

updated: 4/11/16

Research Projects and Activities at Blue Oak Ranch Reserve 2008 - 2016

APP#19315 - Geographic divergence of coevolving plants and insects

Project Dates: May 2009 to Apr 2016

Principal Investigators: John Thompson

Other Members: Christopher Schwind | Magne Friberg | Paula Lemos

Affiliations: University of California, Santa Cruz | University of California Santa Cruz

Sponsor: National Science Foundation NSF is completing the paperwork now (Jan 2009) \$620,000.00

Project Abstract

I would like to visit the reserve during spring 2009 to look for potential new study sites and collect some *Greya* moths and *Lithophragma* leaves, capsules, and seeds for use in DNA analyses and morphological studies. I have been using these moths and plants as a model for understanding the geographic scale of local adaptation in coevolving interactions and the effects of fragmentation on coevolved interactions. These interactions occur from the Canadian border to the edge of Baja California, and one of the gaps we have in our understanding of these interactions is right in the Mt. Hamilton area. NSF just renewed my grant a few weeks ago to fill in a number of these gaps over the next four years and expand the work in several ways. In addition to evaluating the interaction between *Greya* moths and *Lithophragma* plants, I will also be interested in evaluating whether insects other than *Greya* moths are involved in pollinating *Lithophragma* plants at Blue Oak. The likely co-pollinators include solitary bees and bombyliid flies

APP#21789 - Predator prey communication between rattlesnakes and ground squirrels

Project Dates: May 2010 to Dec 2015

Principal Investigators: Rulon Clark

Other Members: Breanna Putman | Erik Jourgensen | Joseph Chase | Jennifer Schefski | Lauren Kong | Michael Doward | Michael Hogan | Susan Anthony

Affiliations: San Diego State University (CSU) | UC Davis | Mills College

Sponsor: National Science Foundation 951010 \$390,000.00

Project Abstract

When confronted with predators, many animals engage in lengthy, conspicuous interactions involving several stereotyped signals and displays. These antipredator signals have been studied mainly in regards to their function as warning signals directed toward conspecifics, even though they may also serve to communicate with predators. However, the study of the impact of these signals on predators has been rare because predation is infrequent and difficult to observe in the field; consequently, data on natural

predator responses to antipredator signals is lacking. We propose to assemble a large database of natural antipredator signaling interactions and predator responses in two systems that have been well characterized from the perspective of the prey species. These data will be augmented with biorobotic playbacks of antipredator signals, providing the first experimental examination of key predictions derived from predator-prey communication theory. These methods will allow us to address several fundamental questions concerning communication dynamics and the evolution of antipredator signaling behavior.

Our research will focus on the behavior of rattlesnakes confronted by ground squirrels and kangaroo rats. Because these two distantly related rodents have evolved sophisticated antisnake behavior independently our methods will allow us to examine the role of various ecological and organismic factors that shape predator-prey signaling interactions. We will rely on proven methodologies that have been used in past studies of predation behavior and antipredator signaling, including field videography and radio telemetry to quantify the predatory behavior of free-ranging rattlesnakes, tethered snakes and snake models to induce antisnake signaling, and biorobotic rodent models to conduct playback experiments. The uniqueness of our approach will be in combining these methods in studies that simultaneously consider both prey signaling behavior and predator responses in an experimental context. The immediate intellectual goal of this research is to draw robust conclusions about the proximate dynamics and ultimate functions of antipredator signaling, shedding light on why prey engage in such displays and the circumstances under which predators respond to them. This system promises to provide novel insights into such areas as honesty in animal communication, antagonistic coevolution, and the role of receiver sensory systems in shaping signaling behavior.

APP#28194 - Assessing regional differences in community composition, infection, prevalence, and human risk of tick-borne disease in California

Project Dates: Dec 2013 to Apr 2016

Principal Investigators: Andy MacDonald

Other Members: Ashley Larsen, Erik Viik

Affiliations: University of California, Santa Barbara

Project Abstract

Tick-borne diseases are the most commonly reported vector-borne diseases in North America and recent estimates of Lyme disease prevalence in the United States alone are as high as 300,000 cases annually. While the vast majority of cases in the US are reported in the upper Midwest and northeast, there are cases reported from throughout California every year, yet research on ticks and the diseases they vector has been restricted primarily to a handful of northern California counties. Recent research has extended this work to Santa Barbara County and yielded results suggesting both that phenology of some tick species is remarkably constant over large geographic areas and that tick populations and communities can be highly variable even within relatively small geographic areas with similar habitats and climate. As a result, acarological risk is expected to be highly variable across the landscape. Recent large-scale studies and surveillance efforts have been undertaken in the eastern US to characterize this variability and identify areas of high expected acarological risk. This type of large-scale

sampling effort on the ground is crucial to our understanding of the highly geographically variable nature of ticks and tick-borne diseases and what factors are driving their emergence. This project aims to use the UC Natural Reserve System to carry out a standardized sampling and surveillance effort applied at a larger geographical scale than has yet been undertaken in California. The goal of which is both to begin to characterize regional differences in tick communities, infection prevalence, and human risk as well as provide baseline information for the UC Reserves, and for the safety of staff and researchers working on them, that can be built upon in future studies. Specifically, data collected from the reserves will be used to ask the following questions: 1. How do tick community composition and relative abundance differ regionally in California? H1: *I. pacificus* will make up a larger proportion of the community at higher latitudes and in cooler, wetter climates; the proportion will decrease as latitude decreases and as climate becomes hotter and drier where it will be dominated by *Dermacentor* spp. H2: Overall tick abundance will decrease with latitude and as climate becomes more arid. 2. Are there differences in infection prevalence of *I. pacificus* with *B. burgdorferi* on a regional scale in California? H3: Infection prevalence will be highest in the north and decrease with latitude.

APP#29402 - RAPID - Drought effects on hydrology & physiology of plant species at BORR

Project Dates: May 2014 to Dec 2016

Principal Investigators: David Ackerly | Sally Thompson | Todd Dawson

Other Members: Andrew Weitz | Blair McLaughlin | Cameron Williams | Christopher Wong | Gopal Penny | Isabel Schroeter | Jay Scherf | Ken Schwab | Lee Hovey | Laurel Wee | Stefanie Mambelli | Naia Morueta-Holme | Prahlada Papper | Juliana Wu | Xue Feng

Affiliations: University of California, Berkeley | University of California, Santa Cruz

Sponsor

QUEST Program (Qualcomm) NA \$5,000.00

Project Abstract

Summary. California is experiencing the most severe drought to occur in 160 years of state meteorological records. While the drought may not be directly attributed to climate change, it provides a valuable indicator of projected future conditions, when warmer temperatures are anticipated to reduce soil moisture, which will then be exacerbated by years of low precipitation. Understanding how species and ecosystems will respond to these future conditions is complicated by (i) the biodiversity of the affected ecosystems, and (ii) the topographic and edaphic complexity of much of the landscape. In diverse California woodlands, the same imposed meteorological drought conditions may be translated to dramatically different physiological stresses across the landscape, because different species and different individuals employ a variety of strategies that mediate exposure to stress. Our core hypothesis is that species-specific strategies for water-carbon economy, combined with niche-scale differences in the habitat of individual plants will translate into a spectrum of physiological responses to drought and susceptibility to change. The proposed research featured in this RAPID is urgent because the current drought event represents a once-in-a-century opportunity to study the physiological responses of different plant species to severe water limitation, and its consequences at the community and ecosystem scales. Four broad hypotheses will be

tested: 1) species and location-specific differences in drought response metrics will be evident across an array of different plants measured, 2) deep-rooted plants that access groundwater and shallow-rooted plants that efficiently exploit occult precipitation or light rainfall events will exhibit less drought stress than plants that do not efficiently exploit these water sources, 3) observed variation in drought-related damage or plant mortality among species and sites is correlated with abiotic variables (beyond rainfall input) that influence the level of stress tolerated, and 4) the suite of strategies that mediate plant responses when particular species or functional types are exposed to extreme drought may lead to population and community level changes that persist well beyond the immediate drought conditions.

APP#29507 - Avian community composition and parasite transmission in California ponds

Project Dates: Jul 2013 to Mar 2016

Principal Investigators: Pieter Johnson

Other Members: Austin Rife | Chelsea Wood | Ken Ferguson | Travis McDevitt-Galles

Affiliations: University of Colorado | University of Michigan

Project Abstract

California has long been recognized as a biodiversity hotspot of global conservation importance. However, wildlife habitats throughout the state face encroaching development, and marked declines in abundance have been documented for many iconic species, particularly birds. How do these changes to Californias diverse bird assemblages affect the food webs in which birds are influential actors? The study we propose aims to describe the effects of bird biodiversity loss on an ecologically important and highly threatened California ecosystem: freshwater ponds. Our proposed study aims to identify the ecological changes that arise in ponds as a result of alterations in bird abundance and diversity. We hypothesize that changes in bird abundance strongly affect the structure and function of California pond communities. Specifically, we anticipate that change in bird abundance may influence parasite transmission in these pond ecosystems. This is expected because birds are both important sources of parasites to ponds and because they are major predators in those ecosystems, and may regulate the density of pond species that would otherwise increase in abundance and experience related increases in the transmission of disease agents. We believe that it is especially important to characterize the influence of biodiversity loss on disease processes because disease is among the most important challenges to amphibian conservation. Our planned experiment is designed to elucidate how anthropogenic change in bird assemblages affects California ponds. We will accomplish this by experimentally manipulating the rates of visitation by birds to ponds and monitoring resultant changes in free-living and parasitic aquatic and terrestrial species composition.

National Science Foundation \$700,000.00

National Institute of Health (NIH) KK1408 \$398,000.00

APP#30062 - Identification of bistability in ponds to combat amphibian disease.

Project Dates: Jan 2015 to Oct 2015

Principal Investigators: Sally Thompson

Other Members: Michaella Chung

Affiliations: University of California, Berkeley

Sponsor

U.S. Department of Agriculture (USDA) 25-0511-0110-002 \$142,857.00

Project Abstract

My research proposes to address the challenge of identifying high-priority habitats to enable the survival of endangered species by exploring how anthropogenic changes differentially impact a system of isolated vernal pools and farm ponds that serve as the primary habitat of Red-legged Frog and Tiger Salamander. I will characterize the response of the trophic status of a subset of ponds to varied nutrient loading across a land use gradient, defined by different cattle stocking rates in the pond catchments. I will use new quantitative PCR (qPCR) protocols to determine the presence of the disease-causing organisms *Ribeiroia ondatrae* (Rb, which causes teratogenesis in tadpoles) and *Batrachochytrium dendrobatidis* (Bd, widely known as the Chytrid fungus, a key agent of the global amphibian extinction event). Using physical data, I will develop a hydrologic model that can be forced with climate change projections for California under different land use scenarios and will apply this model to the system of 400 ponds in the East Bay region to identify the highest priority areas for watershed management and conservation.

APP#30650 - Oak hybridization, population dynamics, and ecology

Project Dates: Mar 2015 to Jun 2018

Principal Investigators: Prahlada Papper

Affiliations: University of California, Berkeley

Project Abstract

Population genetics and the paleobotanical record indicate a surprising stability to the ranges of most California oaks dating to at least the last interglacial period (~120kya) and possibly to the Pliocene (5-3mya). This long-term range stability would have included dramatic variations in the local climate experienced by populations of oaks. Oaks also show exceptional species-level diversity, which may in part result from interspecific hybridization between two or more ecologically distinct species of the same infrageneric group within *Quercus*. I hypothesize that hybridization, gene flow, and resulting physiological variability help to explain the range stability of the genus in California over geologic time scales. While several studies have investigated local hybridization in California oaks, the rate of hybridization, especially over longer distances, and its evolutionary and ecological significance remain unclear. My doctoral research will investigate these using a variety of methods, including genetics, physiology, and functional ecology. I will perform a rangewide artificial pollination experiment within and between the target species *Quercus douglasii* and *Quercus garryana*, whose combined range extends from southern California to British Columbia. Results of this experiment will be combined with data collected on molecular and population genetics and physiological ecology of the same species.

