Dr. Katherine R. Hayes
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RESEARCH APPOINTMENTS

National Science Foundation Postdoctoral Fellow **2023 - Present**
Forest Futures Lab, Cary Institute of Ecosystems Studies

EDUCATION

Ph.D. in Integrative and Systems Biology
University of Colorado, Denver Advised by Dr. Brian Buma

M.S. in Geography
University of Oregon Advised by Dr. Dan Gavin

B.S. in Environmental Studies, Spanish, and Geography, with honors
University of Wisconsin, Madison Advised by Dr. Jack Williams

PEER REVIEWED PUBLICATIONS

9. Weiss S, Marshall A, **Hayes K**, Nicolsky D, Buma B, Lucash M. Future transitions from a conifer to a deciduous-dominated landscape are accelerated by greater wildfire activity and climate change in interior Alaska. (2023). *Landscape Ecology*. https://doi.org/10.1007/s10980-023-01733-8
8. Carter T, **Hayes K**, Buma B. Putting more fuel on the fire… or maybe not? A synthesis of spruce beetle and fire interactions in North American Subalpine Forests. (2022). *Landscape Ecology*. https://doi.org/10.1007/s10980-022-01481-1
7. **Hayes K,** Carter T, Cook P, Twaddell E, Buma B. Supporting Graduate Field Leadership through Community-Sourced Advice, Action, and Policy. (2022). *Ecosphere.* https://doi.org/10.1002/ecs2.4247
6. Buma, B, **Hayes, K,** Weiss, S, Lucash, M. Short interval fires increasing in the Alaskan boreal forest as fire self-regulation decays across forest types. (2022). *Scientific Reports*. https://doi.org/10.1038/s41598-022-08912-8
5. Muthukrishnan R, **Hayes K**, Bartowitz K, Cattau M, Harvey B, Lin Y, Lunch C. Harnessing NEON to evaluate ecological tipping points: opportunities, challenges, and approaches. (2022). *Ecosphere*. http://doi.org/10.1002/ecs2.3989
4. Nagy C, Balch J, Bissell E, Cattau M, Glenn N, Halpern B, … **Hayes K**, … O'Riordan, C. Harnessing the NEON data revolution to advance open environmental science with a diverse and data-capable community. (2021). *Ecosphere*. https://doi.org/10.1002/ecs2.3833
3. **Hayes K**, Buma B. Effects of short-interval disturbances continue to accumulate, overwhelming variability in local resilience. (2021). *Ecosphere.* https://doi.org/10.1002/ecs2.3379
2. Jensen A, Fastovich D, Watson B, Gill J, Jackson S, Russell J, Bevington J, **Hayes K**, …. Williams J. More than one way to kill a spruce forest: The role of fire and climate in the late-glacial termination of spruce woodlands across the southern Great Lakes. (2021). *Journal of Ecology*. https://doi.org/10.1111/1365-2745.13517
1. Buma B, Weiss S, **Hayes K**, Lucash M. Wildland fire reburning trends across the US West suggest only short-term negative feedback and differing climatic effects. (2020). *Environmental Research Letters*. https://doi.org/10.1088/1748-9326/ab6c70

OTHER PUBLICATIONS

- Reichenborn M, Rottler C, Aragón L, Bishop T, **Hayes K,** Kottler E, Talal M, Sommers P. Advice from the field: practical skills, challenges, and how to support early career ecologists. (2023). *Bulletin of the Ecological Society of America.* **[In press]**
- Kulakowski D, Buma B, Guz J, **Hayes K**. The ecology of forest disturbances. (2019). Reference Module in *Earth Systems and Environmental Science*. https://doi.org/10.1016/B978-0-12-409548-9.11878-0

PUBLICATIONS IN REVIEW (available on request)

