

**Katherine R. Hayes**  
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Updated: 10/6/21

## EDUCATION

<b>Doctorate Degree in Integrative and Systems Biology</b> University of Colorado, Denver	<b>August 2018 - Present</b> Advised by Dr. Brian Buma
<b>Master of Science in Geography</b> University of Oregon	<b>June 2018</b> Advised by Dr. Dan Gavin
<b>Bachelor of Science in Environmental Studies, Spanish, and Geography (Honors)</b> University of Wisconsin, Madison Minor in European Studies	<b>May 2016</b> Advised by Dr. Jack Williams

## RESEARCH APPOINTMENTS

<b>Graduate Researcher</b> Buma Lab, Department of Integrative and Systems Biology, University of Colorado Denver <ul style="list-style-type: none"><li>Studying the effect of shortening fire intervals and reburns in boreal systems on succession, carbon storage and permafrost in Interior Alaska.</li><li>Guiding undergraduate researchers in field data collection, laboratory analysis &amp; data organization.</li></ul>	<b>August 2018 - Present</b>
<b>Graduate Field Assistant</b> Buma Lab, Landslide Task Force, Sitka Sound Science Center <ul style="list-style-type: none"><li>Conducted vegetation and soil surveys as part of a team of landslide-researchers in Sitka, Alaska.</li></ul>	<b>June 2019 – July 2019</b>
<b>Research Lead Technician</b> Buma Lab, Department of Natural Resources, University of Alaska Fairbanks/Southeast <ul style="list-style-type: none"><li>Lead a team of field assistants on fieldwork in Interior Alaska.</li><li>Coordinated field sampling efforts with a team of researchers from multiple institutions.</li><li>Trained undergraduate interns in field sampling methods and laboratory procedures.</li></ul>	<b>May 2018 – August 2018</b>
<b>Graduate Researcher</b> Environmental Change Research Group, Department of Geography, University of Oregon <ul style="list-style-type: none"><li>Coordinated and conducted fieldwork in North California and Eastern Oregon.</li><li>Served as a field assistant on several multidisciplinary research teams.</li><li>Recruited and trained undergraduate research assistants.</li><li>Coordinated the establishment of several new laboratory procedures.</li><li><b>Thesis title:</b> <i>"Fire History and Soil Carbon in Old Growth Coast Redwood forests across the Late Holocene"</i></li></ul>	<b>August 2016 – June 2018</b>
<b>Undergraduate Researcher</b> Williams Paleoecology Lab, Department of Geography, University of Wisconsin <ul style="list-style-type: none"><li>Collaborated with research teams on field work and laboratory analysis.</li><li>Entered and organized data, maintained lab and conducted original research.</li><li><b>Thesis title:</b> <i>"A continuous charcoal record of Bonnett Lake, Ohio since the Last Glacial Maximum"</i></li></ul>	<b>May 2015 – May 2016</b>

## PUBLICATIONS

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- 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]
- **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>
- 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>
- 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>
- 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

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- 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 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*. [Submitted]
- **Hayes K.** Acid-digestion recovers more pyrogenic carbon and reduces variability compared to traditional manual counting, particularly where pyrogenic carbon is scarce. *Applied Soil Ecology*. [Submitted]

## GRANTS

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- 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

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- **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]**
- **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].
- 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.
- **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.
- **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

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- **Hayes K**, Hoffman C, 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.

- **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. [\*Undergraduate 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. [\*Undergraduate 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.
- **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.
- **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

- 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
<b>Ecological Society of America Graduate Policy Award</b>	<b>Spring 2021</b>
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
<b>Christopherson Geosystems Award for Excellence in Applied Geography/Earth Systems Science</b>	<b>Fall 2017</b>
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

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### 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

Sept. 2016 – June 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

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- 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

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### *Service positions*

2020 - 2021	Graduate Student Representative: <b>Office of the Dean Graduate Advisory Group.</b> Provided a student perspective and advocated for student issues to the office of the Dean.
2019 - 2021	Student Representative & Executive Committee Member: <b>International Association of Landscape Ecology North America.</b> 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: <b>Department of Biology Graduate Advisory Committee.</b>
2018 – Present	Journal Reviewer. <i>Plant and Soil</i> , <i>Global Change Biology</i>

*Special sessions*

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| 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.  |