



Emily Fairfax, PhD

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 @EmilyFairfax

Research Interests

Ecohydrology
Ecosystem Engineers
Wetlands
Environmental Data Science
Remote Sensing and GIS

Earth/Environmental Science Education Research
Curriculum Development
Diversity and Inclusion
Accessibility in Earth/Environmental Science
Game-Based Learning

Education

University of Colorado Boulder 2019
PhD in Geological Sciences, NDSEG Fellow
Certificate in College Teaching
Certificate in Hydrologic Sciences

Carleton College 2014
Bachelor of Arts, Physics, *cum laude*
Bachelor of Arts, Chemistry, *cum laude*

Appointment History

California State University Channel Islands
(to begin Fall 2019) Assistant Professor, Environmental Science and Resource Management

UNAVCO, CO
(2019) Professional Development Instructor, UNAVCO GLP & RESESS Program

University of Colorado Boulder, CO
(2019) Lecturer: University of Colorado Boulder
(2019) Research Assistant with ASSETT: Arts & Sciences Support of Education Through Technology
(2018) RESESS (Research Experiences in Solid Earth Sciences for Students) Graduate Fellow
(2016 – 2018) Teaching Assistant
(2015 – 2018) NDSEG Fellow

Los Alamos National Laboratory, NM
(2014 – 2015) Systems Engineer
(2013) Materials Science Research Assistant

Teaching Experience

Instructor of Record

(to begin summer 2019) Lecturer, GEOL 1010 Intro to Geology
(to begin summer 2019) Instructor, Professional Development and Skills for GLP and RESESS Programs at UNAVCO

Teaching Assistant

(2018) Teaching Assistant, GEOL 2001 Planet Earth
(2018) Teaching Assistant, GEOL 4241 Geomorphology
(2016) Teaching Assistant, GEOL 2001 Planet Earth

Tutoring

(2018 - 2019) Head Tutor, Geology Tutoring Room

Guest Lecturing

(2019) Guest Lecturer, GEOL 1030 Intro to Geology, Topic: The Water Cycle
(2019) Guest Lecturer, GEOL 4715 Field Hydrogeology: Contouring
(2019) Guest Lecturer, GEOL 4715 Field Hydrogeology: Hydrologic Tracers
(2018) Guest Lecturer, GEOL 1030 Intro to Physical Geology, Topic: Minerals
(2018) Guest Lecturer, GEOL 1010 Intro to Geology, Topic: The Water Cycle
(2018) Guest Lecturer, GEOL 1010 Intro to Geology, Topic: Ecohydrology
(2017) Guest Lecturer, GEOL 1010 Intro to Geology, Topic: Hydrology

Formal Pedagogical Training

Classes

(2018) CIRTL Graduate Course: Equity in STEM for All Genders
(2018) EBIO Graduate Seminar: Practicing Scientific Teaching
(2018) CIRTL Reads Seminar: Evidence-Based Teaching
(2017) GEOL Graduate Seminar: Teaching and Learning in Geoscience
(2017) ENVS Graduate Seminar: Pedagogy

Workshops and Conferences

(2018) CIRTLcast Workshop Series: Addressing Implicit Bias in STEM
(2018) Faculty Teaching Excellence Program: Story-Telling in the Classroom
(2018) Faculty Teaching Excellence Program: Tense Moments
(2018) CIRTL Workshop: Academic Advising for Future Faculty
(2017) NAGT Earth Educator Rendezvous Conference
(2015 – present) 30+ Graduate Teacher Program Workshops, CU Boulder

Mentoring Undergraduate Research Assistants

(2018-2019) Andrew Whittle: Surface Water Storage in Beaver Ponds
(2017) Alexis Ahlert: Hydrograph Damping by Beavers
(2016) Claire Czarnecki: Beaver Dam Catalogue

Formal Programs

(2018 – present) GATES (Graduate Admission in The Earth Sciences) Mentoring Program: Mentor for Owen van de Graaf
(2018) Research Experience in Solid Earth Sciences for Students (RESESS) Graduate Fellow. General mentor for 8 undergraduates.
(2018) Research Experience for Community College Students (RECCS) Science Mentor: Sean Will
(2017) Research Experiences in Solid Earth Sciences for Students (RESESS) Communication Mentor: Danya AbdelHameid
(2017) CU Boulder Summer Science Discovery Camp: Research Mentor for High School Students: Sage Basiri and Connor Jansen

