Katherine R. Hayes
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EDUCATION

Doctorate Degree in Integrative and Systems Biology **2018 - Present**
University of Colorado, Denver Advised by Dr. Brian Buma

Master of Science in Geography **2018**
University of Oregon Advised by Dr. Dan Gavin

Bachelor of Science in Environmental Studies, Spanish, and Geography (Honors) **2016**
University of Wisconsin, Madison Advised by Dr. Jack Williams
Minor in European Studies

RESEARCH APPOINTMENTS

Graduate Researcher **2018 - Present**
Buma Lab, Department of Integrative and Systems Biology, University of Colorado Denver

- Studying the effect of shortening fire intervals and reburns in boreal systems on succession, carbon storage and permafrost in Interior Alaska.
- Guiding undergraduate researchers in field data collection, laboratory analysis & data organization.

Graduate Field Assistant **2019**
Buma Lab, Landslide Task Force, Sitka Sound Science Center

- Conducted vegetation and soil surveys as part of a team of landslide-researchers in Sitka, Alaska.

Research Lead Technician **2018**
Buma Lab, Department of Natural Resources, University of Alaska Fairbanks/Southeast

- Lead a team of field assistants on fieldwork in Interior Alaska.
- Coordinated field sampling efforts with a team of researchers from multiple institutions.
- Trained undergraduate interns in field sampling methods and laboratory procedures.

Graduate Researcher **2016 – 2018**
Environmental Change Research Group, Department of Geography, University of Oregon

- Coordinated and conducted fieldwork in North California and Eastern Oregon.
- Served as a field assistant on several multidisciplinary research teams.
- Recruited and trained undergraduate research assistants.
- Coordinated the establishment of several new laboratory procedures.
- **Thesis title:** "*Fire History and Soil Carbon in Old Growth Coast Redwood forests across the Late Holocene"*

Undergraduate Researcher **2015 – 2016**
Williams Paleoecology Lab, Department of Geography, University of Wisconsin

- Collaborated with research teams on field work and laboratory analysis.
- **Thesis title:** *"A continuous charcoal record of Bonnett Lake, Ohio since the Last Glacial Maximum*"

PUBLICATIONS

6. 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. *Ecosphere*. **[In Press]**
5. Nagy C., … **Hayes K.**, et al. Harnessing the NEON Data Revolution to Advance Open Environmental Science with a Diverse, Inclusive and Data-Capable Community. *Ecosphere.* **[In Press]**

4. **Hayes, K.**, Buma, B. (2021). Effects of short-interval disturbances continue to accumulate, overwhelming variability in local resilience. *Ecosphere, 12(3),* e03379. https://doi.org/10.1002/ecs2.3379
3. Jensen, A. M., Fastovich, D., Watson, B. I., Gill, J. L., Jackson, S. T., Russell, J. M., Bevington, J., **Hayes, K.**, …. & Williams, J. W. (2021). 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. *Journal of Ecology*, *109*(1), 459-477. https://doi.org/10.1111/1365-2745.13517
2. Buma, B., Weiss, S., **Hayes, K**., & Lucash, M. (2020). Wildland fire reburning trends across the US West suggest only short-term negative feedback and differing climatic effects. *Environmental Research Letters*, *15*(3), 034026. https://doi.org/10.1088/1748-9326/ab6c70
1. Kulakowski D, Buma B, Guz J, **Hayes K**. 2019. "The ecology of forest disturbances". Reference Module in *Earth Systems and Environmental Science*. https://doi.org/10.1016/B978-0-12-409548-9.11878-0

PUBLICATIONS IN REVIEW

- Buma, B., **Hayes, K.,** Weiss S., Lucash, M. Short interval fires increasing in the boreal forest as fire self-regulation decays, especially in drier coniferous forest landscapes. *Scientific Reports*. **[In Review]**
- **Hayes K.** Acid-digestion recovers more pyrogenic carbon and reduces variability compared to traditional manual counting, particularly where pyrogenic carbon is scarce*. Geoderma***. [In Review]**

GRANTS

- UC Denver Department of Integrative Biology Travel Grant. 2021, **$500.**
- Association of Fire Ecology TREE Graduate Travel Grant. 2019, **$265.**
- UC Denver Integrative and Systems Biology Merit Scholarship, **$15,000.**
- Colorado STEM Graduate Grant. 2021, **$1,250.**
- UC Denver Department of Integrative Biology Travel Grant. 2020, **$290**.
- **Hayes K**, Buma B. *Joint Fire Science Program Graduate Research Innovation Award***.** Evaluating Flammability across Reburns in Interior Alaska. 2019, **$24,717.**
- Association of Fire Ecology TREE Graduate Travel Grant. 2019, **$330.**
- UC Denver Department of Integrative Biology Travel Grant. 2019, **$500.**
- UC Denver College of Liberal Arts and Sciences Travel Grant. 2019**, $500.**
- UC Denver Graduate School Travel Grant. 2019, **$500.**
- Association of Pacific Coast Geographer's Travel Grant. 2017, **$200.**

ORAL PRESENTATIONS

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"*, Int. Boreal Forest Research Association. Remote. August 2021. **[Oral Presentation Award]**
- **Hayes K**, Buma B. *"Repeat short-interval fires drive changes in biomass and soil carbon in Interior Alaska"*, Int. 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. **[Oral Presentation Award]**

2020

- **Hayes K**, Buma B. "*Interacting Effects of Herbivory and Short-Interval Reburns on Successional trajectories in Boreal Interior Alaska*", Int. Association of Landscape Ecology: North America. Remote. May 2020.
- **Hayes K,** Buma B. "*The role of spatial heterogeneity in mediating the effect of shortening fire intervals in boreal systems*", American Association of Geographers. Denver, CO. April 2020. [Cancelled due to COVID-19].

