- Received extensive training on water sampling and protocol for parkwide research.
- Collected water samples from the most remote reach of the Gallatin River in the backcountry of northwestern Yellowstone National Park in June, September, December, and May by means of hiking and cross-country skiing.

Wildlife Reserve Internship**May-June 2015***Velgevonden Wildlife Reserve, Waterberg Biosphere, South Africa*

- Assisted reserve biologists in diverse work across the mountainous region.
- Quantified the impact of elephants on plant species.
- Identified grass and tree species and determined mammalian carrying capacities.
- Assisted in the tranquilizing and translocating of nine rhinos and one lion across reserves.
- Tracked individual animals via radio telemetry and tracks.
- Operated camera traps for *Panthera*, as well as processed and organized imagery by species.
- Conducted mammalian population counts using line transect methods.

Research Lab Assistant

Feb 2014-June 2014

Zambian Carnivore Program (ZCP)-Bozeman, MT

- Organized, managed, and entered field data into numerous Access databases.
- Collated multiple databases to streamline work flows before conducting QC/QA
- Identified African wild dogs and hyena individuals and packs using field photos and camera trap images.
- Communicated with scientists in the field what was needed from them and vice versa to ensure high data quality.

Caribbean Coral Reef Health Analysis

Dec 2013-Jan 2014

Ecosystem Field Studies- University of Montana, Missoula, MT

- Project Aim: to assess coral reef health by studying the presence and behavior of two indicator species of butterflyfish.
- Learned and identified reef species, including corals, algae, and fishes.
- Designed quadrat plots to quantify coral health at locations where the focal fish species were present.
- Discovered widespread decay of this particular reef off the Yucatan Peninsula, potentially related to nearby septic leakage.