- **Hayes K,** Hoffman C, Linn R, Ziegler J, Buma B. Fuel constraints not fire weather conditions limit fire behavior in reburned boreal forests. *Agricultural and Forest Meteorology.* **[In Revision]**
- **Hayes K,** Lucash M, Olson K, Buma B. Repeat short-interval fires put carbon storage at risk in Interior Alaska via cumulative combustion of soil carbon. *Global Change Biology*. **[In Revision]**

GRANTS

2023 **Joint Fire Science Program Collaborative Proposal** In Review
Informing effective strategies for managing carbon with increasing fire in boreal forests of Interior Alaska
Hansen W, Hayes K **[co-PI]**, Hall J, Rogers B

2022 **NSF Collaborative Proposal** $276,934 of 1.4 million
The Past, Present and Future of Boreal Fire Feedbacks
Buma B, Higuera C, Hoffman C, Chapman M, Hayes K **[PhD co-author]**

NSF Postdoctoral Research Fellowship $321,333
Investigating fire-biotic disturbance interactions and their sensitivity to climate in the North American boreal biome
Hayes K **[PI]**, Hansen W, Johnstone J

2021 UC Denver Integrative and Systems Biology Merit Grant $15,000

Colorado STEM Graduate Grant $1,250

2019 **Joint Fire Science Program Graduate Research Innovation Award** $25,000
Evaluating Flammability across Reburns in Interior Alaska
Hayes K, Buma B **[PhD co-author]**

SELECT PRESENTATIONS

2023

- Hayes K, Hansen W, Johnstone J, Honkaniemi J, Albrich K. *How do Interactions between Fire and Biotic Disturbances influence Forest Carbon and Communities in Interior Alaska?.* American Geophysical Union. San Francisco, CA. December 2023.
- Hayes K. *How herbivores interact with fire to shape Alaskan forests: challenges and opportunities in understanding disturbance interactions under climate change*. Cary Institute of Ecosystem Studies. Millbrook, NY. Seminar. November 2023. **[Invited]**
- Hayes K, Ziegler J, Hoffman C, Buma B. *Simulated fire spread in reburned boreal deciduous forests limited by wind speed and fuel connectivity, not fuel availability.* Ecological Society of America. Portland, OR. August 2023.
- Hayes K. *Frequent fires change forest composition and carbon of Alaskan boreal forests*. Seminar. Natural Resources Institute Finland. Helsinki, Finland. April 2023. **[Invited]**
- Hayes K, Hansen W. *A systematic review of emerging biotic disturbances in Interior Alaska.* International Association of Landscape Ecology: North America. Riverside, CA. March 2023.

- Hayes K, Buma B, Ziegler J, Hoffman C. *Changing fuels and fuel structures in boreal forests alter and can increase fire spread through wind, spread, and other mechanisms.* American Meteorological Society. Denver, CO. January 2023. **[Invited]**

2022

- Hayes K, Hoffman C, Ziegler J, Lucash M, Buma B. *Continued short-interval reburning changes carbon storage and future fire behavior of boreal forests regardless of forest resilience.* American Geophysical Union. Chicago, IL. December 2022.
- Hayes K, Hoffman C, Ziegler J, Buma B. *Evaluating flammability of reburns across Interior Alaska.* Alaska Fire Science Consortium. Webinar. November 2022. **[Invited]**
- Hayes K, Carter T, Cook P, Twaddell E, Buma B. *How do we practice, develop and support graduate field leadership skills?* Pal(a)eo Early Career Seminar Series. Remote Seminar. September 2022. **[Invited]**
- Hayes K, Lucash M, Hoffman C, Ziegler J, Buma B. *Short-interval reburning changes fuel structure, carbon storage and fire behavior of boreal forests*. Ecological Society of America. Montreal, CA. August 2022.
- Hayes K, Carter T, Cook P, Twaddell E, Buma B. *Strategies for managing and leading fieldwork successfully as a graduate student*. Ecological Society of America: Inspire Session. Montreal, CA. August 2022.
- Hayes K, Lucash M, Buma B. *Repeat short-interval fires put carbon storage in Interior Alaska at risk.* International Association of Landscape Ecology: North America. Remote. April 2022. **[Presentation Award]**
- Hayes K, Gavin D. *Establishing baseline patterns of fire in old-growth coast redwood forests using soil carbon and charcoal*. Northwest Science Association. Remote. March 2022.
- Hayes K, Carter T, Cook P, Twaddell E, Buma B. *Graduate Field Leadership: Challenges, Successes and Strategies.* Front Range Student Ecology Symposium. Fort Collins, CO. Feb. 2022.