APP#31673 - Insect Photography

Project Dates: Aug 2015 to Sep 2015

Principal Investigators: Joyce Gross

Other Members: Diane Erwin

Affiliations: University of California, Berkeley

Project Abstract

Photographing insects for a revision of the Powell and Hogue "California Insects" book. Am working on this with Kip Will, Pete Oboyski, and Jerry Powell.

APP#32471 - Archaeological Survey and Excavation at Blue Oak Ranch Reserve: Summer of 2016

Project Dates: Jun 2016 to Jun 2017

Principal Investigators: Jelmer Eerkens | Roshanne Bakhtiary

Affiliations: UC Davis Anthropology

Sponsor

University of California, Davis Department of Anthropology \$5,000.00

University of California, Davis Institute of Social Sciences \$5,000.00

Project Abstract

Introduction: Traditional studies of settlement patterns in ancient California focus on the distribution of sites across a landscape and their associated artifact types to track people and their movements within broad temporal windows. Missing from this approach is seasonality data that can place people on the landscape at different points in a yearly settlement round. Since isotopic signatures found in ancient mollusk shells record signals about environmental conditions, they have the potential to be a good measure of season of harvest, and by extension, can provide information about where people were living during different times of the year. Coastal, shell-dense sites in the San Francisco (SF) Bay and inland in the Sacramento-San Joaquin (Sac-SJ) Delta provide a great platform for conducting such studies, an approach that has only recently been introduced to the region. Background: Salinity and water temperature affect the ratio of stable oxygen isotopes (^{18}O and ^{16}O) in shell carbonates according to well-defined and widely accepted methodologies. In the SF Bay, predictable annual changes in water salinity due to freshwater runoff from the Sierras has a marked effect on estuarine ^{18}O which in turn affects the ^{18}O of mollusk shells. Using modern salinity data, scientists can estimate the season of death for ancient shellfish harvested in these waters from isotopic signatures found in their growth rings. Previous studies show that foraging for mussels and clams in bayshore sites occurred throughout the year, but with noticeable harvesting peaks in early summer and late fall/early winter. By contrast, a recent study at a Middle Period (2000-1300 ca. BP) inland site in Fairfield, CA shows that harvesting occurred almost exclusively in the winter months, a marked difference from bayshore midden. With limited sampling along the bayshore and only one study from the interior, it is unclear if the difference in shellfish harvesting seasonality between these locations is contingent on temporal or environmental factors, and how they reflect broader patterns in land use and settlement. Research Objectives: With this dichotomy in mind 1) I will sample shellfish remains from CA-SCL-330 and analyze their oxygen isotope signatures. 2) Additionally, I will evaluate the role of shellfish in prehistoric local diets by comparing shellfish seasonality information with data on diet collected from stable carbon and nitrogen isotopes in human bone collagen and apatite sampled at CA-SCL-330. 3) Lastly, I will synthesize this data within an optimal foraging framework, modifying the Diet Breadth model to analyze the caloric ranking/return rate of shellfish compared to terrestrial resources on a seasonal basis. I will also modify the Central Place Foraging model to illustrate how optimal foraging behaviors change as a function of increasing round-trip travel time from central-place (CA-SCL-330) to foraging location

and back, and how this varies by season.

APP#32939 - Linking land use change, host diversity and amphibian malformations and 2) Disease in complex communities: How multi-host, multi-pathogen interactions drive infection dynamics

Project Dates: May 2015 to Aug 2016

Principal Investigators: Pieter Johnson

Other Members: Dana Calhoun | Margaret Summerside | Travis McDevitt-Galles

Affiliations: University of Colorado

Sponsor

National Science Foundation \$700,000.00

National Institute of Health (NIH) KK1408 \$398,000.00

Project Abstract

Host-parasite interactions are embedded within dynamic, often highly disturbed environments, which can sharply alter patterns of infection and disease risk among hosts. Changes in land use and the resulting shifts in biological communities have been linked to the emergence of pathogens with medical and veterinary importance. However, the ecological mechanisms responsible for increases in infection often remain conjectural. This proposal examines how the ongoing transformation of landscapes surrounding wetlands influences an emerging issue of conservation importance: amphibian limb deformities. The flatworm parasite *Ribeiroia ondatrae*, which sequentially infects freshwater snails, larval amphibians, and birds, has been linked to widespread limb deformities in amphibians. Infection and the resulting malformations also increase amphibian mortality, potentially causing declines in amphibian populations. Building upon previously funded NSF research and ecological theory, the current proposal combines broad-scale field surveys and mechanistic experiments to understand how land use change, by altering host density and host diversity, will promote or limit *R. ondatrae* abundance and amphibian malformations. This effort will specifically seek to identify how biodiversity losses in freshwater ecosystems affect the transmission of pathogenic parasites, such as *R. ondatrae*. Considering the growing number of emerging infections that threaten human health and wildlife conservation, results of the proposed efforts have broad application potential. *Ribeiroia ondatrae* is not only growing in conservation importance itself, but is an excellent analog for other parasite infections of economic and human-health significance (e.g., human blood flukes). This proposal would further support cooperative efforts among amphibian biologists and ecologists to address ongoing declines in amphibian populations worldwide.

APP#26088 - New Electromagnetic and Magnetic Instrument Development

Project Dates: Oct 2012 to Oct 2015

Principal Investigators: Darryl Curley | Toby VanVeghten

Other Members: John Nichols

Affiliations: Geometrics Inc.

Project Abstract

Geomatrix is actively developing new electromagnetic and magnetic geophysical instruments. We are looking for a test site that is electromagnetically quieter than our facility in San Jose. We also want the site to be easily accessible from our facility in San

Jose. Our instruments use both natural field (passive) and active sources. Our transmitter is battery powered. It outputs 800 Hz to 100 kHz at 400 W. The antenna consists of two vertical loops (horizontally polarized). The transmitter only runs when manually triggered for a recording. A long period recording is planned for new magnetometers. The instrument will be left unattended recording for approximately 1 week. The sensor sits on a tripod approximately 4 ft tall, and electronics are housed in small plastic boxes that sit on the ground or are attached to the tripod. This instrument will need to be away from foot traffic and magnetic noise due to moving vehicles, ferrous metal buildings, fences, or other above ground structures. This instrument is powered by a 12-V car battery.

APP#28436 - East Bay Puma Project

Project Dates: Nov 2013 to Nov 2018

Principal Investigators: Ally Nauer | Zara McDonald

Other Members: Generic Person Test Consulting | Owen bissell | Adam Bean | Ronald Nauer | Andrea Goodnight | Anne Orlando | Dan Tlchenor | Delaina Clemetson | Eric Connors | Ian Hanley | Griffith Kenemer | Jennifer Addison | josh peixoto | Kristina Fialko | Matt Nelson | Heather Dolan | Paloma Alcazar | Richard Pickens | Reginald Barrett | Mairi Hilton | Robert Waugh | Sean Parnell | Sebastian Kennerknecht | Boone Smith | Vaslissa Derugin | David Tharp | Cliff Wiley | Will Stauffer-Norris

Affiliations: University of California, Berkeley | University of California, Santa Cruz | hellodd | None | Felidae Conservation Fund

Project Abstract

Pumas in the San Francisco East Bay region represent an undetermined population of an apex predator living close to humans. We have launched a long-term ecological research and public outreach program to conserve viable populations of pumas and associated wildlife communities in this developing region, containing a mixture of dense urban, suburban, and rural development interspersed with wild lands. Further development has the potential to increase conflicts with humans, increase puma mortality rates, and to isolate segments of the population making them no longer viable, with potentially negative impacts on ecological functions. The project will provide information needed to ensure the future of pumas in this region, and to guide puma management in areas with increasing human presence. We will study puma ecology using a combination of intensive field tracking, remote cameras, lightweight GPS collars, GIS spatial modeling, and advanced genetics work at the population and individual levels. Information collected will be used to estimate, delineate and determine the genetic health of the population; create habitat use profiles and rank habitat values across the region; identify barriers to movement and create habitat linkage strategies; study puma behavior at the urban interface; aid in the design of wildlife crossings for highways; and alleviate human-caused puma mortality and puma-human conflict. Linked to this study, we will conduct an education and outreach program in local schools and communities, to promote and enable sustainable coexistence of humans and wildlife communities including pumas in the urban interface.

APP#29694 - Blue Oak Ranch Reserve Insect Survey

Project Dates: Jul 2014 to Aug 2016

Principal Investigators: Peter Oboyski

Other Members: Student Generic
Affiliations: University of California, Berkeley
Project Abstract

As one of the newest and most accessible reserves in the UC system, BORR offers many opportunities for arthropod research including adaptations to fire, ecology, host-plant associations, etc. However, the current accounting of the species present on the reserve is less than ideal. This project aims to inventory insects, spiders, and their relatives in order to facilitate ongoing research projects.

APP#29947 - A Bryoflora of Blue Oak Ranch Reserve

Project Dates: Oct 2014 to May 2015
Principal Investigators: Caleb Caswell-Levy
Other Members: Madison Allen
Affiliations: University of California, Berkeley
Project Abstract

I plan to collect and identify the bryophytes of Blue Oak Ranch Reserve, with the aim of creating an online flora for use by students and researchers. In the process I plan to familiarize myself to a greater extent with the bryophytes of California, and look for potential locations for future field sites.

APP#30342 - Investigation of possible meteorite fall

Project Dates: Jan 2015 to Jan 2015
Principal Investigators: Petrus Jenniskens
Other Members: Mike Koop
Affiliations: SETI Institute
Project Abstract

On December 29, 2014, at 01:43:39 UT, a meteoroid entered Earth's atmosphere over San Francisco, moving in the direction of Mount Hamilton. The resulting fireball was captured by the video cameras of our Cameras for Allsky Meteor Surveillance project stations at Mount Hamilton and in Sunnyvale. The meteoroid is seen to break in fragments, some of which may have survived and fallen in a wide area in northern and eastern parts of BORR. Our goal is to recover one of those fragments in order to identify the meteorite type that belongs to the measured approach orbit, so that we can forge links between meteorite types and debris fields in the asteroid belt.

APP#30714 - Integrative Biology Honor's Thesis - distribution and abundance of mistletoe in oak woodlands

Project Dates: Mar 2015 to Apr 2015
Principal Investigators: Cameron Bronstein
Affiliations: University of California, Berkeley
Project Abstract

To understand the distribution and abundance of mistletoe in oak woodlands. I am looking for patterns of host species selectivity (Blue Oak or Valley Oak), microclimate selection (slope aspect, water availability), as well as patterns related to parasite prevalence and host size, age, or bark thickness. A mistletoe removal experiment, coupled with measurements of transpiration and water stress (water potential). will provide an understanding of the pressures that mistletoe creates for water use in oak

trees. Mistletoe removal may result in decreased water stress for the host species.

APP#30736 - Monitoring surface water properties with micro UAVs : comparison to traditional static sensors

Project Dates: Jan 2015 to May 2018

Principal Investigators: Carrick Detweiler | Michaella Chung | Sally Thompson

Other Members: Jim Higgins | John-Paul Ore

Affiliations: University of California, Berkeley | University of Nebraska

Project Abstract

This research develops an aerial water sampling system that can be quickly and safely deployed to reach varying and hard to access locations, that integrates with existing static sensors, and that is adaptable to a wide range of scientific goals. The capability to obtain quick samples over large areas will lead to a dramatic increase in the understanding of critical natural resources. This research will enable better interactions between non-expert operators and robots by using semi-autonomous systems to detect faults and unknown situations to ensure safety of the operators and environment. Our existing aerial water sampling platform is equipped with an additional temperature sensor capable of being deployed to various depths in surface water down to 4 m. We are coordinating our efforts with Dr. Sally Thompson (UC Berkeley) to compare the data obtained through our aerial technique to temperature data from a static thermal array already installed at BORR.

