




# Emily Fairfax, PhD

emily.fairfax@gmail.com | emily.fairfax@csuci.edu

emilyfairfaxscience.com

 @EmilyFairfax

## Research Interests

Ecohydrology

Ecosystem Engineers

Environmental Data Science

Remote Sensing and GIS

Science Communication

Curriculum Development

Accessibility in the Field

Game-Based Learning

## Education

### University of Colorado Boulder

2015 - 2019

PhD in Geological Sciences, NDSEG Fellow

Certificate in College Teaching

Certificate in Hydrologic Sciences

### Carleton College

2010 - 2014

Bachelor of Arts, Physics, *cum laude*

Bachelor of Arts, Chemistry, *cum laude*

## Appointment History

### California State University Channel Islands

(2019 - present) Assistant Professor, Environmental Science and Resource Management

### UNAVCO

(2019) Professional Development Instructor, UNAVCO GLP & RESESS Programs

### University of Colorado Boulder

(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

(2018 – 2019) Head Tutor, Geology Tutoring Room

(2016 – 2018) Teaching Assistant

(2015 – 2018) NDSEG Fellow

### Los Alamos National Laboratory

(2014 – 2015) Systems Engineer

(2013) Materials Science Research Assistant

## **Teaching** California State University Channel Islands

ESRM 203: Environmental Statistics

ESRM 328: Introduction to GIS

### **University of Colorado Boulder**

GEOL 1010 Introduction to Geology

GEOL 2001 Planet Earth (Teaching Assistant)

GEOL 4241 Geomorphology (Teaching Assistant)

### **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) ENV5 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** Senior Capstone Projects Supervised

(2019 – 2020)

- Beavers on the Santa Ynez River, CA, USA: Kyle Ball and Jaquie Lozeau
- Impact of Color and Visualization Type on Learning and Retention of Environmental Information: Jenny Shirhall and Miranda Hansen

### **Undergraduate Research Assistants**

(2019 – present) Jenny Shirhall, Jen Bays, Alyssa Connaughton: VR of Santa Rosa Island

(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 – 2019) 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

\* = undergraduate student supervised

- Fairfax, E., & \*Whittle, A. (submitted)** Smokey the Beaver: Beaver Dammed Riparian Zones Stay Green Through Wildfire
- 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. (2019)**, Increasing Inclusion and Accessibility in Undergraduate Geology Labs Through Scenario-Based TA Training. *Journal of Geoscience Education*. DOI: 10.1080/10899995.2019.1602463
- 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. and \*Whittle, A. (2019)** Smokey the Beaver: Can Beaver Dams Help Protect Riparian Vegetation During Wildfire?, AGU Annual Fall Meeting 2019
- Fairfax, E. (2019)** How Can You Talk About Your Research and Tell a Story Without Saying Any Words? With a Little Bit of Patience and Whole Lot of Felt: Lessons Learned from Creating and Sharing an Elevator Video, AGU Annual Fall Meeting 2019
- Fairfax, E. (2018)** Roll a Water Check! Using Games to Teach Hydrology, submitted for Pop-Up Talk at AGU Annual Fall Meeting 2019
- 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 2018
- 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 2018
- M. R. M. Brown. and Fairfax, E. (2018)**, Assessing Accessibility Climate: What undergraduates think about accessibility in the geoscience classroom, AGU Annual Fall Meeting 2018
- \*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 2018
- Fairfax, E. (2018)**, Roll a Water Check! Using Game-Based Learning to Correct Common Alternate Conceptions of the Hydrologic Cycle. Center for STEM Education 10<sup>th</sup> 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 2017
- 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 2016
- 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 H<sub>2</sub>O: 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: ~\$205,800

- (2019) SURF Faculty Fellow, California State University Channel Islands, Virtual Reality of Santa Rosa Island
- (2019) Teaching and Learning Innovations (TLI) Fellow, California State University Channel Islands: Choose-Your-Own Adventure Educational Games
- (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

**Invited Talks** (2019) AEG (Association of Environmental and Engineering Geologists) Mile High Chapter Meeting. Talk Title: *Beavers: the other professional engineers*

## Media Coverage

### Video Media Coverage

- (2019) Featured in **Yale Climate Connections** Video: Creative Climate Communication: 4 Scientists, 4 Approaches  
- <https://www.youtube.com/watch?v=AM-n4x0E0g4>

### Podcast/Audio Media Coverage

- (2019) **SciPod Podcast** Episode: Oh Dam Look, That Beaver Just Put Out A Forest Fire! With Emily Fairfax  
- <https://soundcloud.com/scipodglobal/oh-dam-look-that-beaver-just-put-out-a-forest-fire-with-emily-fairfax-scipod-radio>
- (2019) **Curiosity Hour Podcast** Episode: Emily Fairfax, PhD  
- [https://soundcloud.com/thecuriosityhourpodcast/s05-e107-emily\\_fairfax\\_phd](https://soundcloud.com/thecuriosityhourpodcast/s05-e107-emily_fairfax_phd)
- (2019) Research featured on **The Irrelevant Information Podcast** Episode: Beavers  
- <https://the-irrelevant-information-pod.pinecast.co/episode/f00b7e3bd6704e88/beavers>

### Written Media Coverage

- (2019) **NASA Landsat Science News**: Smokey the Beaver? Beaver Dams and Wildfire  
- <https://landsat.gsfc.nasa.gov/smokey-the-beaver-beaver-dams-and-wildfire/>
- (2019) **Eos**: Are beavers nature's "little firefighters?"  
- <https://eos.org/articles/are-beavers-natures-little-firefighters>
- (2019) **Colorado Arts and Sciences Magazine**: Instructors improve accessibility of geology  
- <https://www.colorado.edu/asmagazine/2019/10/10/instructors-improve-accessibility-geology>
- (2019) **Ojai Valley News**: Wildfire? Drought? Leave it to Beavers  
- <https://www.ojavalleynews.com/?view=article&id=16122:wildfire-drought-leave-it-to-beavers&catid=856>
- (2019) **Mountain West News**: Scientists turn to video, art, graphics to convey data  
- <https://mountainwestnews.org/creative-climate-communication-fb010e22ab51>
- (2019) **Yale Climate Connections** Article: Four scientists make creativity a key to communicating their research  
- <https://www.yaleclimateconnections.org/2019/05/four-scientists-make-creativity-a-key-to-communicating-their-research/>

- (2019) **The Singing Wilderness**: What do beavers have to do with wildfire?  
- <https://singingwilderness.com/beavers-wildfire/>
- (2019) **The Coloradan Magazine**: Emily Fairfax wants you to appreciate beavers  
- <https://www.colorado.edu/coloradan/2019/04/02/qa-emily-fairfax-beavers-drought-fire-video>
- (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://thekidsshouldseethis.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.letemsvetemapple.com/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

- (2019) Ventura County Library Lecture: Smokey the Beaver: Can Beavers Prevent Wildfire?
- (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

- (2019 – present) CSUCI Curriculum Committee
- Committee Member of Curriculum Committee and Math & Sciences Local Committee
- (2018 – 2019) CU Boulder Hydrologic Sciences Steering Committee
- Committee Member and Representative from Geological Sciences
- (2018 – 2019) CU Boulder Dept. of Geological Sciences Department Action Team
- Committee Member
- (2016 – 2019) 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 (Workshops, Panels, etc.)**

- (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)