

## 2022 COOPERATIVE SUMMER FELLOWSHIP PROGRAM – PROJECT PROPOSAL

APPLICANT TYPE: NAGT;ESA;

### PROJECT TITLE: PAST PERSPECTIVES OF WATER IN THE WEST

Lesleigh Anderson, Rebecca Brice, rbrice@usgs.gov

Discipline: Hazards;Ecology;Climate Science;General Geology;Geography;

### PROJECT DESCRIPTION

#### BACKGROUND

Rocky Mountain drought and wildfire in recent decades are leading to increasingly adverse changes in ecosystems and expanding costs to human life and property. Dry conditions enhance wildfire risk and documenting long-term trends in climate and wildfire provide critical context for drought and wildfire hazard preparation, mitigation, and response. Proxy records from environmental archives such as lakes and trees offer the opportunity to obtain long-term, detailed information about the relationship between climate and wildfire for hundreds of years into the past.

Charcoal from wildfire is dispersed to nearby lakes or other surface waters via wind or water and accumulates in the sedimentary record. Using changes in charcoal abundance in lake sediments the intensity or frequency of natural fires can be inferred, which in turn may reflect variation in the local vegetation or climate. In addition, trees with growth sensitive to moisture and temperature record year-to-year variation in climate that can be accurately dated to the year. The goal of this project is to supplement fire information in lakes with tree cores to reconstruct past climate and fire disturbance in the area of the 2020 Troublesome fire near Granby, Colorado. The overlap of tree-ring records with recent lake sediments provides high-resolution environmental information that complements low-resolution natural fire occurrence. The complementary proxy records will be used to assess the 150-year context and the environmental conditions preceding severe fire events.

#### INTERN TASKS

The intern will obtain the training and opportunity to participate in local field work in Colorado to obtain sediment and tree cores. The intern will be trained to conduct lake sediment charcoal analysis including core sampling, pre-treatment, charcoal identification and counting techniques. The intern will also be trained in traditional dendrochronological techniques to cross-date tree cores. If time permits the student will obtain the training in tree-ring measurements, counting, and chronology development, and additional lake sediment techniques such as loss-on-ignition and pre-treatments for stable isotope analyses.

#### BENEFITS TO INTERN

Results from the intern's work will inform our understanding of recent climate-fire impacts currently experienced in the headwaters region of the Colorado River and direct the progression of future research. In addition to valuable field and laboratory skills and training in environmental proxy sampling techniques, the intern will be fully briefed on how their work will specifically contribute to the overall research goals. Through daily contact with project and science center staff, the intern will be exposed to a valuable professional experience and gain insight into USGS careers.

## MENTORING PLAN

Training will consist of demonstration, monitoring and modeling of field and laboratory protocols and techniques. Work expectations will be clearly defined, and quality assessed following the newly implemented USGS Quality Measurement System (QMS). The intern will have daily opportunities to engage with mentors in the lab and/or at the Center who will provide guidance and model professional behaviors. Mentors will have a minimum of two formal meetings with the student with three objectives: 1) to evaluate and reflect on the intern's strengths, weaknesses, interests and abilities, 2) to set goals for the student's career development, and 3) to strategically plan activities during the internship that will help the student achieve their goals.

## ADDITIONAL DETAILS

### STUDENT SKILLS AND INTERESTS

A student with a specific interest in studies of Quaternary geology and/or biogeography is preferred and those with backgrounds or interests in forest ecology or limnology and limnogeology are also encouraged to apply. This position is ideal for a student with a background or interest in both geology and biology as it combines both disciplines. The position requires working in a laboratory setting and operating delicate tools to study small specimens. Good eyesight and ability to observe small objects, including under a microscope, is required as well as manual dexterity. Familiarity with sedimentology and geochronological methods is also helpful.

LOCATION: Denver, Colorado

### ACTIVITY LEVEL:

Level 8-2: The work requires some physical exertion such as long periods of standing, walking over rough, uneven, or rocky surfaces; recurring bending, crouching, stooping, stretching, reaching, or similar activities; or recurring lifting of moderately heavy items. The work may require specific, but common, physical characteristics and abilities such as above-average agility and dexterity.

FIELD WORK	25-50%	VIRTUAL?	No
LAB WORK	25-50%		
OFFICE WORK	0-25%		
OTHER	None		

PROJECTED START DATE	5/15/2022
EXPECTED DURATION	4 months