

## **Post-fire Sediment Retention to Enhance Watershed Resilience to Wildfire**

### **Faculty mentors, name, department, college, and contact information:**

Dr. Sara Rathburn (Primary mentor), Department of Geosciences, College of Natural Resources, [sara.rathburn@colostate.edu](mailto:sara.rathburn@colostate.edu)

Dr. Ellen Wohl (co-mentor working on related post-fire research), Department of Geosciences, College of Natural Resources, [ellen.wohl@colostate.edu](mailto:ellen.wohl@colostate.edu)

Dr. Ryan Morrison (co-mentor working on related post-fire research), Civil and Environmental Engineering, College of Engineering, [ryan.morrison@colostate.edu](mailto:ryan.morrison@colostate.edu)

### **Other identified mentors (e.g. field-based Extension agent) associated with this project:**

Alison O'Connor, Horticulture Agent, CSU Extension in Larimer County, [stovena@co.larimer.co.us](mailto:stovena@co.larimer.co.us)

Sarah Dunn, graduate student, Department of Geosciences, College of Natural Resources, [sarahb.dunn@colostate.edu](mailto:sarahb.dunn@colostate.edu)

### **In what region(s) will the student be working (county/region)?**

Primarily Cache la Poudre River basin in Larimer County, also some work in Grand County.

### **Please describe the proposed internship goals, scope, and objectives.**

Beaver-constructed dams create ponds of water where fine sediments and nutrients are stored. In areas burned by wildfire, beaver ponds likely play an outsized role in storing sediment and burned organic material that is eroded during post-fire rainstorms, limiting the degrading downstream effects of fire on water quality. This project will assess sediment deposition in beaver ponds and wet meadows burned in the 2020 Cameron Peak and East Troublesome fires. Ponds will be probed and sediment cores will be collected to quantify the sediment volume and assess composition; topographic surveys will be completed of the pond area; dam structure, condition and positioning in relation to other ponds will be documented; and burn severity and vegetation regrowth will be mapped. Working closely with faculty and Extension mentors, and graduate students from Geosciences and Civil Engineering, the intern will participate in field data collection, data processing, and analysis. Results of this study will contribute important information on sediment accumulation in beaver ponds where data on sediment retention in burned watersheds is lacking. Finally, this information will be used to support post-fire restoration to enhance watershed resilience to fires.

### **How was the applied research project identified?**

The effects of disturbances (like fires and floods) on erosion and deposition of sediment in rivers has been a research focus of mine for nearly 10 years (see [here](#)). Field work in summer 2021 indicated that erosion during summer thunderstorms in the Cameron Peak Fire burn area filled beaver ponds with sediment, preventing sediment and ash from entering the South Fork Cache La Poudre River, a critical water supply for the Cities of Fort Collins and Greeley. A field inventory of beaver ponds within the entire burn area will quantify post-fire sediment retention and highlight the role of ponds in enhancing watershed resilience to wildfire.

### **With which stakeholder group(s) will the intern work?**

The City of Fort Collins, City of Greeley, US Forest Service, Water Supply and Storage Company, and private landowners.

**What student learning outcomes do you anticipate and are there opportunities for professional development?**

The student intern will gain proficiency in beaver pond/wetland geomorphic and ecological assessment, river wading techniques (waders provided), sediment core collection and description, topographic surveying using state-of-art equipment, precipitation gage installation and data retrieval, burn severity assessment, vegetation plot counts, and collaboration with diverse stakeholders. Professional development will occur through exposure to applied, interdisciplinary research, interactions with diverse faculty and extension mentors, graduate students and stakeholders, opportunities for continued involvement with the project including core processing, GIS analysis, and communicating the results to the broader community.

**Do you have a specific mentor style that you would like to share with potential interns?**

All mentors have extensive experience mentoring and advising students. We will provide hands-on training, guidance, and support for self-motivated and curious students interested in problems that bridge important environmental and societally relevant issues. Also, Dr. Rathburn is a trained mentor through CSU's Graduate School ([Center for the Improvement of Mentored Experiences in Research](#)).

**Are travel funds available? Opportunities to provide student assistance with housing?**

Partial travel funds such as mileage may be available. No funds are available for housing. Field work will include mostly daytrips with a few 1-2 overnights of camping. Some tasks can be done at the CSU campus.