Publications

Peer Reviewed

**italic = undergraduate student supervised*

- Fairfax, E., & Whittle, A.** (*in review*) Refuge in the Inferno: Beaver Wetlands Emerge from Western U.S. Wildfire Unscathed
- Fairfax, E., & Whittle, A.** (*in review*), A Remote Sensing Quantification of Surface Water Storage and Wetland Habitat Associated with Beaver Ponds in Wyoming, USA
- Fairfax, E., & Brown, M. R. M.** (*in press*), Increasing Inclusion and Accessibility in Undergraduate Geology Labs Through Scenario-Based TA Training. *Journal of Geoscience Education*.
- Fairfax, E., & Small, E. E.** (2018), Using remote sensing to assess the impact of beaver damming on riparian evapotranspiration in an arid landscape. *Ecohydrology* 11(7). doi:10.1002/eco.1993

Conference Presentations, Edited Volumes, Reports

- Fairfax, E.** (2018) Roll a Water Check! Using Games to Teach Hydrology, submitted for Pop-Up Talk at AGU Annual Fall Meeting
- Fairfax, E.** and E. E. Small. (2018) Over, Under, or Through: How the leakiness of a beaver dam influences groundwater-surface water interactions, AGU Annual Fall Meeting
- Fairfax, E.** and M. R. M. Brown. (2018), Increasing Inclusion and Accessibility in Undergraduate Geology Labs Through Scenario-Based TA Training, AGU Annual Fall Meeting
- M. R. M. Brown. and **Fairfax, E.** (2018), Assessing Accessibility Climate: What undergraduates think about accessibility in the geoscience classroom, AGU Annual Fall Meeting
- Whittle, A., & Fairfax, E.** (2018), Beaver Ponds are a Major Contributor to Surface Water Storage in the Medicine Bow-Routt National Forest, Laramie Ranger District, WY, USA. AGU Annual Fall Meeting
- Fairfax, E.** (2018), Roll a Water Check! Using Game-Based Learning to Correct Common Alternate Conceptions of the Hydrologic Cycle. Center for STEM Education 10th Annual Symposium, Boulder, CO.
- Fairfax, E.,** and M. R. M. Brown (2017), Characterizing the Accessibility Climate in Geology, in Teaching-as-Research Projects at CU Boulder: A Volume of Projects Done by the Teaching Institute for Graduate Education Research, edited by A. Blanford and J. Scott, University of Colorado Boulder.
- Fairfax, E.** and E. E. Small. (2017), The Role of Beaver Ponds in Maintaining Vegetation Health During Droughts: A Case Study at Susie Creek and Maggie Creek, NV, GSA Fall Meeting Abstracts
- Fairfax, E.** (2016), The Role of Beaver Ponds in Providing Water to the Root Zone of Adjacent Riparian Vegetation, Report to Boulder County Open Space
- Fairfax, E.** and E. E. Small. (2016), Hyporheic Exchange in a Stream Dammed by Beaver: A 1D Simulation with Spatial Energy Head Gradients and Heterogeneous Hydraulic Conductivity as Drivers, AGU Fall Meeting Abstracts
- Fairfax, E.** and E. E. Small. (2016), 1D Simulation of Hyporheic Exchange in a Stream Dammed by Beaver, GSA Fall Meeting Abstracts
- Fairfax, E., et al.** (2015), PBO H₂O: Monitoring the Terrestrial Water Cycle with reflected GPS signals recorded by the Plate Boundary Observatory Network, AGU Fall Meeting Abstracts.
- Fairfax, E.** and Steinzig, M. (2015), Case Histories of Residual Stress Related Mechanical Failures, SEM Conference Proceedings, Costa Mesa, CA

