

**Katherine R. Hayes**  
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Updated: 3/16/22

## EDUCATION

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- 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

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- 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 future fire regimes 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 (n = 7)

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7. 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. *Scientific Reports*. [In Press]
6. Muthukrishnan, R., **Hayes, K.**, Bartowitz, K., Cattau, M., Harvey, B., Lin, Y., Lunch, C. (2022). Harnessing NEON to evaluate ecological tipping points: opportunities, challenges, and approaches. *Ecosphere*, 13(3), p.e03989. <http://doi.org/10.1002/ecs2.3989>

5. Nagy C., Balch J, Bissell E, Cattau, M., Glenn, N., Halpern B., ... **Hayes K.**, ... O’Riordan, C. (2021). Harnessing the NEON data revolution to advance open environmental science with a diverse and data-capable community. *Ecosphere*, 12(12), p.e03833. <https://doi.org/10.1002/ecs2.3833>
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

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- 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. *Landscape Ecology*. [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 Revision]

## GRANTS

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- UC Denver Department of Integrative Biology Travel Grant. 2021, **\$500.**
- Association of Fire Ecology TREE Graduate Travel Grant. 2020, **\$265.**
- UC Denver Integrative and Systems Biology Merit Scholarship, 2021, **\$15,000.**
- Colorado STEM Graduate Grant. 2021, **\$1,250.**
- UC Denver Department of Integrative Biology Travel Grant. 2020, **\$300.**
- **Hayes K.**, Buma B. *Joint Fire Science Program Graduate Research Innovation Award*. Evaluating Flammability across Reburns in Interior Alaska. 2019, **\$25,000.**
- 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 (n = 23)

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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.
- **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.
- Buma B, **Hayes K.**, Weiss S, Lucash M. “Short-interval fires increasing in the boreal forest over multi-decadal time periods, especially in drier coniferous forest landscapes”, 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. [**Oral 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. [**Oral 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. “*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. 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. 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.
- Buma B, Lucash M, **Hayes K**, Weiss S. “*The Predictable, and not so Predictable, Spatial distribution of Short Interval Fires across the US West*”, 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. [**Oral 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. [**Oral Session Award**]
- **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 (n = 8)

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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.
- 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. 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.
- 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 & 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. Soil carbon and charcoal show fire was abundant in prehistoric coast redwood forests

\* Undergraduate Mentees

#### INVITED TALKS

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- **Hayes K**, Hoffman C, Ziegler J, Buma B. “*Repeat reburning drives changes in fuel structure and fire behavior in black spruce forests*”. Alaska Fire Science Consortium. Webinar. April 2022.

- **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
<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 Oral Session Award	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

<b>Graduate Teaching Assistant</b>	<b>Spring 2019 - 2021</b>
Department of Integrative and Systems Biology, University of Colorado Denver	
<ul style="list-style-type: none"> <li>• Taught labs and recitation sections for upper-level biology and statistics courses (Biostatistics, General Biology II).</li> <li>• <b>Guest Lecturer:</b> Biology 3411: Principles of Ecology, Spring 2019. Biology 7050: Disturbance Ecology, Spring 2020.</li> </ul>	
<b>Applied Ecology Graduate Seminar Coordinator</b>	<b>Spring 2019</b>
Department of Integrative and Systems Biology, University of Colorado Denver	
<ul style="list-style-type: none"> <li>• Orchestrated weekly seminar class focused on readings on current topics in applied ecology and peer review of grants, proposals, and other materials.</li> </ul>	
<b>Graduate Teaching Fellow</b>	<b>Fall 2016 – Spring 2018</b>
Department of Geography, University of Oregon	
<ul style="list-style-type: none"> <li>• Taught laboratory sections for upper-level science courses (Biogeography, Quantitative Data Analysis, Climatology).</li> <li>• Planned lessons and assignments, wrote exam questions, held office hours, graded papers and exams, and organized and led review sessions for midterms and exams.</li> <li>• <b>Guest Lecturer:</b> Geography 323: Biogeography, Fall 2017. Geography 419: The Professional Geographer, Spring 2018.</li> </ul>	
<b>Graduate Seminar Coordinator</b>	<b>Spring 2018</b>
Department of Geography, University of Oregon	
<ul style="list-style-type: none"> <li>• Organized and facilitated weekly seminar discussions on professionalism, graduate student well-being and reproducible science.</li> <li>• Coordinated guest speakers from outside departments and organizations.</li> </ul>	
<b>Graduate Mentor</b>	<b>2016 - 2018</b>
Environmental Change Research Group, University of Oregon	
<ul style="list-style-type: none"> <li>• Counseled and supervised undergraduate research assistants on laboratory protocols, applying to graduate programs and field-based research.</li> </ul>	

## GRANTS SUBMITTED, 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*

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

- 2022      Panelist. *Advice from the Field: Practical Skills, Coping with Accessibility Challenges, and What Else You Need to Know*. Ecological Society of America. Montreal, CA.  
Participant. *Regional analysis of landscape and forest change towards practical landscape management*. International Association of Landscape Ecology, North America. Remote.
- 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) course, CyVerse. Remote.
- 2019      Participant. NEON Science Summit. Boulder, CO.
- 2018      Participant. National Science Foundation Polar Office Field Training. Fairbanks, AK.
- 2017      **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.