2025 SARE Project Descriptions

(02-19-25)

SARE Project Title	University/ College	Faculty/ Email	Full-time/ Part-time	In-person/ Virtual	SARE Opportunity Description	Will student be driving vehicle?
Application of GPS and Photo-grammetric Methods for Stream Flow Monitoring (in the Rock Creek and Salmon Falls Creek Drainages tributary to the Snake River Basin)	College of Southern Idaho (CSI)	**Jeffrey Cooper** jcooper@csi.edu	Full-time	In-person or hybrid	Research will focus on novel methods for monitoring open-channel stream flow utilizing photogrammetry techniques and GPS, evaluating techniques for accuracy and efficiency. Student(s) will participate in field data collection, data processing, and/or protocol development. Individuals will be responsible for a significant portion of the research and play a crucial role in the research's success.	Yes
Monitoring Air Toxics in Wildfire Smoke	Lewis Clark State College	**Nancy Johnston** najohnston@lcsc.edu	No preference	No preference	This project aims at measuring exposures and risk to communities of air toxics in wildfire smoke in various cities in the West/Northwest and Idaho. Diffusive sampling will take place weekly in the summer, with analysis at our LC AIR Lab using gas chromatography-mass spectrometry. We will compare sites over time with focus on key air pollutants or smoke indicators, such as particulate matter, benzene, furfural, and other hydrocarbons. Energy-water systems are under stress in Idaho due to warmer climates and drought in the summers,and increases in wildfires may result. Wildfire smoke can put communities at risk to air toxics and particulate matter. This project addresses the frequency of wildfires related to drought conditions on the county level, and the subsequent risk of air particulates (via Idaho Department of Environmental Quality monitors). In addition, air toxics will be measured and risk estimated when smoke impacts communities. This information will help communities plan and become resilient during these times of environmental change. This aligns with I-CREWS mission for Community-engaged Resilience for Energy-Water Systems. Students will learn the following skills: set up field air samples, use instrumentation to analyze air samples for concentrations of air pollutants, calculate air toxic concentrations from raw data, use software to conduct statistical and graphical analysis, prepare and	If the student has a vehicle, they may be asked to drive to sampling sites, but this is reimbursed and optional.

					present a scientific poster of results. Some general chemistry knowledge and spreadsheet/Google drive usage is desirable.	
Application of Cold Atmospheric Pressure Plasma to Sanitization of Foodstuffs and Spacecraft Environments	Boise State University (BSU)	**Ken Cornell** kencornell@boisestate.edu	Full-time (part-time if needed)	In-person	The research project that the student will work on involves the analysis of antimicrobial activity produced by two configurations of cold atmospheric pressure plasma devices (10x10 array, radial inward array) that we have developed in our lab. These devices ionize ambient air or other gasses to create reactive oxygen and nitrogen species that can inactivate planktonic and biofilm associated pathogens to reduce the spread of foodborne or surface-borne disease. The SARE student will work on testing two of our devices for: 1) antimicrobial activity against Pseudomonas aeruginosa, E. coli, and Staph. aureus planktonic cells and biofilms on steel and plastic surfaces, and 2) reactive oxygen species production (ozone, peroxide, hydroxyl radicals, and superoxide). Pseudomonas is a common cause of food spoilage, and E. coli and Staph. can cause of foodborne illness. Both organisms are also capable of causing a variety of other serious infections in humans. All the protocols are established in the lab for assessing antimicrobial activity and detecting reactive oxygen species. The desired knowledge and skills involve standard laboratory techniques (making solutions/media, autoclaving, etc), performing microbiology experiments to grow biofilms and planktonic cells and test plasma activity in a BSL-2 environment, and performing analytical chemistry experiments of reactive oxygen species using spectrophotometric and spectrofluorometric techniques. The proposed students are current undergraduate researchers in the lab and have the training and experience to complete the proposed research.	No (other than personal car)
Understanding the Degradation Behavior of Microplastics in the Environment	Idaho State University	**Joshua Pak** pakjosh@isu.edu	Full-time	In-person	Student will work on simulating how polymers degrade in the environment and will monitor molecular species coming from degradation sources. Particularly, student will prepare and characterize several condensation polymers (polyesters, nylon, polyureas, polyurethanes, etc.) and shorter molecules. These polymers and molecules will be prepared as microplastic samples and exposed to accelerated decomposition conditions simulating natural degradation of polymers in various environmental conditions (i.e. pH, UV exposure, temperatures, etc.). Student will monitor the degradation behavior to understand the amounts and types of potential toxic materials originating from polymer degradation. The knowledge gained from this project can lay a foundation for the detailed understanding of how different polymer-related environmental contaminants are introduced to our water. Student will learn typical synthesis and characterization techniques for organic chemistry. In addition, Student will be introduced to several analytical instrumental techniques such as NMR, IR, MS, DSC, and TGA. He will also be trained in written and oral communication skills.	No
Co-Creating Resilient Water Futures: Integrating Indigenous	Idaho State University	**Jose Luis Benavides** josebenavides@isu.edu	Full-time	Virtual	As an assistant professor of digital media at Idaho State University, I will mentor my former digital media and 3D modeling students about water and energy system resilience in Idaho, focusing on the Snake River Basin. By learning about Indigenous governance and traditional knowledge systems alongside advanced AI and 3D modeling technology, the project aims to imagine sustainable water management strategies and foster workforce development between the digital arts and environmental sciences.	No

