Opportunity Title: USGS Geospatial Analysis to Inform Sagebrush Conservation and Restoration
Opportunity Reference Code: DOI-USGS-2025-01

Organization U.S. Department of the Interior (DOI)

Reference Code DOI-USGS-2025-01

How to Apply ***To submit your application, scroll to the bottom of this opportunity and click APPLY.***

A complete application consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. Click here for detailed information about acceptable transcripts.
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- Two educational or professional recommendations. At least one recommendation must be submitted in order for the mentor to view your application.
- A copy of an abstract or reprint of an article

All documents must be in English or include an official English translation.

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Application Deadline 1/31/2025 11:59:59 PM Eastern Time Zone

Description **USGS Office/Lab and Location:** A research opportunity is available with the U.S. Geological Survey (USGS). Location varies.

The USGS mission is to monitor, analyze, and predict current and evolving dynamics of complex human and natural Earth-system interactions and to deliver actionable intelligence at scales and timeframes relevant to decision makers. As the Nation's largest water, earth, and biological science and civilian mapping agency, USGS collects, monitors, analyzes, and provides science about natural resource conditions, issues, and problems.

Research Project: Recent research has developed two new pieces of information for guiding conservation and restoration decisions across the sagebrush region. First, through interagency collaboration, a method was developed for estimating sagebrush ecological integrity (SEI), which is a generalized measure of sagebrush habitat quality (Doherty et al. 2022). This approach estimates SEI based on 5 simple predictors: sagebrush and perennial grass cover, both positive effects, and annual grass cover, conifer cover, and human influence, all negative effects. SEI is being utilized to inform land management decisions across the sagebrush region, and one intended use of SEI is to prioritize areas for conservation or restoration to sustain or improve habitat quality, respectively. Second, parallel efforts have recently developed new and

improved estimates of ecological resistance and resilience across the sagebrush region (Chenoweth et al. 2022, Chambers et al. 2023). In addition, ongoing work is assessing how climate change will impact both habitat quality and R&R across the sagebrush region.

Ideally, prioritization of long-term conservation and restoration investments across the sagebrush region would consider anticipated trends in both SEI and R&R (Figure 2). SEI and R&R provide valuable perspectives on the current and future of sagebrush ecosystems. The future R&R datasets are a measure of a site's future overall vulnerability to invasive annual grasses and wildfire, regardless of the actual disturbance history experienced at that site. By contrast, the patterns and trajectories of future SEI are based on potential climate-driven shifts from recent remotely-sensed observations of plant functional type abundance. While SEI represents actual condition of the vegetation and habitat, R&R approximates inherent vulnerability. Initial comparisons of sagebrush habitat and R&R under historical climate conditions (Chambers et al. In Review) indicate that the data are both consistent and complimentary. Consistency is apparent because low SEI areas (e.g. other rangeland areas) are disproportionately comprised of low R&R conditions, while high SEI areas (e.g. core habitats) are disproportionately comprised of high R&R conditions. However, the complimentary nature of these datasets is also illustrated by areas where SEI and R&R diverge, demonstrating how both datasets are necessary. For example, high SEI areas with low R&R (Figure 2; bottom left) may be good candidates for high-priority protection efforts while low SEI areas with high R&R (Figure 2; top right) maybe ideal places for restoration.

Although comparison of the new habitat quality and R&R datasets is being conducted for contemporary climate conditions (Chambers et al. In Review), there is a clear need to also assess long-term future trends. Specifically, we know that climate change will impact patterns of habitat quality across the sagebrush region (Palmquist et al. 2021, Doherty et al. 2022),that climate change will alter the distribution of R&R categories across the region, and that currently high SEI areas may experience relatively larger proportions of areas that show projected decreases in R&R categories under climate change (Schlaepfer et al. In Preparation). **What is missing from these datasets is a comprehensive, spatially-explicit picture that combines information about <u>future</u> potential habitat quality and <u>future</u> R&R conditions.** Optimal identification of adaptation strategies for coping with climate change will consider multiple sources of information, including the current habitat quality, the potential for continuing to support high-quality sagebrush habitat in the future, and the current and future R&R conditions, as illustrated in figure 2.

Our overall goal in this project is to integrate future sagebrush habitat quality with future resilience and resistance into the RAD climate adaptation framework to guide prioritization of conservation and restoration across the sagebrush region. Specifically, we have 2 objectives:

1. ***Describe the distribution and abundance of all combinations of sagebrush habitat quality and future resistance and resilience across the sagebrush region***. For this integration, we will leverage results from ongoing research into both future sagebrush habitat quality and future R&R conditions. Both of these efforts are estimating future conditions under two representative concentration pathways (RCP 4.5 and RCP 8.5) and a suite of climate models. Here we will utilize that full set of results and generate maps of future habitat quality x R&R for each climate model and RCP combination. We will use the results to identify the most likely future condition as well and the uncertainty in that projection.
2. ***Develop and disseminate guidance about how long-term conservation and restoration options for all future combinations of habitat quality and R&R***. Once we have maps showing all future combinations of habitat quality and R&R (objective 1), we will engage the broader WAFWA conservation design team (and perhaps others) to identify and vet appropriate strategies and tactics for managing land in those conditions. We will employ the recently developed Resist-Accept-Direct conceptual framework (Schuurman et al. 2020) for approaching climate adaptation decisions.

Learning Objectives: Under the guidance of a mentor, the participant will learn about and gain experience by:

- Developing and implementing scientific workflows for geospatial analysis of large ecological datasets across broad geographic regions.
- Conducting descriptive and statistical analysis of complex spatio-temporal datasets to characterize potential climate change impacts on terrestrial ecosystems.
- Generating maps and figures that effectively communicate complicated results.
- Writing and publishing scientific manuscripts.
- Being in a collaborative team with other researchers and natural resource managers to understand climate change impacts and identify potential adaptation options.

Mentor: The mentor for this opportunity is John Bradford (jbradford@usgs.gov). If you have questions about the nature of the research please contact the mentor(s).

Anticipated Appointment Start Date: March 17, 2025. Start date is flexible and will depend on a variety of factors.

Appointment Length: The appointment will initially be for one year, but may be renewed upon recommendation of DOI and is contingent on the availability of funds.

Level of Participation: The appointment is full time.

Participant Stipend: Stipend rates may vary based on numerous factors, including opportunity, location, education, and experience. If you are

interviewed, you can inquire about the exact stipend rate at that time and if selected, your appointment offer will include the monthly stipend rate.

Citizenship Requirements: This opportunity is available to U.S. citizens only.

ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and USGS. Participants do not become employees of USGS, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

Questions: If you have questions about the application process please email USGS@orau.org and include the reference code for this opportunity.

Qualifications The qualified candidate should have received a doctoral degree in one of the relevant fields. Degree must have been received within the past five years.

Point of Contact Keri Tarwater

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree received within the last 60 month(s).
- **Discipline(s):**
  - **Earth and Geosciences** (2)
  - **Life Health and Medical Sciences** (2)
  - **Mathematics and Statistics** (3)