APP#31157 - Exploring the relationship between soil minerals and organic carbon in semi-arid ecosystems.

Project Dates: Jun 2015 to Jun 2016

Principal Investigators: Eric Slessarev

Other Members: Yang Lin

Affiliations: University of California, Santa Barbara

Project Abstract

Soils contain a vast amount of organic carbon, which is protected from decomposers by association with soil minerals. Soil mineralogy thus mediates the response of soils to changes in their environment. One such response is the rapid release of CO₂ from dry soils after rainfall (the "re-wetting pulse"). Laboratory experiments performed on Oak-woodland soils from the Sedgwick Reserve in central California suggest that this CO₂ pulse results from dissociation of minerals and organic carbon and subsequent processing by microbes. However, the precise nature of the mineral-interaction is impossible to determine using a single soil. I will extend the Sedgwick experiments to a range of soils sampled from different rock types, but within a similar plant community and climate. By sampling different soils in this constrained way, I will be able to isolate and better understand the ways in which minerals determine the nature of the re-wetting pulse.

APP#10277 - Examination of Sexual Dimorphism in the American Kestrel

Project Dates: Aug 2008 to Nov 2013

Principal Investigators: Elizabeth Wommack

Affiliations: University of California, Berkeley

Sponsor

Museum of Vertebrate Zoology \$2,000.00

Mildred E. Mathias Graduate Student Research Grant \$2,400.00

Project Abstract

The American Kestrel (*Falco sparverius*) is the only kestrel within the New World, and is arguably the most sexually dimorphic member of the group in coloration. The wide geographic range of the American Kestrel, which encompasses all of the Americas and includes 17 designated subspecies, represents a unique system for the study of sexual dimorphism in the life histories of kestrels and other birds of prey. This study will examine the presence of possible fitness signals in unique plumage characteristics of male American Kestrels. Comparisons will be conducted of male plumage patterns and ultraviolet reflectance of tail and body coloration of adult and juvenile male American Kestrels at nest box sites at Blue Oak Ranch and other sites in Northern California. Since male American Kestrels molt into their adult plumage by the end of their first fall season and the first juvenile plumage is incredibly similar to that of adult males, it will be possible to examine the plumage of both nesting adults and their offspring in the same time frame. Data collected from the field will then be joined with studies of plumage characteristics of museum specimens. Examinations of data collected from museum specimens combined and contrasted with information from live birds in the field will provide the ability to unite behavioral data with information of plumage patterning and ultraviolet reflectance for birds collected from outside of Northern California. This will enable the inclusion of information from additional subspecies of American Kestrel into this study. The determination of possible fitness signals in the plumage of the American Kestrel will aid in the examination of the evolutionary relationships of the American Kestrel to other kestrels, and may be used to better understand the evolution of sexual dimorphism of plumage in the genus *Falco*.

APP#19714 - Effects of Prescribed fire on Medusahead

Project Dates: Mar 2009 to Sep 2014

Principal Investigators: Danny Fry

Other Members: Brandon Basso | Dave McLean | John Cherbini | Sasha Berleman

Affiliations: University of California, Berkeley | California Department of Forestry

Project Abstract

Medusahead (*Taeniatherum caput-medusae*: Poaceae) is a noxious weed from the Mediterranean region that has invaded many vegetation types in California, altering ecosystem structure and function. Commonly used methods to reduce invasive plant species in grasslands include biological and chemical applications, tilling and livestock grazing. Prescribed fire is a relatively inexpensive approach that has been used to treat medusahead invaded areas with varying degrees of success. We propose a four-year study to examine further the effects of prescribed fires on grasslands invaded by medusahead on BORR and Joseph D. Grant County Park. Cover of medusahead and all other species will be measured prior to, and two years after, treatments in four burn units and three control units. Cover will be recorded using the point-intercept method (50 cm intervals) on three 30 m line transects established in each unit. Prescribed fire treatments will be conducted in June 2009-2010 according to weather conditions and plant phenology. Fire behavior, weather and moisture content of medusahead, thatch and soil will be recorded during burn operations to aid in describing fire effects. Post-treatment measurements will be collected during the spring

2010-2012. Comparisons of pre- and post-treatment plant cover and species composition will be performed using analysis of variance (ANOVA) tests. This study will aid in determining the usefulness of prescribed fire as a management tool in controlling the spread of medusahead.

APP#26033 - Blue Oak Ranch Reserve Ecohydrology

Project Dates: Oct 2012 to Oct 2015

Principal Investigators: Sally Thompson | Todd Dawson

Other Members: David Dralle | Gabrielle Boisrame | Gopal Penny | Lee Hovey | Lucas Goehring | Michael Koohafkan

Affiliations: University of California, Berkeley | Max Planck Institute | Columbia University

Sponsor

NSF \$300,000.00

Project Abstract

Explore the ecohydrological dynamics of the complex landscape at Blue Oak Ranch Reserve

APP#26828 - California Red-legged Frog Surveys Reconnaissance Visit

Project Dates: Mar 2013 to Mar 2014

Principal Investigators: Rachel Anderson

Other Members: Matt Savoca

Affiliations: University of California, Davis

Project Abstract

CRLF Surveys Reconnaissance Visit

APP#27291 - Wired Wilderness

Project Dates: Jul 2013 to Jun 2015

Principal Investigators: Brian Howe | freya bardell

Other Members: Josko Kirigin

Affiliations: Greenmeme

Sponsor

San Jose Office of Cultural Affairs \$33,000.00

Project Abstract

The Wired Wilderness project is engaging the Blue Oak Ranch Reserve in a public art project at San Jose Norman E. Mineta Airport. The project streams timelapse footage from an array of cameras placed in specific locations at the Reserve and then stores them for future compilation into a film about "A Year at Blue Oak Ranch Reserve". This film will become the source for new content at the airport art display a year later and will be released to BORR for promotional and research use with attribution to Greenmeme (artists) and Wired Wilderness (the project title and collaboration with Dr. Hamilton, Reserve Director).

APP#28753 - Thesis research - investigating the four stages of the sampling process

Project Dates: Jan 2014 to Aug 2014

Principal Investigators: Caitlin Youngquist

Affiliations: Academy of Art University

Project Abstract

I am investigating the four stages of the sampling process (collection, preparation, analysis, and transport/storage) from the perspectives of affordability, durability (and repairability), mobility, and ergonomics.

APP#28794 - Assessing Trade-Offs Between Small Mammal Granivory/Herbivory And Competitive Interactions On Plant Community Structure: A Functional Approach

Project Dates: Feb 2014 to Oct 2016

Principal Investigators: Lorelee Larios

Other Members: John Maron

Affiliations: University of Montana

Sponsor

National Science Foundation DBI-1309014 \$45,000.00

Project Abstract

Determining the factors that regulate plant abundance and composition has been a long-standing endeavor for ecologists. Traditionally, this issue has been addressed by examining the determinants of adult plant performance. Here, plant ecologists have taken a bottom-up perspective and focused primarily on the relative importance of abiotic factors and plant-plant interactions in structuring communities. Increasingly, however, we know that top-down factors can influence the magnitude of seedling recruitment into local assemblages and can be key to dictating community assembly and the ultimate structure of the resident community. The proposed work will examine how generalist herbivores (ubiquitous small mammals) influence recruitment and the ultimate composition of species and traits within local assemblages, using a trait based assembly perspective. This approach, which has rarely been applied to studies of how generalist herbivores influence plant communities, evaluates how multiple assembly processes or filters influence species composition and the distribution of traits within that local assemblage. Specifically, the proposed study will examine the individual and interactive effects of granivorous mice and herbivorous voles in affecting community assembly across plots that vary in productivity and hence competitive environment within Californian grassland communities.

APP#29410 - UCIRA Summer 2014

Project Dates: Jun 2014 to Jun 2014

Principal Investigators: Stephanie Hwang

Affiliations: University of California, Irvine

Sponsor

University of California Institute of Research in the Arts \$500.00

Project Abstract

The goal of my project is to produce short educational films that integrate the arts into teaching the NGSS cross-cutting concepts (for K-12 science teachers): -Patterns, similarity, and diversity -Cause and effect; Scale, proportion and quantity -Systems and system models -Energy and matter -Structure and function -Stability and change At the natural reserve, I hope to capture some (if not all) of these cross-cutting concepts on film, which will later be edited and produced into educational films for K-12 science

students.

APP#10889 - Badger Natal Den Habitat Characterization

Project Dates: Dec 2008 to May 2013

Principal Investigators: Katrina Krakow

Affiliations: San Jose State University (CSU)

Project Abstract

Although the North American badger (*Taxidea taxus*) is found all over North America, their ecology is not well understood. It is especially important to gain ecological knowledge about *T. taxus* because their population is declining. In light of their decline, it is important to focus research with this species on recruitment; one area that needs to be better understood is where they choose to make their natal dens. The only research that I have found specifically concerning badger natal dens for *T. taxus* measures physical aspects of the underground den; natal dens may require different or additional characteristics than non-natal burrows. In my research, I will narrow down what characteristics are important to possible natal den habitat; included in my list of possible characteristics are: soil texture, depth, and moisture, local topography, slope, aspect, and elevation of the burrow, prey and food availability, local percent cover, distance to another habitat type, distance to water, and predator presence. If natal dens do fall into a specific habitat characterization scheme, then wildlife managers can make better informed decisions with regards to badgers.

APP#23718 - California tiger salamander genetics

Project Dates: Apr 2013 to Jun 2015

Principal Investigators: Howard Shaffer

Other Members: Gary Bucciarelli | Genevieve ggmount@ucla.edu

Affiliations: University of California, Davis | University of California, Los Angeles

Sponsor

US Dept. of Interior \$200,000.00

Project Abstract

As part of our ongoing, long-term sampling of California tiger salamander hybrid genetics. We have all relevant state, county, and federal permits for our work. We would like permission to enter the Blue Oak Reserve on Mt. Hamilton road. We are accessing a pond on Joseph D. Grant county park, but the easiest way to do so is via the Blue Oak Reserve access road. We would also like permission to sample salamanders at South Pond on the Blue Oak Property. We expect to sample these ponds once per year for at least three more years. So the project date extends to 2015, however, we will only visit the reserve to sample once per year.

APP#24144 - Biophysical contrasts at the tree — grass ecotones at Blue Oak Ranch Reserve: a pilot study to investigate the sensitivity of landscape structure to climate change.

Project Dates: Sep 2011 to Aug 2012

Principal Investigators: Sally Thompson

Affiliations: University of California, Berkeley

Sponsor

The Nature Conservancy (CA) \$5,000.00

Project Abstract

A striking feature of many seasonally dry landscapes is how vegetation changes along topographic gradients, from relatively sparse vegetation at hilltops and slopes, to denser vegetation in the valleys and riparian areas [1, 2]. This contrast means that different parts of the landscape function in different ways, with different patterns of carbon fixation, water balance, nutrient processing, and more ecosystem diversity arising in upland versus drainage areas. Movement of ecotones is one anticipated consequence of climate change [3-5], and evidence suggests that this movement can be rapid [3, 6]. Moving ecotones could result in an expansion or a contraction of the wooded areas in the valleys. Of particular concern, contraction of these areas could lead to loss of habitat area. Other potential consequences include altered hydrological responses (associated with loss of perennial vegetation), increased risk of erosion (associated with loss of woody vegetation), or reduced nutrient processing (associated with a decreased width of the riparian zone). To make predictions about the potential impacts of climate change on the location of ecotones, however, the factors that cause the ecotone to exist in its contemporary location must be understood. The aim of this proposal is to begin an assessment of the biophysical contrasts associated with tree-grass ecotones at the Blue Oak Ranch Reserve that could offer insight into how the location of these ecotones might change under scenarios of climate change. This proposal will contribute to conservation by improving understanding of how climate change could alter the location of ecotones, potentially causing habitat loss. In the long term this work also has the potential to improve understanding of the consequences of climate change for watershed-scale carbon, water, energy and nutrient balances.

Blue Oak Ranch Reserve Ecotones and Hypotheses

The ecosystems at Blue Oak Ranch Reserve have an obvious relationship with landscape position. Grasses, with some oak savannas, cover the crests and hillslopes, but are replaced by trees in the valleys and on north-facing hillslopes. Several ecological communities with significant conservation value are associated with these treed areas, including Blue Oak Woodlands, Valley Oak Woodlands, and native perennial grasslands (which persist as understorey in several wooded areas). The factors that control the location of the tree-grass ecotone are not known. This research will explore three hypotheses:

- a) Soil depth determines the ecotone. USDA soil data suggests that soil depth in the valleys (800 mm) may be twice that of the slopes (400-500mm). Deep soils may allow trees to outcompete grasses. This kind of ecotone may be relatively stable to climate variation.
- b) Available water determines the ecotone. Sites with greater upslope accumulated area (drainage lines) receive additional water from runoff and subsurface flow, allowing trees to outcompete grasses. This kind of ecotone would be sensitive to changing precipitation.
- c) Microclimate determines the ecotone. Drainage lines may be cooler, shadier and more humid than the slopes. Competition for light, and reduced atmospheric water demand, enable trees to outcompete grasses in the drainage lines. This kind of ecotone

would be sensitive to changing temperature and precipitation.

APP#24173 - Valley oak landscape genomics

Project Dates: Oct 2011 to Oct 2012

Principal Investigators: Paul Gugger

Affiliations: University of California, Los Angeles

Project Abstract

Climate change has already begun to impact species and ecosystems throughout the world by altering local climate conditions and shifting current climate zones. This rapid change is of particular concern for long-lived tree species that define the ecosystem they occupy and shape local biodiversity. Here, we use cutting-edge genomic tools to investigate geographic patterns of genetic and phenotypic variation in a keystone endemic oak species of California, valley oak (*Quercus lobata* N?e), and assess how the underlying genetic structure of populations might influence this species' ability to survive climate change. Local adaptation across many traits is likely to create geographic structure in traits associated with response to climate. By sampling populations through the species' range, we propose to test the association of genetic variation, phenotypic variation, and gene expression with climate gradients. Specifically, we will use a reference transcriptome to identify candidate genes associated with functional traits for response to climate change, test for SNPs under selection by association with geographical and environmental gradients after controlling for background historical genetic structure, and then map the SNPs associated with these genes onto phenotypic traits measured in a greenhouse experiment. We will study variation in gene expression in phenology of bud burst and drought tolerances as an initial analysis of geographic patterns of sequence variation and gene expression. This project will provide a rigorous assessment of the extent to which spatial patterns in adaptive genetic variation, phenotype and gene expression might influence response to future climates.

APP#25932 - Variation in space and time of a phenotypic trait: TTX levels of *Taricha torosa* within and between watersheds

Project Dates: Jan 2013 to Jan 2013

Principal Investigators: Gary Bucciarelli

Affiliations: University of California, Los Angeles

Project Abstract

Toxins mediate numerous animal behaviors, from predation and courtship to fecundity and habitat colonization. The potent neurotoxin tetrodotoxin (TTX) is a non-proteinaceous alkaloid that primarily serves as a chemical defense in numerous taxa, but for California newts, *Taricha torosa*, which possess TTX, it is both a defense and alarm cue to conspecifics. As a means of defense, variation of TTX levels has been observed across broad scales and related to a coevolutionary arms race. Experimental sampling of newts conducted over a two year period from Oregon to British Columbia indicate that congeneric TTX levels vary at both inter- and intra-population levels. However, Recent research conducted within the Santa Monica Mountains has quantified phenotypic variation in TTX levels at finer spatial and temporal scales and these data demonstrate that levels of TTX in *T. torosa* vary within and between locations, as well as between breeding and post breeding periods even though

mass and snout-vent length do not significantly differ temporally. In contrast to studies primarily focused on TTX resistance and fitness consequences for predators of toxic newts, these initial data reveal phenotype variation of TTX levels through space and time of newts. Phenotypic variation in toxin levels has been observed at broad spatial scales in other amphibians, yet never as a result of breeding status or at fine spatial scales. Initial data suggest that determining levels of variation at fine and broad scales would decipher what ecological processes affect this phenotype.

APP#26649 - Dispersal vectors and risk assessment of noxious weed spread: medusahead invasion in California rangelands

Project Dates: Feb 2013 to Dec 2014

Principal Investigators: Emily Farrer

Affiliations: University of California, Berkeley

Sponsor

United State Department of Agriculture, National Institute of Food and Agriculture

Postdoc Fellowship 2012-67012-19840 \$130,000.00

Project Abstract

Plant invasions are occurring on a global scale at unprecedented rates, and often their spread is not tracked until they become widely distributed and problematic. Being able to reconstruct the history of invasions and understanding the dispersal of invaders is essential in identifying corridors of spread and predicting which uninvaded areas are at risk for future invasion. My goal is to use a population genetics approach to understand dispersal and establishment of the noxious rangeland weed medusahead in California and apply this information for state-wide invasion risk assessment. Medusahead has infested 2.4 million acres in the western United States and is still expanding its range. Because medusahead is unpalatable to cattle, it can reduce rangeland grazing capacity by up to 80% causing severe economic losses. Medusahead seeds can adhere to grazing animals or be transported in infested hay, and in this proposal, I test whether landscape connectivity by these vectors increases medusahead dispersal. I hypothesize that dispersal will be high in land holdings throughout California that have high connectivity with other sites (cattle grazing and transportation, hay importation, human and vehicle traffic). I will also test whether medusahead shows evidence of local adaptation. I will then integrate dispersal and local adaptation information with medusaheads current distribution to create predictive maps of invasion risk for CA, which will act as an important tool for preventative management strategies.

APP#27068 - Phylogeny and Revision of the Hypherpes complex (Coleoptera:Carabidae)

Project Dates: Mar 2013 to Mar 2014

Principal Investigators: Kipling Will

Affiliations: University of California, Berkeley

Project Abstract

This project will develop a higher-level phylogeny for genera related to and species in the Pterostichus (Hypherpes) complex. Within Hypherpes species limits are being tested and new species described. The evolutionary history and historical and ecological biogeography of this group of well over 100 species, throughout its range (Alaska to Baja California, east to New Mexico and two species in eastern North

America)is being investigated.

APP#27154 - Impacts of controlled burns on pocket gopher activity and California native/exotic plants

Project Dates: Apr 2010 to Apr 2013

Principal Investigators: Danny Fry | Sean Watts

Other Members: Michelle Bezanson

Affiliations: University of California, Berkeley | University of California, Santa Barbara | Santa Clara University

Project Abstract

In collaboration with Danny Fry (UC Berkeley), we will be investigating impacts of controlled burns on growth and recruitment of purple needle grass (*Nassella pulchra*) and several exotic forbs. We will also be investigating interactions between pocket gopher (*Thomomys bottae*) activity in burn areas and potential secondary interactions with California tiger salamanders (*Ambystoma californiense*).

APP#27290 - Project Baseline - a nationwide initiative to systematically collect, preserve and archive seeds

Project Dates: Jan 2013 to Sep 2015

Principal Investigators: Heather Schneider | Susan Mazer

Other Members: Kristen Peach | Prahlada Papper

Affiliations: University of California, Santa Barbara

Project Abstract

Project Baseline is a nationwide initiative to systematically collect, preserve and archive seeds to be made available to future biologists for studies of evolutionary responses to anthropogenic and natural changes in the environment that will occur over the coming decades. Over an initial period of 3 years, seeds will be collected from multiple populations of up to 84 widely dispersed plant taxa, to represent phenotypic and genotypic variability across habitats and climates that roughly encompass each species' current geographic range, using a sampling plan designed to capture variation within and between populations. The seeds will be stored at the USDA National Center for Genetic Resources Preservation. In collaboration with experts at this facility, we will examine the critical assumption that genetic variation collected today will persist in seeds stored and grown for future experiments. Thus, in addition to providing scientists with well-characterized germplasm for use in future direct comparisons of evolutionary change (e.g., in common garden plantings), this work will contribute to the development of better methods for assessing seed quality, sampling genetic diversity, and calibrating monitoring guidelines.

APP#27460 - Ecological Field Methods Research Project (UCSC)

Project Dates: May 2013 to May 2013

Principal Investigators: Cameron Kolk

Affiliations: University of California, Santa Cruz

Project Abstract

Feral pigs are an invasive problem species that have a significant impact on native flora and fauna. Hunting and depredation efforts have been observed to cause a change in pig behavior. For our study we are going to compare the behavior and environmental

impact of pigs on two adjacent plots of land, one with hunting pressure and one without.

APP#27491 - Understanding Groundwater and Vegetative Distribution Patterns through Electromagnetic Induction Profiling

Project Dates: Jun 2013 to Jun 2013

Principal Investigators: Taylor Winchell

Affiliations: University of California, Berkeley

Project Abstract

Various longstanding oak trees at the Blue Oak Ranch Reserve live in areas that currently appear relatively dry and demonstrate little oak recruitment potential. This leads to the idea that these oak trees may be decoupled from the surface flow patterns and are instead obtaining their main source of water from subsurface aquifers. This project utilizes an EMI profiler, along with TDR and gravimetric water content measurements, to evaluate the subsurface profile in two different watershed transects of five grids each. These profiling methods will then be related back to the vegetation and topographic patterns of the watersheds.

APP#10687 - Alarm calling of California ground squirrel (*Spermophilus beecheyi*) in response to American badger (*Taxidea taxus*): predator specificity and geographic variation

Project Dates: Jul 2009 to Aug 2011

Principal Investigators: Margaret Swisher

Affiliations: University of California, Davis

Sponsor

Geography Graduate Group, UC Davis \$3,343.00

Project Abstract

Alarm calls and escape responses have been shown to differ significantly between snakes, mammals, and aerial predators in several ground squirrel species, including the California ground squirrel. However, there are insufficient data to analyze the badger-elicited alarm call/response. This study will allow the vocalization and escape response elicited by badgers to be compared with those elicited by terrestrial and aerial predators including dogs, snakes, domestic cats and birds. The study will also compare vocalizations from different locations to determine if there is a geographical dialect.

APP#23078 - Microbial communities associated with cavity nesting solitary bees and their floral resources

Project Dates: Jan 2011 to Oct 2011

Principal Investigators: Ryder Diaz

Affiliations: University of California, Davis

Project Abstract

Insect microbial relationships are pervasive in nature. For the most part, it is largely unknown the extent to which insect relationships with microbes influence larger community dynamics and species interactions. Observational evidence for the association between microbes, bee pollinators, and flowers is documented in the literature. However, despite the large interest in pollination biology and community ecology, questions regarding the ecology and evolution of these microbe-bee-plant interactions are untouched.

The numerous reports of microbes associated with plants and pollinators suggest that microbial communities may play integral roles in the biology of bees. Furthermore, these associations may have implications for structuring communities, selection for plant or pollinator traits to utilize beneficial microbes or selecting against antagonistic associations, and may influence pollinator foraging behavior and development. Potential impacts of microbes on pollination and pollinator behavior may have cascading effects on plant fitness.

It may be the case that microbial community assemblages are a function of both plant and pollinator traits. Flowering plants are frequently under selection to attract pollinators and to deter antagonists, and many species have secondary compounds in nectar that might affect microbial communities. If the majority of microbes are antagonistic, for example, if yeasts digest sugars that are meant as rewards for pollinators, then plants may be under selection to make nectar inhospitable to microbes but attractive to pollinators. On the other hand, if microbes are attractive to effective pollinators, perhaps as sources of protein, then plant nectar may have traits that foster specific microbial associations beneficial to pollinators.