2019

- *Buma* B, **Hayes K**, Weiss S, Lucash M. "*Overlapping and interacting fires, a double whammy: Short-interval burns are becoming more frequent across the US West but pace suggests negative feedbacks and spatial patterning*", American Geophysical Union. San Francisco, CA. December 2019.
- **Hayes K,** Buma B. "*Continued short-interval fires overwhelm serotinous resilience regardless of topographic variation*", Association for Fire Ecology Annual Meeting. Tucson, AZ. November 2019.
- Buma B, **Hayes K**, Weiss S, Lucash M. "*Rates of short-interval fires increasing across the US West*", Association for Fire Ecology Annual Meeting. 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*", Int. Association of Landscape Ecology: North America. Fort Collins, CO. April 2019.
- Buma B, Lucash M, **Hayes K,** Weiss S. "*The Predictable, and not so Predictable, Spatial distribution of Short Interval Fires across the US West"*, Int. 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. **[Christopherson Award Winner]**
- **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,** Saban C, Reis S, Johnson G, Hendricks L.*"A synthesis of Coastal Systems Hydrology in the Pacific Northwest*". University of Oregon Graduate Research Forum: Symposia on Hydrology of the Pacific Northwest. Eugene, OR. April 2017. **[Panel Session Award Winner]**
- **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

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. December 2019.
- Weiss S, **Hayes K**, Lucash M. "*Modeling Post-fire Successional trajectories under Climate Change in Black Spruce forests in Interior Alaska*", American Geophysical Union. San Francisco, CA. December 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. **[*Undergrad. mentee]**
- 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. [***Undergrad. mentee]**
- **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.
- Jensen A, Rubbelke C, **Hayes K**, Bevington J, Fastovich D, Watson B, Jackson S, Russel J, Williams J. "*The role of fire in the late-glacial decline of spruce forests across the midwestern US*", American Geophysical Union. 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 and 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.

INVITED TALKS

- **Hayes K,** "*Bears, burning and Battlestar Galactica: Climate Change in Alaska and Why it Matters*". Nerd Nite. Denver, CO. October 2021.
- Buma B, **Hayes K.** *"Evaluating flammability of reburns in the boreal forests of Interior Alaska".* Alaska Fire Science Consortium. Webinar. April 2020.
- **Hayes K**. "*Climate Change: How the Arctic is Changing and Why it Matters*". First Unitarian Society Sunday Forum. Milwaukee, WI. November 2019.

HONORS & AWARDS

International Boreal Forest Research Association, Oral Presentation Award	Fall 2021
Front Range Student Ecology Symposium, Oral Presentation Award	Spring 2021
Ecological Society of America Graduate Policy Award	**Spring 2021**
Polanki Graduate Achievement Award	Spring 2020
University of Colorado Graduate Research Fellowship	Fall 2018
Nominated for University of Oregon Dean's Award	Spring 2018
Robert J. Leonard Memorial Award	Spring 2018

Christopherson Geosystems Award for Excellence in Applied Geography/Earth Systems Science **Fall 2017**

UO Graduate Research Forum Panel Session Winner Spring 2017
University of Oregon Graduate Teaching Fellowship 2016 – 2018
Polanki College Achievement Award Spring 2014
Polish National Alliance Scholarship 2013 – 2015
UW-Madison Initiative Award 2014 – 2015

TEACHING AND MENTORING EXPERIENCE

Graduate Teaching Assistant **Spring 2019 - 2021**

Department of Integrative and Systems Biology, University of Colorado Denver

- Taught labs and recitation sections for upper-level biology and statistics courses (Biostatistics, General Biology II).
- **Guest Lecturer:** Biology 3411: Principles of Ecology, Spring 2019.
  Biology 7050: Disturbance Ecology, Spring 2020.

Applied Ecology Graduate Seminar Coordinator **Spring 2019**

Department of Integrative and Systems Biology, University of Colorado Denver

- Orchestrated weekly seminar class focused on readings on current topics in applied ecology and peer review of grants, proposals, and other materials.

Graduate Teaching Fellow **Fall 2016 –Spring 2018**

Department of Geography, University of Oregon

- Taught laboratory sections for upper-level science courses (Biogeography, Quantitative Data Analysis, Climatology).
- Planned lessons and assignments, wrote exam questions, held office hours, graded papers and exams, and organized and led review sessions for midterms and exams.
- **Guest Lecturer:** Geography 323: Biogeography, Fall 2017.
  Geography 419: The Professional Geographer, Spring 2018.

Graduate Seminar Coordinator **Spring 2018**

Department of Geography, University of Oregon

- Organized and facilitated weekly seminar discussions on professionalism, graduate student well-being and reproducible science.
- Coordinated guest speakers from outside departments and organizations.

Graduate Mentor **2016 - 2018**

Environmental Change Research Group, University of Oregon

- Counseled and supervised undergraduate research assistants on laboratory protocols, applying to graduate programs and field-based research.

GRANTS SUBMITTED BUT NOT FUNDED

- National Geographic Society Early Career Grant, "*Searching for ice: mapping and modeling permafrost in Interior Alaska*", 2019.
- NSF Graduate Research Fellowship, "*Reconstructing hurricanes and fire in Cuba using paleotempestology*", 2016.

SERVICE AND ENGAGEMENT

Service positions

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.**
2018 – Present	Journal Reviewer. *Plant and Soil, Global Change Biology*

Special sessions and workshops

2021	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), CyVerse. Remote.
2019	Participant. NEON Science Summit. Boulder, CO.
2016	Participant. PalEON: Assimilating Long Term Data into Ecosystems Models. University of Notre Dame Research Station.