USGS NSF GRIP, GSP Opportunity

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USGS Center:	Fort Collins Science Center
Project Title:	Plant invasions on the sagebrush steppe: effects and interactions with fire
Summary:	Fire and invasive grasses have interacted to replace sagebrush shrublands with grassland habitats across the Intermountain West. This project will explore the role of fire on Bureau of Land Management lands to provide a landscape-scale perspective on the drivers of plant invasion and sagebrush condition.
Project Hypothesis or Objectives:	Invasive plants are a major threat to the maintenance of sagebrush shrubland plant communities in the US Intermountain West. Invasive grass, particularly cheatgrass, can interact with fire to create a positive feedback cycle that converts shrubland to grassland habitat. Land management agencies make decisions in the context of both fire and invasions, but may lack a landscape-scale perspective on how fire has shaped invasion intensity. Our proposed project would leverage vegetation inventory and monitoring data from the Bureau of Land Management (BLM) to evaluate how fire history is related to invasive and sagebrush cover, and to explore the factors that facilitate resistance or resilience to invasion. The student will bring together existing resources in a geospatial analysis that can inform land management decisions. The student will have access to BLM monitoring data at ~9000 plots on BLM land across Western states; exotic species richness, exotic cover, and sagebrush cover have already been summarized for each plot. Our USGS research group has modeled cheatgrass habitat suitability, and we have geospatial layers of predicted suitability, as well as those for the underlying drivers of suitability. Existing datasets on fire history (e.g., monitoring trends in burn severity data) can be used to derive the timing and intensity of fire at BLM survey plots. The student will combine these data to explore the relationship between fire and invasion at a landscape scale, as well as how that relationship is modified by predicted habitat suitability

	for cheatgrass. The student will interact with both USGS and BLM scientists, and will present finding to BLM scientists and managers.
Duration:	Up to 12 months
Internship Location:	Fort Collins, CO
Field(s) of Study:	Life Science
Applicable NSF Division:	DEB Environmental Biology
Intern Type Preference:	NSF Graduate Research Fellow (GRF) via the Graduate Research Intern Program (GRIP)
Keywords:	invasive species, fire ecology, ecology, environmental science, biology, geospatial data, GIS
Expected Outcome:	This project will provide analytical and visual summaries of the relationship between fire and plant invasion across BLM lands, and communicate results to BLM managers. The Intern will gain experience in geospatial data management, analyses, and visualization, as well as exposure to work environments at USGS and the BLM. Opportunities exist for long term collaborations between the Intern and USGS researchers. USGS will benefit from this collaboration because it is in line with our mission of conducting research to address management questions of partner agencies. This work represents the first collaboration between our USGS research group and the BLM group responsible for the monitoring dataset; it could serve as the basis for future work and collaborations.
Special skills/training Required:	Experience with management of spatial data in R and/or GIS software is desirable.
Duties/Responsibilities:	The Intern will conduct research in applied ecology while gaining experience working in a government agency. The student will be responsible for combining and analyzing geospatial data, with mentoring from USGS researchers who have expertise in spatial data management, analysis, and visualization. The analytical component of the project will be scaled to match the capabilities of the student; considerable training in spatial statistics could be provided to an interested Intern. The Intern will have access to Bureau of Land Management monitoring data, as well as to USGS geospatial datasets and USGS computing and modeling resources. In addition to mentorship at USGS, the student will interact with scientists at the BLM, and thereby gain exposure to diverse work environments within the federal government. In particular, the project exemplifies the role of USGS in providing scientific research that aligns with the priorities set by Department of Interior land management agencies. The overarching question has been defined by BLM staff, and the student will be able to participate in meetings between USGS and BLM scientists in which we finalize the methods

and desired products. The Intern will also present his/her results to BLM staff, and thereby gain experience giving presentations to a management-focused audience.