The goal of this research program is to gain understanding on the role of microbial communities in pollination biology, as well as in emergent community properties and species interactions.

Research objectives include: 1) Survey the microbial communities associated with solitary bees (brood provisions, larvae, and adults) and their floral resources (specifically, floral nectar). 2) Determine significant relationships, degree of specialization, and the strength of associations between solitary bees, floral resources, and microbes using a network theory approach. Use the constructed network to investigate whether pollinators seem to be partitioning floral resources and/or microbial communities. 3) Use phylogenetic tools to understand the importance of evolution (speciation, adaptation, extinction) in the community assembly process. Construct phylogenies for microbes, plants, and pollinators in order to make inferences about the processes involved in community assembly (habitat filtering, competitive exclusion, etc). Particularly, examine the extent of trait conservatism or convergence in floral nectar properties (secondary compounds, volatiles, etc) and degree of floral specialization or overlap for pollinators and the relationship with microbial assembly. 4) Determine if communities vary temporally (season and year) or are consistent.

APP#23229 - Investigation of mercury deposition and sources of mercury input to four western National Parks and one California State Park

Project Dates: Jun 2011 to Jul 2011

Principal Investigators: Jiaoyan Huang

Affiliations: University of Nevada

Project Abstract

The Western Airborne Contaminants Assessment Project (WACAP) showed that fish in eight National Parks of the western U.S. had mercury concentrations that exceeded the threshold for fish eating wildlife (www.nature.nps.gov/air/Studies/air_toxics/wacap.cfm). These observations led to the development of this study focused on investigating air mercury concentrations and potential dry deposition using newly developed passive samplers and surrogate surfaces. The primary question being addressed is whether

local, regional or global sources are responsible for the Hg measured in fish in western parks.

To investigate this question passive samplers and surrogate surface samplers are being deployed that allow for understanding reactive gaseous mercury concentrations and deposition, respectively, along a transect from the coast of California to the eastern edge of Nevada. Passive samplers for ozone are being also being deployed simultaneously. In addition the sampling locations have ancillary meteorological and air quality data available that will be used along with back trajectory analyses to better understand the source of air interacting with each site. Air Hg concentrations are also being measured at select locations using a Tekran 2537a/1120/1135 speciation system at select locations during 2011 for 4-6 weeks. Sampling locations are from west to east within: Point Reyes National Seashore, CA; Elkhorn Slough, CA; Previously Lick Observatory on Mt. Hamilton, CA-We hope to replace with the Blue Oak Ranch Reserve; Yosemite National Park, CA; Sequoia & Kings Canyon National Park, CA; and Great Basin National Park, NV. Investigation of elevation gradients in air concentrations and deposition within select parks during sampling intensives will allow us to better understand the sources of Hg to park ecosystems.

APP#23767 - Genetic diversity and local adaptation and the success of restoration materials

Project Dates: Jun 2011 to Jun 2015

Principal Investigators: Erin Espeland | Paul Aigner

Other Members: Kevin Rice | Nancy Emery

Affiliations: University of California, Berkeley | University of California, Davis | US Department of Agriculture

Project Abstract

In this experiment, we are testing how local adaptation and genetic diversity affect growth and persistence of restoration plantings of 3 commonly-used California native perennial grass species: *Poa secunda*, *Nassella pulchra*, and *Elymus glaucus*. We will compare low-diversity plantings (5 maternal families) to high-diversity plantings (30 maternal families). We are testing local adaptation in two ways: 1) comparing locally-collected seed (< 5 miles distant) to seed collected from sites further away (>40 miles distant), and 2) collecting seeds within these distances from riparian and upland areas and performing a reciprocal transplant (growing these seeds at both riparian and upland sites) within the restoration area. Seeds will be grown in containers in a common garden before being transplanted as plugs into the restoration areas. We will also plant commercially-available materials for comparison. Transplanted plants will be tracked for survival, reproduction, and growth yearly for three years and then every other year for a total of 11 years of monitoring. Through this experiment, we can determine the value of restoring with locally-collected seeds, the value of restoring with seeds collected from appropriate site types (riparian vs. upland), and the value of restoring with genetically-diverse materials. The value of using locally adapted seeds has often been posited without large-scale field research to quantify the effect of using these seeds. In this experiment, we also refine the factor of local adaptation, examining it on two axes: habitat type and distance. This experiment will be conducted within a large-scale restoration (80 acres) performed along Elicuera creek at the University of California McLaughlin Natural Reserve.

Experimental design. Two large blocks will be delineated within the restoration area. Each block will contain a riparian habitat area as well as an upland habitat area. Within each habitat area, each species will be planted in eight treatments in a factorial design: habitat seed source (riparian or upland) x local seed source (near or far) x genetic diversity (5 families or 30 families). We will also plant plugs of commercially-available materials for each species. Each treatment will consist of a plot of 30 plants.

APP#23794 - Effects of the North American Bullfrog on Populations of Northern California Amphibians

Project Dates: Jun 2011 to Oct 2011

Principal Investigators: Jacob Finkle

Affiliations: University of California, Berkeley

Project Abstract

The purpose of this study is to examine the effects of the North American Bullfrog (*Rana catesbeiana*) on populations native California amphibians, including the California Red-legged frog (*Rana draytonii*), Pacific Tree frog (*Pseudacris regilla*), Western toad (*Bufo boreas*), California Tiger salamander (*Ambystoma californiense*), California newt (*Taricha torosa*), and the California Rough-skinned newt (*Taricha granulosa*). The project hopes to determine whether presence of bullfrogs (*R. catesbeiana*) in the same breeding ponds as native amphibians has a negative, positive, or no effect on native amphibians.

APP#23820 - Blue oak demography and bioclimate model projections

Project Dates: Jun 2011 to Aug 2011

Principal Investigators: Blair McLaughlin

Affiliations: University of California, Santa Cruz

Sponsor

The Nature Conservancy \$5,000.00

Project Abstract

The Nature Conservancy has developed a high-resolution bioclimate model, including blue oak, for the greater Mt. Hamilton area that indicates a high likelihood of range contraction for the species in most of Blue Oak Ranch Reserve and a high likelihood of refugia or range expansion in the Lick Observatory area. Bioclimate models traditionally have been evaluated by their accuracy in predicting historic species distributions or a control set of current distribution data left out of the original model generation. However, ongoing climate change creates the opportunity to begin to test models with ground-level data on emerging changes (Araujo et al 2005). In long-lived species, these changes may be detected by examining the distribution of young life history stages and mortality in the field. We propose to ground test the correspondence between TNC bioclimate model projections for blue oak and actual patterns of recruitment and mortality in the field. If the model reflects patterns in the field, we would expect to see higher recruitment and lower mortality in the projected refugia/expanding areas and lower recruitment and higher mortality in the projected contracting areas. Our field surveys on this species of high conservation concern will be useful both for exploring current impacts of climate change and developing a baseline for future studies.

APP#23904 - Wireless Multiprotocol Field Router Test for Environmental Monitoring Applications

Project Dates: Aug 2011 to Sep 2011

Principal Investigators: Valerie Barker

Affiliations: Intelesense Technologies

Project Abstract

The purpose of this project is to test the design of the InteleCell, a wireless multiprotocol field router, and associated sensors for field ruggedness and reliability in a realistic deployment environment. The InteleCell Field Router is a wireless TCP/IP-enabled, programmable, data acquisition device with built-in GPS module, sensor power management, and a multitude of wireless and wired interfaces. As a true multi-protocol router for sensor data, it can be used for acquiring information from a wide variety of sensors with different hardware interfaces and speaking different software protocols. Applications include environmental monitoring, medical monitoring, emergency telemedicine and disaster response, and stand-alone wireless communications infrastructure for remote areas. The InteleCell Field Router is able to extend any TCP/IP network, such as the Internet, into very remote areas where no other infrastructure is available.

APP#24320 - Drosophila busckii collection

Project Dates: Oct 2011 to Oct 2011

Principal Investigators: Doris Bachtrog

Affiliations: University of California, Berkeley

Project Abstract

I want to collect a population sample of *Drosophila busckii*.

APP#24435 - BASMAA Regional Monitoring Coalition Creek Status and LongTerm Trends Monitoring Plan

Project Dates: Nov 2011 to Jun 2012

Principal Investigators: Kevin Lunde

Affiliations: Regional Water Quality Control Board

Project Abstract

In early 2010, San Francisco Bay Area public agencies joined together to form the Bay Area Stormwater Agencies Association (BASMAA) Regional Monitoring Coalition (RMC) to coordinate and oversee water quality monitoring required by the Municipal Regional National Pollutant Discharge Elimination System (NPDES) Stormwater Permit(MRP).

To date, San Francisco Bay Area Stormwater Programs have implemented monitoring designs that target creek reaches of interest to address site specific management questions. Because the representativeness of targeted data is unknown, the condition of all creek reaches in the Bay Area also remains unknown. The RMC has agreed to address this issue by augmenting targeted monitoring designs with a regional ambient (probabilistic) creek status design that integrates many elements of the individualized monitoring programs that currently exist in the region.

RMC participants will conduct a condition assessment to address the first core monitoring question (i.e., what is the condition of aquatic life use in creeks in the San

Francisco Bay Area) by sampling two biological response indicators: benthic macroinvertebrates and algae. This question is addressed using an ambient (probabilistic) monitoring design in order to establish a statistically representative understanding of the relative condition of aquatic life in wadable creeks in the RMC area. While the

RMC area does not cover the entire San Francisco Bay Area, the monitoring question is stated in this manner in anticipation that the RMC monitoring area may be expanded in the future as additional stormwater programs become RMC participants. As currently designed, the ambient monitoring design in the RMC area will provide information about the condition of aquatic life in the majority creeks in the San Francisco Bay Area.

APP#25466 - Informatics Engine for Understanding Biotic Response to Global Change

Project Dates: Jun 2012 to Jun 2012

Principal Investigators: Sarah Hinman

Affiliations: University of California, Berkeley

Sponsor

William M. Keck Foundation 32510 \$1,499,695.00

Project Abstract

A large aim of the Keck Informatics Engine project is to locate, catalog, and digitize data from the UC field stations. My visit to BORR is to discover the various datasets with help from Mike Hamilton. Specifically, their physical location, format (e.g. collection, excel files), accessibility, and potential use in the Keck Informatics Engine.

Keck Engine project abstract: The next generation of predictive models of the biotic response to environmental change must meet the challenge of incorporating the effects of complex interactions among organisms, climate, and their physical and biotic environments. A great variety of data types are required to meet this challenge, including current and past species' distributions, the increasing amount of associated data on their genotypes and phenotypes, and how these have changed in space and time, as well as empirical and modeled data on environmental and climate change. The goal of this project is to develop a Predictive Biosystems Informatics Engine (PBIE), the informatics infrastructure needed to access, visualize, and analyze these rich data, thus providing the foundation for building the next generation of models of the biotic response to global change. The unique combination of data in Berkeley's Natural History Museums, Field Stations, and faculty labs, our leading role in bioinformatics and the digitizing and serving of organismal and environmental data, and our world-class community of scholars and students make the unprecedented scale and complexity of the proposed effort possible. The PBIE will innovate with cutting-edge technologies, and once operational, will enable cross-disciplinary exploration of the vast and disparate data sources required to understand biotic response to global change. More information on the project can be found here: <http://ib.berkeley.edu/labs/globalchange/keck.html>

APP#19404 - A Geo-spatial Survey of Prehistoric Land Use in California's Diablo Mountain Range

Project Dates: Feb 2009 to Apr 2011

Principal Investigators: Linda Hylkema

Affiliations: Santa Clara University

Project Abstract

The Diablo Range subset of the Interior Coast Ranges is one of the least well-known archaeological regions within the State of California. The surrounding regions have experienced a great deal of Spanish mission influence, according to baptismal, birth, death, and marriage records kept at several of the central California missions. However, ethnographic records for the study area are sparse compared with other more well-documented areas up and down coastal California. Even less is known about the late Holocene archaeological record. Archaeological evidence suggests a significant adaptation to, and long-term reliance on a dart/spear hunting tradition, presumably for the procurement of large game (elk). Overt archaeological evidence for decreasing reliance on large game does not appear to manifest itself until the Late Period in central California. In fact, despite the introduction of the bow and arrow into the region around A.D. 300, there is evidence to believe that the long-held dart/spear hunting strategy does continue to persist in tandem.