Grants, Fellowships and Awards

Total Funding from 2015 through present: ~\$182,100

- (2018) AGU Hydrologic Sciences “Haiku Your Research” Best Haiku Winner
- (2018) Undergraduate Research Mentorship Grant, CU Boulder Department of Geological Sciences: *ET Across Beaver-Dammed Landscapes*
- (2018) Nominated for K. Patricia Cross Future Leaders Award
- (2018) United Government of Graduate Students Travel Grant
- (2018) Conference Travel Grant, CU Boulder Department of Geological Sciences
- (2018) AWG (Association for Women Geoscientists) Takken Student Research Presentation Travel Award
- (2018) RESESS (Research Experience in Solid Earth Science for Students) Geological Sciences Graduate Fellowship
- (2018) AWG (Association for Women Geoscientists) Outstanding Student Award
- (2018) Nominated for Governor’s Energy & Environment Fellowship
- (2018) Penny E. Patterson Graduate Research Grant, CU Boulder Department of Geological Sciences: *Using the Leakiness of Beaver Dams to Assess their Hydrologic Function in a Landscape*
- (2018) Undergraduate Research Mentorship Grant, CU Boulder Department of Geological Sciences: *Surface Water Storage in Beaver Ponds*
- (2017) GSA (Geological Society of America) Rocky Mountain Section Travel Grant
- (2017) University of Colorado Graduate School Travel Grant
- (2017) Birkeland Graduate Scholarship Research Grant, CU Boulder Department of Geological Sciences: *Using Remote Sensing to Evaluate the Role of Beaver Ponds in Buffering the Effects of Drought on Nearby Riparian Vegetation*
- (2017) GSA (Geological Society of America) Graduate Student Research Grant, Geological Society of America: *Drought Buffering in Riparian Areas Along Susie Creek, Nevada: The Role of Beaver Damming*
- (2016) Conference Travel Grant, CU Boulder Department of Geological Sciences
- (2016) Spetzler Research Grant, CU Boulder Department of Geological Sciences: *Beaver Dam Shallow Subsurface Hydrology*
- (2016) Undergraduate Research Mentorship Grant, CU Boulder Department of Geological Sciences: *Beaver Dam Catalogue*
- (2015-2018) National Defense Science and Engineering Graduate Fellowship (NDSEG), Army Research Office, Air Force Office of Research, and ASEE

Media Coverage

- (2019) Research Q&A with **The Coloradan Magazine**
 - <https://www.colorado.edu/coloradan/2019/04/02/qa-emily-fairfax-beavers-drought-fire-video>
- (2019) Research featured on **The Irrelevant Information Podcast** Episode: Beavers
 - <https://the-irrelevant-information-pod.pinecast.co/episode/f00b7e3bd6704e88/beavers>
- (2019) Beavers and Wildfire Elevator Video Featured Widely in Media
 - **The Verge**: ‘Dam good’ video shows how beavers could fight fires
<https://www.theverge.com/2019/2/18/18229737/beaver-fires-dam-good-video-watch>
 - **Edge Effects Magazine**: How a beaver became a twitter star
<http://edgeeffects.net/how-a-beaver-became-a-twitter-star/>
 - **Cottage Life Magazine**: PhD student’s creative video shows how beavers help prevent fires
<https://cottagelife.com/outdoors/phd-students-creative-video-shows-how-beavers-help-prevent-wildfires/>
 - **The Kids Should See This**: Beaver dams and wildfire, a stop motion demonstration