Knowledge and AI with Snake River Water Systems					Our main objectives include two research questions guiding this student investigation of local Indigenous knowledge toward Energy-water system sustainability: • What role could adopting Indigenous knowledge and governance dynamics of water systems, especially considering water protection, play in determining resilience strategies or options to climate-driven technological changes with new technologies such as artificial intelligence? • How could incorporating diverse ways of knowing by means of artistic interpretation with 3D modeling software and AI create viable pathways for more equitable and resilient futures for our water systems?	
The Role of Persistent Springs in Ensuring Reliable Water Flows During Dry Summers and Droughts	Idaho State University	**Sarah Godsey** godsey@isu.edu	Flexible, but some "campaign" weeks will be full-time.		Topic: Integrating water quantity and quality data with mapping to understand the role of springs in headwaters of southeastern Idaho During the summer of 2025, we seek an undergraduate SARE researcher interested in collaborating with Dr. Godsey's watershed hydrology research lab at Idaho State University (ISU). The student will explore how springs — where groundwater emerges at the Earth's surface — affect water quality and quantity in southeastern Idaho. In particular, the student will collaborate with faculty mentor S. Godsey and graduate student A. Sniadach to study headwater springs in the local Gibson Jack watershed. The SARE student will have the opportunity to learn to measure discharge, collect and analyze water quality data, and map variations in flow and water quality throughout a watershed. The SARE student will be expected to learn and carefully implement flow and water quality sampling protocols, deploy and maintain sensors to measure water flows in streams, filter and process collected samples, analyze water quality data, and create maps of results. The student will also contribute to the safety of the field research team, and should be comfortable walking up to 10 miles in a day, sometimes off trail, with up to a 40 lbs. backpack. Dr. Godsey will work with the student to select a specific research question of interest to the student related to the relative contributions of springs to reliable flow, especially during drought periods, or to improved mapping of spring occurrence. Throughout the research experience, the SARE student will build their professional network, learn more about sensitivity of Idaho's mountain streams to climate change, develop hydrological and water quality sampling skills, explore stream network mapping software, and hone their presentation skills in lab group and EPSCoR meetings. If the student wishes to present at the Idaho Council on Undergraduate Research, this effort will be strongly supported.	The student may drive or carpool in an ISU department vehicle. Local (<10 mi) trips may be completed in a personal vehicle if consistent with university guidelines.
Identifying Non-Productive Agricultural Fields for Decommissioning and Landcover Change in the Hangman Creek	University of Idaho	**Mariana Dobre** mdobre@uidaho.edu	No preference	No preference	This project focuses on collaborating with the Coeur d'Alene Tribe to assess non-productive agricultural fields in the Hangman Creek watershed. The goal is to identify agricultural areas that could benefit from decommissioning and transitioning to alternative land cover to improve soil health and water quality. This research will provide valuable insights into sustainable land management practices and their environmental impacts. Students involved in this project will participate in soil sampling, water quality data collection, and crop residue cover measurements. Additionally, students might be involved with both field and satellite data analyses and modeling, depending on skills and interests.	Maybe but not required