2021

- Hayes K, Buma B. *Repeat short-interval fires drive changes in biomass and soil carbon in Interior Alaska, regardless of local site conditions or resilience*. American Geophysical Union. New Orleans, LA. December 2021.
- Hayes K, Buma B. *Continued short-interval reburning drives changes in fuel-scapes across boreal forest landscapes*. Great Plains Rocky Mountains Applied Geography. Remote. October 2021.
- Hayes K, Buma B. *Biomass and soil carbon in reburned stands burnt in short-intervals in Interior Alaska*. International Boreal Forest Research Association. Remote. August 2021. **[Presentation Award]**
- Hayes K, Buma B. *Repeat short-interval fires drive changes in biomass and soil carbon in Interior Alaska*. International Association of Landscape Ecology: North America. Remote. April 2021.
- Hayes K, Buma B. *The effects of multiple short-interval fires on community and functional trait-based regeneration in boreal Alaska.* American Association of Geographers. Remote. April 2021.
- Hayes K, Buma B. *Repeat short-interval fires drive changes in forest structure, composition and carbon in Interior Alaska*. Front Range Student Ecology Symposium. Remote. March 2021. **[Presentation Award]**

2020

- Hayes K, Buma B. *Interacting Effects of Herbivory and Short-Interval Reburns on Successional trajectories in Boreal Interior Alaska*. International Association of Landscape Ecology: North America. Remote. May 2020.
- Hayes K**,** Buma B**.** *Evaluating flammability of reburns in the boreal forests of Interior Alaska.* Alaska Fire Science Consortium. Webinar. April 2020. **[Invited]**

2019

- Hayes K, Buma B. *Continued short-interval fires overwhelm serotinous resilience regardless of topographic variation*. Association for Fire Ecology. Tucson, AZ. November 2019.

- Hayes K. *Repeat short-interval fires in boreal cause continued ecosystem change*. UC Denver Integrative Biology Graduate Student Seminar Series. Denver, CO. October 2019.
- Hayes K. *Using NEON data to identify ecological tipping points across spatial/temporal scales*. NEON Science Summit. Boulder, CO. October 2019.
- Hayes K, Buma B. *Landscape Context mediates the effect of shortening fire intervals in boreal systems*. International Association of Landscape Ecology: North America. Fort Collins, CO. April 2019.
- Hayes K, Buma B. *Landscape Context mediates the effect of shortening fire intervals in boreal systems*. UC Denver Integrative Biology Graduate Student Seminar Series. Denver, CO. April 2019.

2017

- Hayes K, Gavin D. *Reconstructing Paleofire in Old Growth Coast Redwood Forests in Northern California Using Pyrogenic Charcoal and Soil Carbon*. Association of Pacific Coast Geographers. Chico, California. October 2017. **[Presentation Award]**
- Hayes K, Gavin D. *Reconstructing a fire history in the Coast Redwood (Sequoia Sempervirens) forests of Northern California*. Ecological Society of America. Portland, OR. August 2017.
- Hayes K. *Marine Fog, Climate Change and Coast Redwood Forests: Implications for management and research*. University of Oregon Graduate Research Forum. Eugene, OR. April 2017.
- Hayes K, Gavin D. *Marine Fog, Climate Change and Coast Redwood Forests: Past, Present and Future*. UO Climate Change Research Symposium, Eugene, OR. April 2017.

2016

- Hayes K, Williams J. *Fire History of Bonnett Lake, Ohio since the Last Glacial Maximum.* Midwest Undergraduate Geography Symposium, Minneapolis, MN. April 2016.
- Hayes K, Williams J. *Compiling a continuous charcoal record of Bonnett Lake, Ohio since the Last Glacial Maximum*. University of Wisconsin Undergraduate Symposium, Madison, WI. April 2016.

SELECT POSTER PRESENTATIONS [Undergraduate mentees underlined]

2022

- Hayes K, Hoffman C, Lucash M, Buma B. *Short-interval reburning changes fuel structure, carbon storage and fire behavior of boreal forests.* Forest Disturbance and Ecosystem Dynamics Symposium. Berchtesgaden National Park, Germany. September 2022. **[Poster Award]**

2021

- Hayes K, Hoffman C, Ziegler J, Buma B. *Continued short-interval reburning changes fuel structures of Boreal forests.* Int. Fire Ecology and Management Congress. Remote. December 2021.
- Hayes K, Buma B. *Recovery of aboveground biomass and soil carbon after multiple short-interval disturbances in boreal Interior Alaska*. North American Carbon Program Open Science Meeting. Remote. March 2021.

2019

- Hayes K, Buma B. *Effects of spatial heterogeneity on successional trajectories following repeat disturbances in Boreal Interior Alaska*. American Geophysical Union. San Francisco, CA. Dec 2019.
- Olson K, Buma B, Hayes K. *Fine-scale observations of permafrost after repeat fires in Interior Alaska*. American Geophysical Union. San Francisco, CA. December 2019.
- Kodicherla V, Shabaga J, Vogel J, Buma B, Hayes K. *Soil respiration in very high frequency Boreal wildfires as a function of species*. AGU. San Francisco, CA. December 2019.
- Hayes K, Buma B. *The implications of increasing fire frequency in boreal forests in Interior Alaska*. University of Colorado Denver Research and Creative Activities Symposium. Denver, CO. April 2019.

2018

- Hayes K, Buma B. *The future of the Boreal Forest*. University of Colorado Denver Applied Spatial Statistics Poster Presentation. Denver, CO. December 2018.

- Hayes K, Gavin D. *Fire and carbon cycling in old growth Coast redwood*. University of Oregon Graduate Research Forum. Eugene, OR. May 2018.

2017

- Hayes K, Hendricks L, Gavin D. *Forests with naturally infrequent fire: their resilience and susceptibility to impacts by people & climate change*. Joint Campus Conference. Eugene, OR. May 2017.
- Hayes K, Gavin D. *Marine fog and climate change in Coast redwood (Sequoia sempervirens) forests: Implications for management & research*. American Association of Geography. Boston, MA. April 2017.

TEACHING AND MENTORING EXPERIENCE

Instructor of Record

2022 Principles of Ecology, University of Colorado Denver

Teaching Assistant

2020 - 2022 Gen. Biology: Organisms to Ecosystems, University of Colorado Denver (2 semesters)
Biostatistics, University of Colorado Denver
2016 - 2018 The Professional Geographer, University of Oregon
Biogeography, University of Oregon (2 semesters)
Quantitative Data Analysis, University of Oregon (2 semesters)
Climatology, University of Oregon

Guest Lecturer

2020 "Introduction to Fire Ecology.", *Disturbance Ecology*, UC-Denver
2019 "Introduction to Landscape Ecology." *Principles of Ecology,* UC-Denver
2018 "Graduate School in Geography." *The Professional Geographer,* University of Oregon
2017 "Theory of Island Biogeography", *Biogeography*, University of Oregon

Mentoring Experience

2019 – 2020 NSF Research Experience for Undergraduates Mentor (2 students)

Students mentored in lab: 6
Students mentored in field: 10

Student committees:
CU Denver: Elizabeth Kuhn (B.S., 2022)