While many researchers contend that the Diablo Range may have been used seasonally by groups from the San Joaquin or Salinas Valleys to procure specific resources at a given point or season in time, or may have been a cultural "boundary" or "gray area", I hypothesize that the Diablo Range was occupied year-round, at least from as early as the Middle Period (approx. 1500B.P.), by people with an economic reliance upon the variety of resources found locally. This is, in part, evidenced by the numerous, multi-acre occupational sites, many containing human interments, numerous artifact types representing a number of activities, and the importation of exotic materials into the higher elevations of the range.

Preliminary evidence suggests that the cultural chronology represented here in the Diablo Range is consistent with that of neighboring regions, including the Monterey Bay/Big Sur Coast and San Luis/Little Panoche regions.

This project will entail pedestrian transect surveys to identify prehistoric cultural resources in an effort to establish the cultural chronology for this area. Temporary custody of artifacts may result for illustration, measurement and photography but will be returned to the preserve. All artifacts will remain the property of the reserve.

APP#21730 - Climate change, plant traits, and the future of Bay Area upland vegetation

Project Dates: Jul 2010 to Jul 2010

Principal Investigators: Katherine Fitzgerald

Affiliations: University of California, Berkeley

Sponsor

Moore UCB fund 93389 \$154,000.00

Project Abstract

The specific aims of this project are to first compare demographics of *Acanthurus bahianus*, *A. coeruleus* and *A. chirurgus* (Caribbean) with *A. nigrofuscus*, *A. lineatus* and *A. olivaceus* (Indo-Pacific) using size at age estimates and mean life span estimates in populations from equal habitats. The following questions will be addressed: Are intra-specific growth comparisons similar?

APP#21782 - Search for *Leymus triticoides*, *L. condensatus*, and hybrids

Project Dates: Jul 2010 to Sep 2010
Principal Investigators: David Thomson
Affiliations: US Fish and Wildlife Service | Unaffiliated with any institution
Sponsor
National Fish & Wildlife Foundation \$90,000.00
Satterberg Foundation \$30,000.00
San Francisco Foundation \$60,000.00
United States Fish and Wildlife Service \$77,000.00

Project Abstract

We are performing a demonstration research project on managing vegetation in habitats adjacent to the tidal marshes of San Francisco Bay. Our goal is to provide detailed plans and specifications for creating or restoring plant communities at large scales. One key issue is the lack of these habitats remaining in the region, so there are few sites from which to collect the historic flora. The more successful we are at recreating the historic species assemblages, the more likely we are to reach our goal of creating low maintenance, native-dominated plant communities that provide habitat for native fauna, as well as the native flora themselves.

APP#21979 - Dragonfly distribution in the San Francisco Bay Area

Project Dates: Jun 2010 to May 2011
Principal Investigators: Joan Ball
Affiliations: University of California, Berkeley

Project Abstract

The goal of this study is to determine how dragonflies respond to landscape alteration at different spatial and temporal scales. Specifically, my objectives are to: 1) evaluate the relative importance of landscape and in-pond variables in shaping distribution patterns of dragonflies; 2) determine whether ecological niche models can accurately predict suitable habitat for odonates; and 3) calculate the approximate area of potential habitat lost for these odonate taxa over the past 30 years, by identifying key landscape changes that are associated with degradation of their habitat.

APP#22146 - Insect diversity on coyote bush across a latitudinal gradient.

Project Dates: Jul 2010 to Jul 2010
Principal Investigators: Gregory Crutsinger
Affiliations: University of California, Berkeley

Project Abstract

This is a simple biogeographic survey of insect diversity on coyote bush (*Baccharis pilularis*) across a latitudinal gradient in California. It will compare insect responses along the California coast versus inland sites. We will address whether coastal climate buffers the effects of latitude on insects.

APP#22259 - CRAM Assessment of Coyote Creek Watershed

Project Dates: Aug 2010 to Sep 2010
Principal Investigators: Sarah Pearce
Affiliations: San Francisco Estuary Institute

Project Abstract

The San Francisco Estuary Institute (SFEI) is working on a project funded by the Santa

Clara Valley Water District (SCVWD) to assess the ambient condition of creeks in the Coyote Creek Watershed. This assessment uses the California Rapid Assessment Method for wetlands (CRAM), a protocol developed under EPA guidance (www.cramwetlands.org). Within the Coyote Creek watershed 100 locations have been chosen based upon stream order (various colored dots on the topographic maps) to be assessed. The method requires a field team of two people to access the reach of creek for approximately 3 hours to make a series of observations about the creek. Using a professional judgment checklist, the creek is assessed for its health and condition based upon landscape setting, hydrology, physical structure and biologic structure. At the end of the assessment, the site receives a score for each attribute, as well as an overall score, or assessment of condition. Data for each site will be uploaded to cramwetlands.org and visible to the public. The primary goal of this project is to develop an understanding of condition of the creeks in the watershed based upon the assessments of each of these locations. The data will be analyzed and a short technical memo written to describe the findings of this study.

APP#22415 - The Aquatic Dryopoidea (Insecta: Coleoptera) of California

Project Dates: Oct 2010 to Oct 2010

Principal Investigators: Cheryl Barr

Affiliations: University of California, Berkeley

Project Abstract

This is a statewide, ongoing survey to document species occurrence and geographic distribution, as well as habitat and microhabitat preferences of beetles in the families Elmidae, Dryopidae, Psephenidae, and Eulichadidae. Because of my UC affiliation, I make an effort to conduct mini-surveys within the NRS system and other UC properties in order to provide a faunistic list and basic data of their aquatic dryopoid fauna. Surveys of this group have so far been completed in the following: Angelo Reserve, Sagehen Reserve, Landels-Hill Big Creek Reserve, Hastings Natural History Reservation, Granite Mountains Reserve, Sedgwick Reserve, Santa Cruz Island Reserve, Blodgett Forest Research Station, and Hopland Field Research and Extension Center.

APP#22983 - Spatial segregation of sexes in the moss *Scleropodium touretii*

Project Dates: Jan 2011 to Mar 2011

Principal Investigators: Benjamin Carter

Affiliations: University of California, Berkeley

Project Abstract

I am scouting potential locations for an ecological study examining niche differentiation between the sexes of a moss, *Scleropodium touretii*. Moss sex ratios, especially in arid environments, often range from 2:1 to 10:1 in favor of females. I intend to test the hypothesis that males only occur in a subset of the environments tolerated by females, and that sexual reproduction is distributed heterogeneously at small to moderate spatial scales (meters to 100s of meters).

I have been to Blue Oak ranch several times and am familiar with the site, but would like to visit it to again to determine whether the reserve would be an appropriate location for the proposed study.

APP#23000 - preliminary survey of Blue Oak for ectomycorrhizal study

Project Dates: Jan 2011 to Jan 2011

Principal Investigators: Thomas Bruns

Affiliations: University of California, Berkeley

Project Abstract

We are interested in the role of ectomycorrhizal fungi in oak and pine recruitment. Our initial visit to the reserve is simply to check out the landscape and plant communities and determine whether it is suitable for our research needs. If it is, then we will submit a research plan.

APP#23230 - Investigation of mercury deposition and sources of mercury input to four western National Parks and one California State Park

Project Dates: Mar 2011 to Mar 2011

Principal Investigators: Jiaoyan Huang

Affiliations: University of Nevada

Project Abstract

The Western Airborne Contaminants Assessment Project (WACAP) showed that fish in eight National Parks of the western U.S. had mercury concentrations that exceeded the threshold for fish eating wildlife (www.nature.nps.gov/air/Studies/air_toxics/wacap.cfm). These observations led to the development of this study focused on investigating air mercury concentrations and potential dry deposition using newly developed passive samplers and surrogate surfaces. The primary question being addressed is whether local, regional or global sources are responsible for the Hg measured in fish in western parks.

To investigate this question passive samplers and surrogate surface samplers are being deployed that allow for understanding reactive gaseous mercury concentrations and deposition, respectively, along a transect from the coast of California to the eastern edge of Nevada. Passive samplers for ozone are being also being deployed simultaneously. In addition the sampling locations have ancillary meteorological and air quality data available that will be used along with back trajectory analyses to better understand the source of air interacting with each site. Air Hg concentrations are also being measured at select locations using a Tekran 2537a/1120/1135 speciation system at select locations during 2011 for 4-6 weeks. Sampling locations are from west to east within: Point Reyes National Seashore, CA; Elkhorn Slough, CA; Previously Lick Observatory on Mt. Hamilton, CA-We hope to replace with the Blue Oak Ranch Reserve; Yosemite National Park, CA; Sequoia & Kings Canyon National Park, CA; and Great Basin National Park, NV. Investigation of elevation gradients in air concentrations and deposition within select parks during sampling intensives will allow us to better understand the sources of Hg to park ecosystems.

APP#23242 - Test of wireless acoustic sensor networks - Pilot

Project Dates: Mar 2011 to Mar 2011

Principal Investigators: Matthew McKown

Affiliations: University of California, Santa Cruz

Sponsor

National Science Foundation DBI-0964254 \$385,000.00

Project Abstract

Automated sensors have the potential to greatly expand the spatial and temporal scale of biological monitoring projects while reducing costs and detrimental impacts associated with research projects in sensitive locations. Existing state of the art acoustic sensors are relatively expensive and lack the ability to telemeter data from remote locations. We are developing automated acoustic sensors for wildlife monitoring based on Android cellphones. The rationale is that cellphones contain all of the components required for acoustic monitoring, that they are tested by millions of users, and that prices should go down over time due to market forces. At the Blue Oak Ranch Reserve, we will test a pilot network of 5 acoustic sensors that will transmit acoustic data through the reserves wireless network. The first days of the test will involve testing and troubleshooting near the wireless access point at the barn. Then, we will try to move the network to a biologically relevant location on the reserve to monitor Owls and/or bullfrog activity.

APP#23494 - Climate change impacts on lizards, mediated by plant habitat structure

Project Dates: Apr 2011 to Apr 2011

Principal Investigators: Barry Sinervo

Affiliations: University of California, Santa Cruz

Sponsor

National Science Foundation IOS-1022031 \$476,101.00

Project Abstract

This collaborative project will assess vulnerability of lizards to climate warming on a global scale. It is motivated by recent discovery that warming has already driven many lizard populations extinct as well as by our model predictions that warming will drive many more extinct by 2020. Because lizard extinction is happening now and because lizards are important to many ecosystems, studies that quantify extinction risk of populations/species must be a high priority for biodiversity and conservation studies at continental scales. Our analyses show that risks can be reliably evaluated and predicted. We need to know what traits make a lizard vulnerable now, why those traits evolved, and at global scales. Global surveys spanning 5 continents will enable us to calibrate our models. We propose to expand our existing research on climate warming effects on the side-blotched lizard, *Uta stansburiana* (currently conducted across the western U.S. and Mexico), to research projects with the Northern Alligator Lizard, *Elgaria coerulea*, and the Southern Alligator Lizard, *Elgaria multicarinata*. Based on climate projections, some populations of *E. coerulea* face extinction in their range in Santa Cruz, San Mateo, and Santa Clara counties. Its former range may be colonized by *E. multicarinata*, which prefers higher temperatures. We propose to conduct surveys for both *Elgaria* species in the Blue Oak Ranch Reserve to assess extinction risk in Santa Clara County.