Watershed (Coeur d'Alene Tribe)						
Building Big Meadow: An Environmental History of an Experimental Forest	University of Idaho	**Alyssa Kreikemeier** akreikemeier@uidaho.edu	Full-time	No preference	Big Meadow Creek camp housed Civilian Conservation Corps workers on Moscow Mountain during the 1930s. One of 270 such camps across Idaho at the time, the public works project put 200 men to work between 1933 and 1942. Specifically, the CCC established camp F-141 four miles north of Troy, Idaho where the workers developed trails, managed wildfires, and established ponds along the creek. The site offers a case study of how the CCC impacted rural communities' relationship with infrastructure development, honing in on water infrastructure to determine how residents of Troy have accessed and understood water access over time. This student will utilize archaeological survey and field work, historical research, oral histories, and community collaborations to construct an environmental history of the CCC camp. They will then contextualize that environmental history among changing social, political, and environmental conditions from the 1930s through the time of the site's acquisition by the University of Idaho. Such a study will shed light on one rural community's perceptions of changing natural resources--specifically water--over time, and help environmental scholars to better understand the role of governance in water resource management. ***Prefer student with experience living or working in rural communities*	Yes, their own vehicle
Differentiating Groundwater Recharge Zones through Traditional and New Age Dating Techniques	University of Idaho	**Jeff Langman** jlangman@uidaho.edu	Full-time or Part-time	In-person	Develop a monitoring well program to test a new age-dating technique for discriminating primary recharge zones in a basalt aquifer system. Results of the study will be used by local/regional entities for water resource protection, enhanced recharge, and ensuring climate resiliency of the regional water supply. Project will include identification of appropriate wells for inclusion in the study through web-based, GIS, and in-person evaluation of existing wells in the basin. Sampling of wells and collection of field parameters through use of a multi-parameter probe and collection and preservation of groundwater samples for submission to multiple analytical laboratories. The student should be familiar with basic stratigraphic principles and comfortable interacting with landowners.	Yes – department truck
Community-Centered Human-Wildlife Interactions and Conservation in Idaho	University of Idaho	**Kenneth Wallen** kwallen@uidaho.edu	Full-time	In-person or hybrid	The project will examine Idahoans' interactions with and connection to carnivore species, primarily the gray wolf (Canis lupis), which influence socioecological feedback in water and energy systems (the focus of I-CREWS) and explore the implications of human-wildlife interactions and human-human conflict via a mixed methods research design. While carnivore research is a common ecological topic of study, it has also become increasingly common as a topic for the social sciences given their cultural value to tribes and shifting community priorities in Idaho. The student will be expected to collaborate with the faculty advisor and participate in research design, methodological development, data collection, data analysis, and reporting findings. The student should be interested in conducting social sciences (or socioecological) research, the human dimensions of wildlife conservation, and related to human-environmental relationship inquiry. The student should be able to work independently and as part of a group. Ideally, the student should have a background in basic social science research design and methods. This opportunity will provide the student with skills necessary to pursue research after graduation (if interested) or basic	No

					knowledge of natural resources management, wildlife conservation, and public involvement if they pursue a career in government or nonprofit sector	