HONORS & AWARDS

2023

Ecological Society of America Paleoecology Travel Award. **$300.**

2022

UC Denver Dept. of Biology Doctoral Teaching Award. **$2,500.**
U.S. Carbon Program Leadership Award. **$1,000.**
International Association of Landscape Ecology Presentation Award. **$300.**
UC Denver Dept. of Biology Graduate Excellence in Research Award**. $250.**

2021

International Boreal Forest Research Association Presentation Award. **$400.**
Front Range Student Ecology Symposium Presentation Award. **$150.**
Ecological Society of America Graduate Student Policy Award

2020
Polanki Graduate Achievement Award. **$1,200.**
Association of Fire Ecology TREE Graduate Travel Award. **$265.**

2019
Association of Fire Ecology TREE Graduate Travel Award. **$330.**
UC Denver Graduate School Travel Award. **$500.**

2019 - 2023
UC Denver Department of Integrative Biology Travel Award. **$1,900.**
UC Denver College of Liberal Arts and Sciences Travel Award. **$1,000.**

2018
Robert J. Leonard Memorial Award. **$1,200.**

2017
Christopherson Geosystems Award for Excellence in Applied Geography/Earth Systems Science. **$300.**
UO Graduate Research Forum Oral Session Award. **$75.**
Association of Pacific Coast Geographer's Travel Award. **$200.**

SERVICE AND ENGAGEMENT

Service positions

2023 – Present	AGU Leadership Academy and Network for Diversity and Inclusion in the Geosciences (LANDInG) Postdoctoral Research Fellow.
	Fire, Consumer and Modeling Working Group Member, Bonanza Creek LTER
2022 - 2023	NSF Collaborative Proposal Reviewer, Arctic Natural Sciences Program
	Postdoctoral Hiring Committee, Bonanza Creek LTER
2020 - 2021	Graduate Student Representative: Office of the Dean Graduate Advisory Group. Provided a student perspective and advocated for student issues to the office of the Dean.
2019 - 2021	Student Representative & Executive Committee Member: International Association of Landscape Ecology North America. Elected. Prepared student-specific events and content for annual meetings (both virtual and in-person), provided a student perspective on the executive committee.
2019 – 2020	Graduate Student Representative: Department of Biology Graduate Advisory Committee, University of Colorado Denver.
2016 – 2019	Graduate Department Representative: Graduate Teaching Fellows Federation, University of Oregon.

Special sessions, workshops, and training

2023	Participant. *NEON-NCAR Community Workshop.* Boulder, CO.
	Invited speaker. *Wildfire Research: Advances, Challenges and Opportunities,* American Meteorological Society. Denver, CO.
2022	Wilderness First Aid License
	Panelist. *Advice from the Field: Practical Skills, Coping with Accessibility Challenges, and What Else You Need to Know.* Ecological Society of America. Montreal, CA.
	Session Participant. *Regional analysis of landscape and forest change towards practical landscape management.* International Association of Landscape Ecology, North America. Remote.

2021	Session Organizer: *Exploring the context and implications of departures from historic fire frequency across ecosystems*. International Association of Landscape Ecology, North America. Remote.
2020	Participant. *Foundations of Open Science Skills* (FOSS) course, CyVerse. Remote.
	Participant. *Introduction to Using Google Earth Engine for Landscape Ecology*. IALE North America Workshop.
2019	Participant. *NEON Science Summit*. Boulder, CO.
2018	Field Safety Training. National Science Foundation Polar Office. Fairbanks, AK.
2017	Session Organizer: *Water in the Pacific Midwest: Past and Future.* Graduate Student Research Forum, University of Oregon. [Organized Session Award]
2016	Participant. *PalEON: Assimilating Long-Term Data into Ecosystems Models* workshop. University of Notre Dame Research Station.

Journal Reviewer:

Plant and Soil
Global Change Biology
Ecosphere
OneEarth
Arctic, Antarctic, and Alpine Research
Ecosystems
Combustion Science and Technology
Forest Ecology and Management
Geoscientific Model Development