

Justin D. Gay, Ph.D.

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Education

Ph.D. Ecology and Environmental Science (2017 – 2022)

Montana State University, Department of Land Resources and Environmental Science,
Bozeman, MT

Advisor: Dr. Jack Brookshire

Dissertation: "A multi-scale assessment of the coupling between the nitrogen cycle and the terrestrial carbon sink under global change"

M.A. Teaching with a focus in Science Curriculum and Instruction (2014 – 2015)

University of Vermont, Burlington, VT

B.S. Environmental Science (2007 – 2011)

Endicott College, Beverly, MA

Semester abroad: National Outdoor Leadership School (NOLS), 3-month backpacking and mountaineering training course in the Himalayas (Spring semester 2010, India)

Professional Academic Appointments

Assistant Teaching Professor of Ecology (July 2024 – Present)

Department of Ecosystem and Conservation Science, W.A Franke College of Forestry and Conservation, University of Montana

Courses taught (IOR): NRSM 212 Ecology, physics, and taxonomy of soil; NRSM121 Introduction to environmental science and sustainability; NRSM110 First year seminar in environmental science and sustainability; GPHY 111&112 Introduction to physical geography: climate, landforms, and geography and lab.

Postdoctoral/Research Appointments

ORISE Research Fellow (June 2023 – Present)

Rocky Mountain Research Station Missoula Fire Sciences Lab, U.S. Forest Service, Missoula, MT

Mentor: Dr. Kimberley Davis

Postdoctoral Research Associate (June 2022 – May 2023)

University of Wisconsin-Madison, Madison WI, Department of Soil Science

Mentors: Dr. Rebecca Larson and Dr. Matt Ruark

Teaching

Lead Teaching Assistant (2017-2021)

Department of Land Resources and Environmental Science, Montana State University

- ENSC353 Environmental Biogeochemistry, Fall semester 2017, 2018, 2020, lead TA
- ENSC272 Water resources, Fall semester 2021, lead TA

High School Science Faculty (Aug 2013 – June 2017)

- Middlebury Union High School (2016-2017), Middlebury, VT
- Vergennes Union High School (2015), Vergennes, VT
- Rock Point School (2013-2014), Burlington, VT

Publications

Published Manuscripts:

- **Gay, J.D.**, Currey, Davis, KT, Brookshire, ENJ. Functional attributes of conifers expanding into semi-arid grasslands modulate carbon and nitrogen fluxes in response to prescribed fire. Accepted Aug 1, 2024. Biogeochemistry
- Romanko, C. A., **Gay, J. D.**, Powell, J. M., Wattiaux, M., Barford, C., Larson, R. A., & Ruark, M. D. (2023). Soil greenhouse gas flux and nitrogen mineralization following manure application from tannin-fed dairy cows. Journal of Environmental Quality, 00, 1–11. <https://doi.org/10.1002/jeq2.20534>
- **Gay, J.D.**, Currey, B. & Brookshire, E.N.J. Global distribution and climate sensitivity of the tropical montane forest nitrogen cycle. Nature Communications 13, 7364 (2022). <https://doi.org/10.1038/s41467-022-35170-z>
- **Gay, J.D.**, H. Goemann, B. Currey, P.C Stoy, P. Miller, B. Peyton, B. Poulter, E.N.J Brookshire (2022). The climate mitigation potential and soil microbial response of cyanobacteria-fertilized bioenergy crops on semi-arid cropland. Global Change Biology: Bioenergy. <https://doi.org/10.1111/gcbb.13001>
- Goemann, H, **Gay, J.D.**, R. Mueller, P. Miller, ENJ Brookshire, B. Poulter, B. Peyton (2021). Above and below-ground responses to cyanobacterial biofertilizer supplement in a semi-arid bioenergy cropping system. Global Change Biology: Bioenergy. <https://doi.org/10.1111/gcbb.12892>
- Epstein, K, D. Wood, K. Roemer, B. Currey, H. Duff, **Gay, J.D.** ... J. Haggerty. (2021) Toward an urgent yet deliberate strategy: sustaining social-ecological systems in rangelands of the Northern Great Plains, Montana. Ecology and Society 20(1):10. <https://doi.org/10.5751/ES-12141-260110>

Manuscripts in Advanced Stages of Preparation (drafts available upon request)

- Currey, B., **Gay, J.D.**, Brookshire E.N.J. Ecosystem consequences of conifer expansion in temperate semi-arid grasslands. To be submitted to Ecosphere
- **Gay, J.D.**, S. Hood, M. Manning, M. Cox, K. T. Davis. Forest understory monitoring protocol for fuels treatments in the USFS northern region. To be submitted as a Gen Tech Rep. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Grants and Funding

