

Developing Long-term Ecological Monitoring Protocols for Land Practitioners in South-Central Colorado

Funded Student Summer Experiences Available for 2021

Collaborators

The Yale School of the Environment (YSE) and Ucross High Plains Stewardship Initiative (UHPSI) have 5 fully funded summer experiences available during May-August 2021 for Yale students. Summer experiences will involve collaborating closely with Yale School of the Environment faculty, Ucross High Plains Stewardship Initiative staff, and land managers on issues associated with a working ranch in south-central Colorado.

Description

Background

YSE and UHPSI are offering 5 fully funded student summer experiences during May-August 2021 for Yale students. These opportunities are part of a larger collaboration between YSE and on-the-ground practitioners in the western United States that is designed to increase knowledge and understanding of working landscapes, ecological processes, and effective land management strategies for conservation in the West. This work will directly benefit the scientific field and community, practitioners, and students.

We are seeking 5 Yale students to assist with our *Assessment* and *Planning* phases of a 3.5-year project that will develop and test long-term monitoring protocols for key ecological resources at a large, working ranch in south-central Colorado. The ranch is located within 40 minutes of Alamosa, Colorado and is managed by an experienced team. During the next 3.5 years, YSE will work with the land managers at the Colorado site to develop monitoring protocols that will assist them with their stewardship goals, needs, and priorities. Protocols will increase understanding of how management efforts affect specific resources (rangelands, forests, riparian areas) and will inform future decisions. The YSE team will work closely with managers at the site during summer 2021 to further refine environmental indicators or metrics that will be monitored long-term. Our understanding is that managers may be interested in using long-term monitoring to study the following five broad topics:

- Grazing Effects on Ecosystem Health Indicators
- Evaluating Grazing as a Fire Mitigation Tool
- Efficacy of Shrub Treatments
- Post-Harvest Forest Monitoring
- Riparian Monitoring

Summer 2021 Experiences Available

The focus for summer 2021 students will be to assist the YSE team in building this collaboration and assessing the monitoring needs of the working ranch. This summer work will contribute to the *Assessment* and *Planning* phases of the 3.5-year project. It is vital to create a solid base of information that will inform the remaining phases of the project such as monitoring protocol

implementation, analysis, and adaptation. In order for the YSE team to begin developing monitoring protocols during the fall 2021, our team needs to understand current available data, past management at the ranch, ranch interests and goals, and future climate (water availability) projections.

The student summer experiences available for summer 2021 are described below:

A.) Data Curation (1 person for remote and/or in-person)

A student will work with YSE team and land managers to compile ranch data (spatial and non-spatial data) and publicly available data to create a consolidated geodatabase or web-based tool for future use by entire YSE and ranch team. This may involve collaborating closely with land managers in Colorado and creating spatial-explicit GIS layers to understand what land management has been done, where it has been done, and when. Geospatial analysis may be used to begin to understand the landscape and possible future monitoring locations. This work may be done remotely, however, depending on covid-19 situation and university policies, a visit or working from the ranch may be possible.

Qualifications Needed:

- GIS skills and experience (Intermediate-expert level)
- Strong communication skills and ability to communicate GIS work to novices and experts
- Ability to think critically and solve problems independently and collaboratively

B.) Climate and Water Availability Projections (1 person for remote)

To assist with design of long-term monitoring protocols, a student will work closely with Dr. Bill Lauenroth to create projections of climate into the future, particularly focused on changes in water availability. Water availability in the West remains the single most important force driving ecosystem dynamics, including plant species composition and response to management. Changes in the seasonality of precipitation, and in the evaporative demand of the atmosphere, are clear across global drylands, including the Western US. Planning rangeland and forest management practices for the future must incorporate estimates of the frequency and intensity of drought or changes in the seasonal distribution of precipitation. Our analysis will make possible the creation of monitoring and management plans that will be relevant for current conditions as well as for the near and mid-term future (10-30 years). Not doing so would risk a mismatch between management planning, conservation practices, and the future climate. This work will be done remotely, however, depending on covid-19 situation and university policies, a visit to the ranch may be possible.

Qualifications Needed:

- Demonstrated ability to use R (Intermediate level)
- Experience and/or interest in interacting with online data sources

C.) Collaboration Coordination, Project Management, and Field Investigation (2 people for remote and/or in-person)

Students will work closely with Michelle Downey (Director of Ucross High Plains Stewardship Initiative) and other YSE team members to coordinate collaboration with ranch and YSE team, manage project, and collect field data that will help the team understand the landscape. Duties at the beginning of the summer will likely be completed remotely, but we hope for students to be able to visit the site and collect field data later in the summer (June/July) depending on the covid-19 situation and University policies at the time. If travel is permitted, students will spend time at the Colorado site collecting preliminary field data that will help us better understand the status of the site, which is key to all future work there. Data will assist our team in designing monitoring protocols later in the year. Field duties may include creating a list of known plants at site, collection of unknown plant with plant press, soil sampling, and other field sampling related to natural resources. Other duties that may be done remotely or in-person may include assisting with facilitating conversations with ranch managers to identify ranch goals and priorities for long-term monitoring, documenting and summarizing ranch interests, and creating communication strategy to share progress during 3.5-year project.

Qualifications Needed:

- Project management and problem-solving skills
- Excellent writing and communication
- Familiarity with flora and vegetation sampling methods in the western United States
- Ability to work in the field safely (i.e., operating vehicle on rough dirt roads, spending long days in the sun)
- Ability to communicate questions and needs to YSE team

D.) Lessons Learned from Other Long-term Monitoring Efforts (1 person remote and/or in-person)

A student will investigate long-term monitoring efforts taking place on other large, working ranches and summarize major takeaways, findings, and lessons learned. This may involve conversations with land managers at ranches throughout the West (such as the King Ranch and East Foundation) to understand what is working well and not working well with long-term monitoring strategies they have implemented. Findings will be used to assist the team in learning from others. This work may be done remotely, however, depending on covid-19 situation and university policies, a visit or working from the ranch may be possible.

Qualifications Needed:

- Excellent writing and communication
- Professionalism
- Some understanding ecological monitoring and working ranches

General Student Expectations

- Commit 10-12 weeks of time during May-August 2021
- Conduct work professionally and timely
- Work closely and communicate often with YSE team
- Incorporate feedback and suggestions from YSE team and land managers

Compensation

- A \$12,000 award per student. Stipend would cover any permitted travel.
- Up to \$3,000 for housing (only available if work is completed on site and housing isn't provided on site).

How to Apply

Applications will be considered on a *rolling basis* after April 5th 2021. Please submit the following as 1 PDF to michelle.downey@yale.edu:

- Cover letter (1-page max.) stating which experience(s) (A-D) you are applying for and why you are interested in the opportunity. If you are applying to more than one, please identify them all and if you have preference.
- Resume with 2 references and their contact information
- Unofficial transcripts (Yale and undergraduate)
- A document answering the following questions (max. of 300 words per question):
 1. Describe your career aspirations and what you hope to get out of this experience
 2. Describe the specific skills, traits, and/or experience you would bring to this work and how you have demonstrated these in past experiences. For skills, please state skill level (e.g., novice, some experience, extensive experience, expert). (If you are applying to more than one project, please be sure to answer this for each project if skills are different.)
 3. Briefly describe the amount of time you will have available to commit to this work during 10-12 weeks during May-August. Also please briefly mention if you have an interest in working in-person at the site if covid and the site allow it.

Note on Travel

Travel to the site will depend on the covid-19 pandemic situation and university policies at the time of possible travel.