APP#23552 - Forest Inventory and Analysis

Project Dates: May 2011 to May 2011

Principal Investigators: Josh Feinberg

Affiliations: US Forest Service

Project Abstract

FIA is a national program that collects data on the forests of our nation. Randomly located points occur every 3.5 miles across the country. This is the most comprehensive data source available which describes the state of our forests.

APP#23762 - UC Reserve Climate Monitoring

Project Dates: Jun 2011 to Jun 2011

Principal Investigators: Gregory McCurdy

Affiliations: Desert Research Institute

Project Abstract

Installation of a long term base climate monitoring station. The data collected will be transmitted in near real-time to WRCC where it will be accessible to any internet user.

APP#23833 - Genetics of Western Pond Turtles

Project Dates: Jun 2011 to Jun 2011

Principal Investigators: Howard Shaffer

Affiliations: University of California, Davis

Sponsor

California Department of Fish and Game HBSDF15 \$118,576.00

Project Abstract

Our goal is to collect Western pond turtle tissue samples for genetic analysis of phylogeographic patterns and to inform conservation and management decisions.

APP#9951 - Amphibian Chytridiomycosis in Central California

Project Dates: May 2008 to Jun 2010

Principal Investigators: Gretchen Flohr

Affiliations: Southern Illinois University

Project Abstract

I have surveyed all amphibian species for amphibian chytridiomycosis at BOR since 2003 researching occurrence and prevalence of the pathogen (*Batrachochytrium dendrobatidis*; "BD") within and between ponds. I sample all ponds and all species collecting a minimum of 30 samples of each species from each pond. My goal is to assess endemism of the pathogen and to test for patterns in the spread of BD across the site over the long-term.

I have further tested all species for susceptibility to BD.

APP#19714 - Effects of Prescribed fire on Medusahead

Project Dates: Mar 2009 to Sep 2014

Principal Investigators: Danny Fry

Other Members: Brandon Basso | Dave McLean | John Cherbini | Sasha Berleman

Affiliations: University of California, Berkeley | California Department of Forestry

Project Abstract

Medusahead (*Taeniatherum caput-medusae*: Poaceae) is a noxious weed from the Mediterranean region that has invaded many vegetation types in California, altering ecosystem structure and function. Commonly used methods to reduce invasive plant species in grasslands include biological and chemical applications, tilling and livestock grazing. Prescribed fire is a relatively inexpensive approach that has been used to treat medusahead invaded areas with varying degrees of success. We propose a four-year

study to examine further the effects of prescribed fires on grasslands invaded by medusahead on BORR and Joseph D. Grant County Park. Cover of medusahead and all other species will be measured prior to, and two years after, treatments in four burn units and three control units. Cover will be recorded using the point-intercept method (50 cm intervals) on three 30 m line transects established in each unit. Prescribed fire treatments will be conducted in June 2009-2010 according to weather conditions and plant phenology. Fire behavior, weather and moisture content of medusahead, thatch and soil will be recorded during burn operations to aid in describing fire effects. Post-treatment measurements will be collected during the spring 2010-2012. Comparisons of pre- and post-treatment plant cover and species composition will be performed using analysis of variance (ANOVA) tests. This study will aid in determining the usefulness of prescribed fire as a management tool in controlling the spread of medusahead.

APP#20204 - Testing attractiveness of candidate pheromones of longhorned beetles (Coleoptera: Cerambycidae)

Project Dates: Jun 2009 to Apr 2010

Principal Investigators: Annie Ray

Affiliations: University of California, Riverside

Project Abstract

The research proposed is an experiment to test the attractiveness of candidate pheromones of longhorned beetles. Previous research and field testing has indicated that longhorned beetles of different species use pheromones of similar molecular structure. We have produced a variety of isomers of this basic structural theme that we predict are pheromones for different species, but we do not yet know which isomers are used by which species. In addition to testing the attractiveness of candidate pheromones, headspace volatiles of beetles collected in the traps will be analyzed to conclusively identify pheromones.

APP#20406 - Influence of summer fog on chaparral in the central coast region of California

Project Dates: Aug 2009 to Aug 2009

Principal Investigators: Michael Vasey

Affiliations: University of California, Santa Cruz

Project Abstract

Maritime chaparral is a legally-protected natural community, however, it is a challenge to delineate its particular characteristics. This study investigates the influence of summer fog, as well as soils and species diversity patterns, to establish the basis for better understanding how to delineate maritime chaparral. One key component of this research is a regionally-scaled sampling of stands of coast range chaparral along coast to interior climate gradients from Sonoma County south to northern Santa Barbara. This component of my study will help to identify species diversity patterns, such as potentially different rates of species turnover, in maritime versus interior chaparral.

APP#20523 - Ecosystem Services and Sensor Web Research

Project Dates: Sep 2009 to Sep 2009

Principal Investigators: Christopher Potter

Affiliations: NASA

Sponsor

Cisco TBD \$500,000.00

Project Abstract

Together with corporate partners such as Cisco Systems, NASA has an extensive Earth observation network spanning land, air, sea and space. In particular, NASA currently has over a dozen satellites with approximately 80 sensors monitoring the major components of the Earth system, including the oceans, land, atmosphere, biosphere and cryosphere. At NASA Ames Research Center, the Carbon Query and Evaluation Support Tools (CQUEST) is one of NASAs contributions to carbon management. CQUEST is an online tool that combines satellite data and decision-support tools to provide users with information on carbon sources, sinks, stocks and fluxes for a given location in the US. Our ecosystem research at the BORR will integrate remote sensing, computer modeling and ground-based sensor networks to help understand processes of vegetation change, carbon and nitrogen cycles, energy and water fluxes, and atmospheric coupling at the wildland-urban interface.

APP#20542 - Seed Production of *Baccharis pilularis*

Project Dates: Sep 2009 to Sep 2009

Principal Investigators: Allison Kidder

Affiliations: University of California, Berkeley

Project Abstract

The specific aims of this project are to first compare demographies of *Acanthurus bahianus*, *A. coeruleus* and *A. chirurgus* (Caribbean) with *A. nigrofuscus*, *A. lineatus* and *A. olivaceus* (Indo-Pacific) using size at age estimates and mean life span estimates in populations from equal habitats. The following questions will be addressed: Are intra-specific growth comparisons similar?

APP#20570 - Water vapor vertical profile measurements using field deployable laser-based analyzer

Project Dates: Sep 2009 to Sep 2009

Principal Investigators: Priya Gupta

Affiliations: Unaffiliated with any institution

APP#20773 - Ants of California -- surveys of selected field sites

Project Dates: Nov 2009 to Nov 2009

Principal Investigators: Phil Ward

Affiliations: University of California, Davis

Project Abstract

Ants of California -- surveys of selected field sites. This is part of a long-term project to advance our understanding of the systematics and biology of California ants (Hymenoptera: Formicidae).

APP#20779 - Influence of slope position and mistletoe on water relations of oak trees (*Quercus lobata*) at Blue Oak Ranch Reserve/Diablo Range/Santa Clara County/California

Project Dates: May 2009 to Oct 2009

Principal Investigators: Ute Runkel

Affiliations: University of Trier

Project Abstract

At two different slopes at one tree each slope in two days diurnal courses including predawn first every second week and later once a month:

Analysing water potential with the Scholander Pressure Bomb

Measuring stomata conductance with a Porometer

Measuring air-moisture and temperature with a hand sensor

Collecting leaf samples of *Quercus lobata* for stable isotope analysis of sugars

Getting climate data from the weather station and Crossbow's remote sensing monitoring network for all working days

Once in August and once in September around noon:

Taking aerial images with a self transferred NDVI-Camera fixed on the remote controlled flying robot platform Asctec Falcon 8 made by Ascending Technologies/Munich/Germany

APP#20814 - Understanding the role of plasticity and genetic variation in parallel invasion fronts: Study of the range expansion of *Erodium cicutarium* in Chile and California.

Project Dates: Nov 2009 to Mar 2010

Principal Investigators: Brooke Baythavong

Affiliations: University of California, Davis

Sponsor

National Science Foundation International Research Fellowship 853094 \$138,490.00

Project Abstract

Project description: Invasive species undergoing rapid range expansions experience a variety of novel environments. Successful establishment in a novel range is likely to be facilitated by some combination of genetic variation among lineages within a population and phenotypic plasticity. This research is focused on understanding the relative importance of quantitative genetic variation and phenotypic plasticity in determining the relative success of populations of an invasive annual plant species, *Erodium cicutarium*, undergoing a recent range expansion in California and Chile. This research utilizes field surveys, greenhouse experiments, and Bayesian modeling techniques to address several questions including: 1) How does trait expression re... more

APP#20833 - Why the Myxoma virus infection is highly lethal for the European rabbit (*Oryctolagus cuniculus*), while in other leporids it is benign?

Project Dates: Nov 2009 to Nov 2009

Principal Investigators: Ana Lemos de Matos

Affiliations: K-12 Schools - Unspecified location

Sponsor

Project Abstract

The order Lagomorpha is divided in two families: Ochotonidae and Leporidae. The first is characterized by a single extant genus, *Ochotona* (pikas), while the second is constituted by 11 genera, where *Lepus*, *Sylvilagus* and *Oryctolagus* are included. According to molecular data, these families differentiated 30 MYA while genera *Lepus*, *Sylvilagus* and *Oryctolagus* diverged 12 MYA. The *Oryctolagus* genus is monotypic and

European rabbit (*O. cuniculus*) is the only existing species. The Iberian Peninsula rabbit populations are suffering a severe decline (near threatened by the Portuguese Vertebrate Red Book). The European rabbit is a key species of the Iberian ecosystem as the main prey of some critically endangered species.

APP#20839 - eKo Environmental Sensing System long-range testing deployment

Project Dates: Jun 2009 to Sep 2009

Principal Investigators: Alan Broad

Affiliations: Crossbow Technology

Project Abstract

eKo Sensing Systems are being tested from new sensors for climate, and new radios to extend the range

APP#21311 - Quantifying the distribution limiting factors of *Clarkia concinna* and *C. breweri*

Project Dates: Apr 2010 to May 2010

Principal Investigators: Timothy Miller

Affiliations: University of California, Santa Cruz

Project Abstract

I am interested in determining the ecological and evolutionary factors that limit the ranges of species. My study system is *Clarkia concinna* and *C. breweri*, a pair of closely related annual plants. *C. concinna*, the purported ancestral taxa, is a generalist, pollinated by bees, butterflies and flies, while *C. breweri* is specialized on hawk moths. The range of *C. concinna* extends north to Oregon and south to Mount Hamilton, represented at Blue Oak Ranch by the predominately selfing subspecies, *C. c. automixa*. *C. breweri* is found from Mt. Hamilton south to southern Monterey county. The first task that I will begin in this, the first year of my dissertation research is to understand the spatial and genetic structure of species ranges. To do this I will locate populations of *Clarkia concinna* and *breweri* across their range. I will measure population size and collecting seeds and tissue samples from a few individuals. As well as containing populations of *C. concinna*, Blue Oak Ranch could provide a location from which to survey the southern portion on the range of *C. concinna*. Additionally, I may make some preliminary pollinator observations. I would like to return to Blue Oak Ranch for several years to continue population surveys and possibly establish demography plots.

