

## USGS NSF Internship Opportunity


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| ● <b>USGS Center:</b>                      | Pacific Island Ecosystem Research Center  |
| ● <b>Project Title:</b>                    | Tropical forest restoration across climate gradients  |
| ● <b>Summary:</b>                          | Would you like to work on ecosystem restoration directly with land managers? National Park Service and USGS are interested in resampling 12 year old restoration plots to inform the role of climate variability in restoration in Hawaii. In particular, we are interested in how plant-soil interactions may shift along climate gradients in ways that explain the efficacy of restoration using a native N-fixing tree.   |
| ● <b>Project Hypothesis or Objectives:</b> | <p>Restoration of forests that were cleared for cattle grazing and now dominated by exotic grasses are a priority for many land managers across Hawaii, in part to create habitat for endangered forest birds. These areas encompass a large gradient in climate, ranging from seasonal submontane to wet tropical forests. Land managers have noted that Acacia koa, a native nitrogen-fixing tree, can be successful at surviving and forming a canopy in dense exotic grasses. Our recent work in mesic forests, however, suggests that N-inputs from Acacia increase exotic grass growth and stall secondary succession of native understory species. Anecdotally, outcomes with Acacia vary across sites in ways that may relate to climate. For example, in drier climates it is possible that Acacia litter decomposes slower, leading to a physical barrier to grass growth.</p> <p>To ask whether the effects of Acacia on litter dynamics, grass growth, and secondary succession vary across climates, we propose to resample experimental plots that were implemented by Hawaii Volcanoes National Park (HAVO) in 2005 to test restoration techniques. The HAVO plots, which were replicated across four sites that vary widely in climate, resulted in different densities of Acacia. We hope to use relationships between Acacia density and litter and soil dynamics, as well as exotic grass biomass and native seedling recruitment, to try and disentangle how climate may alter secondary succession. Better understanding outcomes of a widely proposed restoration species could inform management across the island</p> |


state. As such, this project offers a mix of important basic ecological questions (i.e., the role of plant-soil feedbacks in community assembly) with applied science.


 **Duration:** Up to 12 months


 **Internship Location:** Volcano, HI


 **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:** Hawaii, invasive plants, litter dynamics, restoration, soil nutrient cycling, tropical forest

 **Expected Outcome:** The intern will gain experience in a new field site and one of the few tropical sites in the United States. It also offers an opportunity to meet and work with managers from the National Park Service, and opportunities to also meet managers and researchers in the Fish and Wildlife and Forest Service. More broadly, the project offers a mix of important basic ecological questions (the role of plant-soil feedback in community assembly) with applied science. The work will be of direct utility to managers across the state given their use of *Acacia koa* as a restoration species. As such, it follows the mission of the USGS to provide research that informs resource management. We expect at least one first authored journal article and one poster/oral presentation of results (preferably at a conservation oriented conference in Hawaii) by the GRIP intern.

 **Special skills/training Required:** Ability to safely conduct fieldwork in remote settings, safely drive 4x4 vehicles and navigate off-trail with a hand held GPS.  
Training in plant ecology, forestry, and/or soil science  
Statistical proficiency in R

 **Duties/Responsibilities:** The successful intern will be responsible for fieldwork to obtain plant and soil data. The first field trips will include both USGS and NPS Resource Management staff which will offer a "boots on the ground" opportunity to work directly with NPS managers. It should be noted that these sites are not currently open to the public and offer the opportunity to see many rare and endangered endemic island plants and birds. The GRIP intern will also be responsible for lab work, and the USGS POC will work with the intern to learn any bench chemistry or other techniques they are unfamiliar with. Finally, the USGS POC will work with the intern to analyze and write-up the project. The natural history, ecology, statistics, and GIS expertise within the USGS Center will offer a good opportunity to hone skills in all of these areas.



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**Internal Information - Not to be posted:**

**Center Director Name:** Gordon Tribble  
**USGS Responsibilities:** Equipment, Facilities, Mentoring, On-boarding, Background Check, Volunteer Agreement Management  
**Preliminary Approval:** This opportunity has my Center's approval  
**I already have a student in mind:** N/A

**Comments:**

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