- **2022** - Dairy Innovation Hub grant for capacity equipment proposals (\$61,000), UW-Madison. Project Title: A greenhouse gas measurement system for dairy agroecosystems.
- **2022** - Montana State Undergraduate Scholars Program / Montana State (\$1,800). Project Title: Up in smoke and down the river: Evaluating the environmental controls on watershed-scale transport and degradation rates of pyrogenic carbon (mentored lab undergraduate D. Egen)
- **2022** - Ph.D. Completion Grant / Montana State Graduate School (\$10,800)
- **2021** - Montana State Undergraduate Scholars Program / Montana State (\$900). Project Title: Comparative analysis of root characteristics and arbuscular mycorrhizae community structures across two bioenergy cropping systems in SW Montana (mentored lab undergraduate S. Walsh)
- **2020** - Professional Advancement Grant / Montana State University (\$500)
- **2019** - Murdock Trust's Partners in Science Grant / Murdock Trust (\$15,000). Project Title: Mechanistic drivers behind the transformation of the Northern Great Plains' mixed-grass prairie (mentored high school teacher T. Dille)
- **2019** - Nielsen Pedology Graduate Research Assistantship / Montana State University (\$8,585)
- **2018** - Environmental Analytics Laboratory Assistantship / Montana State University (\$12,500)
- **2016** - NSF Stem Teacher and Researcher Summer Research (STAR) Fellowship / (\$10,000)
- **2015** - NSF Stem Teacher and Researcher Summer Research (STAR) Fellowship / (\$10,000)
- **2014** - NSF Robert Noyce Scholarship for Science Teachers / University of Vermont (\$15,000)

Awards

- **2021** - NACTA Teaching Award of Merit for Graduate Students / North American Colleges and Teachers of Agriculture
- **2019** - Ecological Society of America Annual Meeting Student Volunteer Award
- **2017** - Jo and Dave Cole Teaching and Mentorship Award / Middlebury Union High School Parents and Community Association

Invited Talks and Presentations

***2024** – Guest Lecture for BSE349: Quantitative Methods for Biological Systems at UW-Madison / Madison, WI / *“Nitrogen: The overlooked element in climate change”*

***2023** – Guest Lecture for BSE349: Quantitative Methods for Biological Systems at UW-Madison / Madison, WI / *“From the Prairie to the Tropics: Emerging feedbacks between ecosystem nitrogen and carbon cycling under environmental change”*

***2023** – MT Nature Conservancy / Matador Ranch, Dodson MT / *“Conifer expansion in semi-arid grasslands increases ecosystem productivity and exacerbates nitrogen limitation and episodic carbon and nitrogen losses from fire”* Presenting author: J. Brookshire

***2023** - Utah Valley University Earth Science Department Seminar Series / Orem, UT / *“Perturbation to terrestrial carbon and nitrogen cycling: Implications for global change and environmental management.”*

2023 - *International Fire Ecology and Management Congress*. “Functional attributes of conifer trees expanding into grassland modulate carbon and nitrogen fluxes in response to prescribed fire” (*Accepted Talk*)

2023 - *Ecological Society of America*. “Functional attributes of conifer trees expanding into grassland modulate carbon and nitrogen fluxes in response to prescribed fire” (*Accepted Talk*)

2022 - *Ecological Society of America*. “The climate mitigation potential and soil microbial response of cyanobacteria-fertilized bioenergy crops on semi-arid cropland” (*Accepted Talk*)

***2022** - Massachusetts 4-H Climate Change Extension Series / Barnstable, MA / *“Global Climate Change: The Science & Emerging Solutions”*

2020 - *Ecological Society of America*. “Integrative effects of prescribed fire and woody plant encroachment on biogeochemical cycling in the Northern Great Plains” (*Accepted Talk*)

2020 - *Society of Range Management*. “Pyrogenic carbon production from prescribed fire and woody plant encroachment in the Northern Great Plains” (*Accepted Talk*)

2019 - *Ecological Society of America* / “Temperature sensitivity of forest soil N cycling across latitudinal and elevational gradients” (*Accepted Talk*)

***2019** - Musselshell Watershed Coalition Annual Meeting / Roundup, MT / *“Understanding the impacts of changing climate and fire on the vegetation structure and function in the Musselshell-Missouri River Breaks”*

***2019** - Institute on Ecosystems Rough Cut Seminar Series / Bozeman, MT / *“Building resilience on the margin: Characterizing social-ecological change in the Northern Great Plains”*

**denotes invited*

Poster Presentations

2023 – *“American Geophysical Union”* Persistent Hydrologic Nutrient Export in Response to Wildfire and Climate Change in Semi-Arid Watersheds. (*Accepted Poster*)

2015 - *American Geophysical Union* / “The effect of drought on stomatal conductance in the Biosphere 2 rainforest” (*Accepted Poster*)

Professional Service

- Journal reviewer: *Plant and Soil, Biogeochemistry, International Journal of Wildland Fire, Agronomy for Sustainable Development, Journal of Environmental Management, Rangeland Ecology and Management, Journal of Ecology*
- Reviewer for the Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report: Chapter 5 “Global Carbon and other Biogeochemical Cycles and Feedbacks”
- Ecological Society of America invited panelist and moderator for Career Central session titled “Deep Dive: Federal Careers”

Professional Affiliations

- American Association for Fire Ecology (2023-present)
- Ecological Society of America (2017-present)
- Society of Range Management (2019-2021)
- National Ski Patrol, Outdoor Emergency Care Medical Certification

Additional Professional Experience

SPATIAL Short Ecosystem Isotope Course (2021 Summer)

University of Utah, Salt Lake City, UT

Avalanche I and II certifications (2019 & 2016, Winter)

AIARE, Bozeman MT and North Conway, NH

Professional Ski Patrol (2012 – 2013, Winter)

Okemo Mountain Resort, Ludlow VT

Backcountry Facilities Manager and Naturalist (2011 – 2013, Summer)

Appalachian Mountain Club, White Mountains, NH

Wilderness Travel Instructor (2011 Summer)

Deerhill Expeditions, Mancos CO