APP#21542 - Islands of invasion - regional patterns in the effect of oak trees on California grasslands

Project Dates: Apr 2010 to May 2010

Principal Investigators: Karen Stahlheber

Affiliations: University of California, Santa Barbara

Sponsor

Mathias Research Award 8-444017-37499-3 \$2,000.00

Project Abstract

Among ecosystems invaded by exotic species, California's 17.5 million acres of grasslands and savannas are unique in their nearly universal ecological conversion from perennial to annual-dominated communities. Many factors contribute to invasions

in a particular location; the most significant often include disturbances leading to increased nutrient levels or alterations in water availability. These disturbances are frequently attributed to anthropogenic influences such as fertilization, nitrogen deposition, overgrazing and eutrophication. Once dominated by an exotic, however, natural resource heterogeneity in the landscape may contribute to persistence of non-native species. Understanding the distribution and effect of heterogeneity is central to a clear mechanistic understanding of the impact of an experimental treatment or land management choice such as grazing. Woody savanna species are one natural source of heterogeneity in grassland ecosystems and while the impact of some tree species on soil and understory composition has been studied, variation in the impact of different types of trees within multiple savanna settings has not been studied. Additionally, previous studies have not included sites with different rainfall and climate patterns, and can not comment on larger, regional patterns.

My objective in this project is to examine the effects of oak canopies on understory vegetation across a regional precipitation and climate gradient. My previous work at Sedgwick Reserve has explored the effects of these important rangeland trees at a single location, but the generality of the patterns for other areas in the state remains unknown. In particular I am interested in the observed patterns of increased species diversity in open grassland relative to below-canopy habitats and the higher species richness in the near vicinity of evergreen oak species. To further explore these patterns, I will be visiting several different reserves this spring and early summer. The selected reserves span southern and northern California and annually differ in precipitation as well as temperature. Previous authors have suggested that the effect of an oak tree on the productivity of the herbaceous layer may vary according to annual rainfall amounts, or with the abundance of fine oak roots in the upper layers of soil. To examine the support for these patterns, I will investigate the following questions (1) How do oaks impact surrounding vegetation and soil properties in sites with different mean annual precipitation? (2) Do these impacts differ between evergreen and deciduous oak species and (3) Is the effect of oaks on species diversity of the understory related to the presence of fine oak roots in the upper layers of soil?

APP#21660 - Temporal and spatial patterns of admixture between introduced and native tiger salamanders

Project Dates: May 2010 to May 2010

Principal Investigators: Jarrett Johnson

Affiliations: University of California, Davis

Sponsor

Bureau of Land Management Reclamation Grant CESU3FC810873 \$237,840.00

Project Abstract

This project has three interrelated science objectives, all of which seek to use molecular genetic tools to identify the most important regions and individual sites for California tiger salamander (*Ambystoma californiense*, or CTS) mitigation and recovery. The three tasks attack this problem at three spatial scales:

Task 1: At the scale of the entire species, what are the fundamental management units

that must be protected to ensure overall protection of the CTS?

Task 2: Within each of these regions, how accurately can the actual population size of specific breeding sites be estimated by physical and landscape characteristics? That is, can we develop reliable indicators for specific sites that will allow one to quickly and accurately determine whether that site contains a biologically important CTS population that is worthy of protection?

Task 3: What are the dynamics of the hybrid swarm between native and non-native tiger salamanders in central California, and should we expect the swarm to expand or contract in the near future? Given the lower conservation priority placed on hybrid, compared to pure CTS populations, we will resample an established transect of 40 populations to assess the stability of hybrid populations over time and space.

APP#21979 - Dragonfly distribution in the San Francisco Bay Area

Project Dates: Jun 2010 to Jun 2010

Principal Investigators: Joan Ball

Affiliations: University of California, Berkeley

Project Abstract

The goal of this study is to determine how dragonflies respond to landscape alteration at different spatial and temporal scales. Specifically, my objectives are to: 1) evaluate the relative importance of landscape and in-pond variables in shaping distribution patterns of dragonflies; 2) determine whether ecological niche models can accurately predict suitable habitat for odonates; and 3) calculate the approximate area of potential habitat lost for these odonate taxa over the past 30 years, by identifying key landscape changes that are associated with degradation of their habitat.

APP#22055 - Sensitivity and range testing of a remote fire detection system.

Project Dates: Jun 2010 to Jun 2010

Principal Investigators: Philippe Cohen

Affiliations: Stanford University

Sponsor

National Science Foundation 45536 \$249,582.00

Project Abstract

We will be testing the response and range of a remote fire sensing equipment manufactured by Firebreak Corporation for use in an urban/wildland interface.

APP#9909 - Investigation of Amphibian Malformations in the United States: the Role of Trematode Parasite Infection

Project Dates: Feb 2009 to Feb 2009

Principal Investigators: Kevin Lunde

Affiliations: University of California, Berkeley

Project Abstract

INTRODUCTION: Since 1990, severe abnormalities have been recorded in more than 26 species of amphibians from more than 41 states in the US and three countries abroad. The cause(s) of these deformities and their role in global declining amphibian populations remains unclear. Our own field and laboratory studies in California have

isolated trematode parasite infection as the cause of severe limb abnormalities in several populations of Pacific treefrogs, *Pseudacris regilla* (see Johnson et al. (1999), *Science* 284: 802-804). Unfortunately, little is known about this trematode (*Ribeiroia* sp.), its life cycle, distribution, or role in the limb abnormalities observed in other species or sites. Abnormalities in amphibians from the western U.S. have been reported throughout this century from Montana, Idaho, Colorado, Washington, Oregon, and California. Each year new with amphibian abnormalities are recorded across these states (NARCAM 1999; Lunde, unpublished data). Neither the cause of abnormalities at these sites nor the reason behind the apparent increase has been determined, although eutrophication appears to play a role in promoting malformations cause by *Ribeiroia*.

OBJECTIVES: The objective of the current study is to investigate the connection between *Ribeiroia* infection and deformities in amphibian species in the state of California. To this end, we propose to sample 20 sites for which we have recent or historical reports of deformed amphibians and up to 15 new sites and determine (1) their current status with respect to deformities, (2) the presence/absence and abundance of the trematode *Ribeiroia*, (3) the inter-annual fluctuations of malformations and *Ribeiroia* abundance at these sites and to (4) compare the abiotic and biotic characteristics of the affected and unaffected sites and comparisons across years.

RATIONALE FOR THE COLLECTION OF SPECIMENS: Voucher specimens of amphibians need to be collected to (1) examine for infection with trematode parasites (comparing frequencies of infection between normal and deformed specimens) and (2) detail the types of deformities present (facilitated via dissecting scope examination of specimens and x-ray photography).

DURATION OF COLLECTION : Larval and juvenile specimens will be collected between March and September, while adults will be collected during adult sampling events in the winter (January - March) or if present in the summer.

METHOD OF COLLECTION: Larvae, juvenile, and adult amphibians will be collected either by hand or with a dipnet, or occasionally using a seine net.

SPECIES TO BE COLLECTED AND APPROXIMATE NUMBER, STAGE : Our study focuses on larval and metamorphic amphibians, the least sensitive stages for collection. We will collect few, if any adult amphibians, and then only in the case of alternative, non-sexually mature stages not being present. Given the extremely high mortality rate accompanying the nature of the deformities we're investigating, we do request permission to collect all deformed specimens encountered. Aquatic snails will also be collected as trematode hosts, typically of families Physidae and Planorbidae. Species: *Pseudacris regilla*, *Bufo boreas*, *Taricha torosa*, *T. granulosa*, *Rana catesbeiana*, *Ambystoma macrodactylum*.

SPECIES	NO. SITES	NO. LARVAL	NO. JUVENILE	NO. ADULTS
Pacific treefrog				

Pseudacris regilla	35	40	50	10	
California newt*					
Taricha torosa	14	40	0	2	
Western toad					
Bufo boreas	12	40	30	2	
American bullfrog					
Rana catesbeiana	10	20	30	4	
Rough skinned newt					
Taricha granulosa	5	50	0	2	
Long-toed salamander**					
Ambystoma macrodactylum		4	25	0	0

Table 1. Maximum estimated take per site for each amphibian species broken down by life history stage. The number of sites at which the given species is expected to be sampled is also indicated. Table does not show take of deformed specimens, for which we request permission to collect all such specimens encountered (maximum 100 larvae/ juvenile per species).

*Note: this species will not be collected in Monterey Co as requested by DFG in 2007.

**Note: this species will only be collected in Shasta County and NOT in Santa Cruz Co.

APP#10103 - Niche use of the moss *Antitrichia californica* on Blue Oak trunks

Project Dates: May 2008 to May 2009

Principal Investigators: Benjamin Carter

Affiliations: University of California, Berkeley

Project Abstract

The specific aims of this project are to first compare demographics of *Acanthurus bahianus*, *A. coeruleus* and *A. chirurgus* (Caribbean) with *A. nigrofuscus*, *A. lineatus* and *A. olivaceus* (Indo-Pacific) using size at age estimates and mean life span estimates in populations from equal habitats. The following questions will be addressed: Are intra-specific growth comparisons similar?

APP#19306 - An Integrative Approach to Understanding Speciation in Salamanders of the *Ensatina eschscholtzii* Complex

Project Dates: Jan 2009 to Jan 2009

Principal Investigators: Tom Devitt

Affiliations: University of California, Berkeley

Sponsor

NSF 641078 \$280,002.00

Project Abstract

Although decades of analysis of both allozymes and mitochondrial DNA have provided a fine-scale view of spatial patterns of genetic differentiation in *Ensatina*, we are still lacking a vital component of *Ensatina* history - a high-resolution species tree inferred from gene trees for multiple unlinked loci. Equipped with newly-isolated molecular markers and recently-developed, coalescent methods for inferring phylogeny and demographic history, we are now poised to test explicitly predictions about historical demography stemming from the prevailing ring species interpretation. Our integrative approach will enhance understanding of the history of the lineages that comprise the ring species and generate new insights into the causes and consequences of

establishment of reproductive isolation in this textbook example of speciation in action.

APP#19535 - Ecophysiological responses of *Heteromeles arbutifolia* to heatwaves

Project Dates: Feb 2009 to Feb 2009

Principal Investigators: Michal Shuldman

Affiliations: University of California, Berkeley

Project Abstract

My research focuses on common native woody plant *Heteromeles arbutifolia* (Rosaceae). I am interested in determining if populations of *Heteromeles* growing in varied environments will have different responses to climate change. Understanding how climate change will affect plant species is integral to determining the repercussions of global warming. Models predict that plants unable to shift their range (i.e. disperse) in concert with climate will be exposed to higher temperatures and more extreme heat days. Within California, the heatwave season is expected to increase 5-13 weeks. There have been numerous studies examining the effects of increased average temperatures on plants in California and elsewhere but, we know very little about the impact of increased extreme temperatures on the terrestrial biosphere. For this project I want to monitor *Heteromeles* plants throughout the year for water status, photosynthesis, etc. In addition, I will monitor plants during extreme heat days. I am especially interested in extreme heat days during the spring and fall, because we do not know if in the future the heatwave season will start earlier or end later, or both. Finally, I would like to collect fruit to use in a greenhouse study at UC Berkeley.

APP#19637 - Flowering time & habitat preference in coastal columbines *A. formosa* & *A. eximia*

Project Dates: Apr 2009 to Apr 2009

Principal Investigators: Justen Whittall

Affiliations: Santa Clara University

Project Abstract

Temporal isolation and habitat differentiation are two driving forces of speciation. We are examining the coordinated changes in flowering time and serpentine affinity in *Aquilegia formosa* and its sister species, *A. eximia*. The former flowers in early spring (March-May) and is typically found in the shade of moist, north facing slopes throughout western North America from northern Baja to southern Alaska. Whereas, the latter species flowers during the late summer and into fall (July-Sept) and is endemic to serpentine seeps of the central and north-coast range of California. We are characterizing the distinct developmental and phenological differences between these two species at several sites in southern Santa Clara county. This, in combination with a common garden experiment housed at Santa Clara University, will help elucidate the relative roles of these two potential isolating mechanisms in these columbines.