- <https://thekidshouldseethis.com/post/beaver-dams-wildfire>
- **Lake Superior Magazine:** Smokey the Beaver?
<https://www.lakesuperior.com/blogs/superior-notes/around-the-circle-this-week-march-15-2019/>
 - **ClimateCrocks.com** What do beavers have to do with wildfire?
<https://climatecrocks.com/2019/02/19/what-do-beavers-have-to-do-with-wildfire/>
 - **cnBeta.com:** A cute video showing how beavers fight wildfires raises attention on twitter
<https://hot.cnbeta.com/articles/funny/819545>
 - **MartinezBeavers.org:** I see beaver people
<https://www.martinezbeavers.org/wordpress/2019/02/19/i-see-beaver-people/>
 - **LangweileDich.net:** Stopmotion zeigt positive Nebeneffekte von Biber-Dämmen
<https://www.langweiledich.net/stopmotion-zeigt-positive-nebeneffekte-von-biber-daemmen/>
 - **LetemSvětém Applem:** Twitter válcuje naučné stop-motion video. Mrkněte na něj i vy
<https://www.letemsvetemapplem.eu/2019/02/19/twitter-valcuje-naucne-stop-motion-video-mrknete-na-nej-i-vy/>
 - **Beavers and Brush:** Beavers: California's Missing Keystone to Mitigate Wildfire Risk
<https://www.beaversandbrush.com/beavers-californias-missing-keystone-to-mitigate-wildfire-risk/>
- (2019) Research featured in **CU Arts and Sciences Magazine:** “CU Boulder’s geoscientists, ranked world’s best, showcase rock-it science”
<https://www.colorado.edu/asmagazine/2019/02/05/cu-boulders-geoscientists-ranked-worlds-best-showcase-rock-it-science>
- (2018) Research Haiku featured in **EOS:** “Can you express your science in 17 syllables?”
<https://eos.org/geofizz/can-you-express-your-science-in-17-syllables>
- Haiku also featured on **MartinezBeavers.org:** “Haiku Beaver”
<https://www.martinezbeavers.org/wordpress/2018/10/17/haiku-beaver/>
- (2018) Featured on **MartinezBeavers.org:** “Emily and the 360 View Beaver Pond”
<https://www.martinezbeavers.org/wordpress/2018/09/28/emily-and-the-360-view-beaver-pond/>
- (2018) Blog post about beavers sourced in **National Resource Defense Council** article: “Beavers Are the Working-Class Heroes of Their Ecosystems—America Should Appreciate Them More”
<https://www.nrdc.org/onearth/beavers-are-working-class-heroes-their-ecosystems-america-should-appreciate-them-more>
- (2018) Blog post about beavers sourced in **Davidson Land Conservancy** post: “Wow – beavers!”
<http://www.davidsonlands.org/wow-beavers/>
- (2018) Mentee interviewed and research featured in **CU Boulder Today:** “Drones, beaver dams help community college students get involved in research”
<https://www.colorado.edu/today/2018/07/31/drones-beaver-dams-help-community-college-students-get-involved-research>
- (2018) Blog post about beavers sourced in **GreenTumble** environmental blog: “12 Examples of Keystone Species”
<https://greentumble.com/12-examples-of-keystone-species/>
- (2017) Interviewed for feature article in **Earth Magazine:** “Beavers preserve wetlands in water-stressed areas”
<https://www.earthmagazine.org/article/beavers-preserve-wetlands-water-stressed-areas>

Outreach One-Time Events

- (2018) Lens on Climate Change Interviewee: Beavers and Climate Change
- (2018) National Ocean Science Bowl
 - Regional Trout Bowl: Science Judge
 - National Ocean Science Bowl: Science Judge
- (2017) CU Boulder Research Sampler: Full Day Workshop and Activities for High School Students
- (2017) Diverse Learners Awareness Week Roundtable Discussion Host: "Accessibility and Field Trips in STEM"

Long-Term Programs

- (2016 - 2017) Letters to a Pre-Scientist Pen Pal Program
- (2014 - 2015) Expand Your Horizons Fair Planning Committee

Service Peer Reviewer

Journal of the American Water Resources Association
Ecohydrology
Wetlands

Committees

- (2018 – present) CU Boulder Hydrologic Sciences Steering Committee
 - Committee Member and Representative from Geological Sciences
- (2018 – present) CU Boulder Dept. of Geological Sciences Department Action Team
 - Committee Member
- (2016 – present) CU Boulder Dept. of Geological Sciences Colloquium Committee
 - TIPS Trained Bartender and Social Hour Designee (2018 – Present)
 - Committee Lead and Faculty Liaison (2016 – 2018)
- (2016 – 2018) CU Boulder Dept. of Geological Sciences Social Planning Committee
 - Budget Coordinator (2016 – 2018)
 - Committee Lead (2017 – 2018)

One-Time Events

- (2019) Building Educational Computer Games – Faculty Workshop: Workshop Creator and Facilitator
- (2019) Gamifying Your Class - Faculty Workshop: Workshop Creator and Facilitator
- (2018, 2017) Accessibility and Inclusion Training for New Teaching Assistants, Organizer and Facilitator
- (2018) Panelist for Professional and Educational Developers (PED) Learning Community at CU Boulder
- (2018) Advisory Board Graduate Student Poster Session Organizer
- (2017) Geological Society of American Annual Fall Meeting Student Volunteer

Professional Memberships

American Geophysical Union (2015 – present)
Geological Society of America (2015 – present)
The International Association for Geoscience Diversity (2016 – present)
National Association for Geoscience Teachers (2016 – present)
- Geoscience Education Research Division (2016 – present)
Association for Women Geoscientists (2016 – present)
Colorado Groundwater Association (2018 – present)
Society of Wetland Scientists (2018 – present)