

USGS NSF Internship Opportunity

● Point of Contact Name:	Eben Paxton
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● USGS Center:	Pacific Island Ecosystems Research Center
● Project Title:	Modeling bird-mediated seed dispersal in a Hawaiian restoration forest
● Summary:	<p>The future of a forest is found in a bird's poop. Understanding how a seed moves from its parent tree through a bird to its final resting spot, and whether it will eventually turn into a fruiting tree at that spot, requires bringing together many different strands of information into a model that can illuminate the system and be projected into the future under different scenarios to help optimize restoration efforts.</p>
● Project Hypothesis or Objectives:	<p>Birds are the primary dispersers of seeds in Hawaii, and thus a critical part of forest restoration and recovery. The distribution and density of frugivorous birds, their diet and movement patterns interact with the forest structure and occurrence of fruiting shrubs, all of which synergistically influence the movement of seeds (seed rain) across the landscape. Understanding the pattern of seed rain can provide important insights into the forest ecology and help assist with ongoing forest restoration efforts.</p> <p>We have a long-term study of forest restoration ecology at Hakalau Forest National Wildlife Refuge on Hawaii Island across a gradient of intact forest to former pasture land that is being restored. Over the years we have collected information on the diet and movement patterns of bird species, measured actual seed rain, and evaluated what conditions contribute to the fate of the seed once it reaches the ground. We are looking for a modeler interested in forest ecology to develop an individual-based agent model to mimic the current system of seed dispersal, and then use the model to evaluate different restoration approaches to help find an optimal strategy for the refuge staff to follow. For example, should restoration efforts be focused near intact forest, or could islands of restoration across the degraded pasture lands be a more successful strategy.</p>

Duration:	Up to 12 months
Internship Location:	Volcano, HI
Field(s) of Study:	Life Science, Computing
Applicable NSF Division:	IOS Integrative Organismal Systems, DEB Environmental Biology, DMS Mathematical Sciences, CISE Computer and Information Science and Engineering
Intern Type Preference:	NSF Graduate Research Fellow (GRF) via the Graduate Research Intern Program (GRIP)
Keywords:	Tropical forest, restoration, seed dispersal, individual-based modeling
Expected Outcome:	The intern will gain experience combining many different aspects of a forest community into a model that can help to understand the ecological system and help guide conservation efforts. Expected outcomes include experience in a tropical forest system, interaction with a diverse team of ecologists and managers, and continued development of modeling skills. The project seeks to understand the key factors involved in forest recruitment (seed dispersal and germination), and through that knowledge help managers promote recruitment. We expect at least one first authored journal article and one poster/oral presentation of results by the GRIP intern.
Special skills/training Required:	<ul style="list-style-type: none"> - Modeling skills, especially individual-based models - Programming skills, especially R - Ecology background
Duties/Responsibilities:	The successful GRIP intern will be responsible for developing an individual-based model to mimic the seed dispersal system at Hakalau Forest NWR and evaluate how seed rain might change under different restoration scenarios. The intern will have the opportunity to work with the USGS scientists collecting the field data, and the USFWS refuge managers conducting the restoration work. The USGS POC will work closely with the intern to develop the model framework and parameters and help develop scenarios for the model to evaluate. Limited field work by the GRIP intern to gather additional information needed for the model may be possible. Additionally, the USGS POC will work with the intern to analyze and write-up the project for a publication. The natural history, ecology, statistics, and modeling expertise within the USGS Center will offer a broad spectrum of experience for the intern to draw on and learn from.

Internal Information - Not to be posted:

Center Director Name: Gordon Tribble

USGS Responsibilities: Facilities, Mentoring, Volunteer Agreement Management

Preliminary Approval: This opportunity has my Center's approval

I already have a student in mind: NA

Comments:
