



# School of Environmental and Forest Sciences

UNIVERSITY *of* WASHINGTON

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College of the Environment

Research Newsletter

Volume IV, Issue 1

NEWS: Cost Share changes, Forest Service accounting blackout, Complex Grants.....Page 1

OPPORTUNITIES:.....Page 2

AWARDS: July.....Page 2

August..... Page 4

September.....Page 13

PROPOSALS SUBMITTED: July.....Page 20

August..... Page 26

September.....Page 31

## News

**Cost share** plans must be finalized prior to submission of a proposal to OSP. Beginning immediately, “finished plans” means identifying the budget numbers that will be used for the various elements from within the University, as well as support letters from any 3<sup>rd</sup> party cost share contributions. This extra step may seem unnecessary pre-award, but it is the only way we can be sure that the sources are appropriate and that we are not planning to spend any cost share element more than once.

**The Office of Research** has a team to provide assistance to researchers who are preparing submissions on large, complex grants (Complex Proposals Management Group). If you are planning a large, multi-

unit/multi-institution project, they may be able to provide assistance on everything from grant writing skills, proposal review, team meeting facilitation and advice on team composition. Ideally, they should be brought in at least 8 weeks before the proposal deadline. An application is required; contact Sally for more information, or plan to attend a presentation at the November 16 Faculty Brown Bag Series.

**The Forest Service** has announced plans to implement a new accounting system. During the transition between old and new systems (October 24 – mid-November), there is be a period of time where neither system will be available and transactions and payment will be processed only on an emergency basis. This should have little to no impact on the University of Washington, but if you have concerns, contact Sally Morgan or your fiscal analyst to make sure nothing goes awry.

## Opportunities

As much as possible, new opportunities will be sent directly to those faculty who are most apt to be interested in each announcement. To be most effective, you need to make sure that Sally Morgan (206-897-1754 or [slm@uw.edu](mailto:slm@uw.edu)) is aware of the areas you are interested in, especially if you are seeking new areas or directions. The obvious source of interests is the faculty list on the SEFS website, but any additional guidance you can provide will make the targeting more effective.

## Awards July, 2012

Application Number: A77451  
Faculty Member: Gordon Bradley  
Role: Principal Investigator  
Title: **Pacific NW Coop Ecosystem Studies Unit Program Support**  
Agency: USDI National Park Service  
Period: 9/30/2007 - 9/29/2012  
Amount: \$7,206  
Non-Competing Supplement

The purpose of this supplement is to provide continued financial assistance to support the Pacific Northwest Cooperative Ecosystem Studies Unit, co-led by SFR faculty Gordon Bradley, and the NPS Research Coordinator, to provide high-quality research, technical assistance and education to federal natural-resources managers.

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Application Number: A75832  
Faculty Member: Gregory Ettl  
Role: Principal Investigator  
Title: **Stand Management Cooperative**  
Agency: Oregon Department of Forestry  
Period: 1/1/2012 - 12/31/2012  
Amount: \$37,517  
Supplement and Extension

2012 Membership Dues to Stand Management Coop from Oregon Department of Forestry, State of Oregon.

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Application Number: A76123  
Faculty Member: Soo-Hyung Kim  
Role: Principal Investigator  
Title: **Development and Dissemination of Agro-meteorological Information Systems**  
Agency: Rural Development Administration  
Period: 6/1/2012 - 12/31/2013  
Amount: \$103,400  
New

The objective of this collaborative project is to 1) provide and disseminate agro-meteorological information for climate change adaptation in agricultural communities, and 2) develop tools to couple agro-meteorological data products with agricultural systems models for secure and sustainable agricultural productivity in a changing climate. Critical components in the proposed research are to 1) survey and collect existing data products for provision of agro-meteorological information services and link them with agricultural models, 2) link the agro-meteorological data with agricultural production models, and 3) test model performance, apply the models for current and future climate scenarios, and disseminate relevant agro-meteorological information and model outputs.

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Application Number: A76939  
Faculty Member: Miranda Wecker  
Role: Principal Investigator  
Title: **Data entry and Committee Facilitation Support**  
Agency: Clallam County  
Period: 1/1/2012 - 6/30/2012  
Amount: \$22,124  
Non-Competing Supplement

The North Pacific Coast Lead Entity (NPCLE) requires technical assistance for entering new and historical project information into the Habitat Work Schedule (HWS) program it utilizes as a monitoring and public access portal for its contracted activities with the Salmon Recovery Funding Board.

The North Pacific Coast Marine Resources Committee (NPC MRC) requires public meeting facilitation support for researching and preparing meeting materials and documenting and preparing meeting records.

Olympic Natural Resources Center (ONRC) will provide NPCLE with professional services necessary to compile historical watershed and salmon restoration project records undertaken in WRIA 20 and to enter this information into the HWS on-line data portal. They will also provide meeting facilitation support in the form of researching and compiling meeting documents and assisting in documentation of meeting proceedings for the North Pacific Coast Marine Resources Committee.

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Application Number: A77277  
Faculty Member: Miranda Wecker  
Role: Principal Investigator  
Title: **North Pacific Coast Lead Entity Neutral Forum**

Agency: Washington State Recreation and Conservation Office  
Period: 7/1/2012 - 6/30/2013  
Amount: \$55,000  
New

The University of Washington's Olympic Natural Resources Center proposes to facilitate two neutral forums for development of salmon habitat restoration plans on the western side of the Olympic Peninsula. One neutral forum called the "North Pacific Coast Lead Entity" (NCPLE) is responsible for the development of ranked lists of restoration and protection projects in western Clallam and Jefferson counties. The other forum operates in the Quinalt region. Both must be based on the best available science, community principles, and the integration of environmental and ecological interests.

UW-ONRC will assist the forum members in scientifically-grounded and objective monitoring of the implementation of the selected projects. UW-ONRC will also prepare a compilation of restoration project outcomes in the state-wide Habitat Work Schedule data base; and coordinate with other relevant forums in the region that are addressing endangered salmon recovery efforts.

## Awards August, 2012

Application Number: A77790  
Faculty Member: Ernesto Alvarado  
Role: Principal Investigator  
Title: **Fire, Climate, and Smoke Research**  
Agency: USDA Forest Service  
Period: 7/19/2010 - 12/31/2014  
Amount: \$72,500  
Supplement and Extension

This Joint Venture Agreement will support the USFS Atmosphere and Fire Interactions Research Team (AIRFire) research to improve understanding of the role of weather and climate in fire and other ecological disturbances and to develop decision support tools for ecosystem management, fire operations, planning, and smoke management based on meteorology, air quality engineering, and climate dynamics.

The purpose of this agreement is to advance climate, fire, and smoke science in support of building a better understanding of how fire is affected by and affects the atmosphere, including weather and climate, and how this knowledge can be used to develop scenarios and tools to better inform land managers.

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Application Number: A76511  
Faculty Member: Stanley Asah  
Role: Principal Investigator  
Title: **Role of Motivations on Involvement and Participation in Stewardship Organizations: Case of Greater Seattle**  
Agency: USDA Forest Service  
Period: 10/1/2010 - 12/31/2014  
Amount: \$15,000  
Non-Competing Supplement

Stewardship organizations continue to emerge and some blossoming across the Seattle-Tacoma area. These organizations are of various types, private, community-based, nonprofit, and governmental (city, county, state, federal, etc.). They seek to accomplish a variety of goals including restoration of degraded ecosystems and neighborhoods, preserving desired social-ecological conditions and landscapes, sustainable design, community coherence and bonding, etc. Preliminary examination of the missions of these stewardship organizations suggests that two dimensions of motivations, ecological and social, influence the creation and operation of these organizations. There are preliminary indications that both social and ecological motivations have equal influences on involvement and participation in these organizations and their activities. However, there is less thorough empirical evidence supporting this suggestion. Knowledge of what and to what degree motivates involvement and participation will enhance efforts to create and sustain stewardship within and beyond the Seattle-Tacoma area.

The Pacific Northwest Station of the USDA Forest Service is exploring various facets of stewardship organizations within the Seattle-Tacoma area as part of the Green Cities Research Alliance (GCRA). Their goal is to understand and enhance the structure and function of these organizations for the purposes of achieving social-ecological sustainability within the Seattle-Tacoma area. A secondary goal of the Pacific Northwest Station's efforts is to facilitate transferability of insights that may foster stewardship towards achieving social-ecological sustainability goals across the nation. Using a database of over 700 stewardship and sustainable design organizations, this study will deepen our understanding of the role that motivations and desired benefits plays in determining involvement and participation in these organizations.

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Application Number: A77630  
Faculty Member: Sally Brown  
Role: Principal Investigator  
Title: **Biosolids Information and Education Program**  
Agency: Northwest Biosolids Management Association  
Period: 7/1/2012 - 6/30/2013  
Amount: \$114,300  
Supplement and Extension

UW staff will continue to provide public information, regulation development, and technical support to the King County Biosolids program. As detailed in the Scope of Work, this will include the following: 1) providing public information through committee support, a community assistance/resource information center, information gathering, and assisting in the BW Biosolids Conference; 2) regulation development, including committee support and regulatory interpretation; 3) research and demonstrations to include W-170 group interaction and projects involving A. the fate of organic compounds in biosolids amended soils, B. Canola growth using biosolids, and C. lead arsenic and compost; 4) continuing special research projects with the King County Biosolids Program on Canola for Biodiesel, gravel pit, biosolids basics, Class A soil mixes, and organic contaminants; 5) attending NBMA general and board meetings.

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Application Number: A77884  
Faculty Member: Sally Brown  
Role: Principal Investigator  
Title: **Mountains to Sound Gateway**  
Agency: King County Department of Natural Resources and Parks

Period: 7/1/2012 - 6/30/2013  
Amount: \$40,000  
Supplement and Extension

This agreement is a continuation of a long-standing agreement between the King County Wastewater Treatment Division and the School of Forest resources. Dr. Brown will assist the KCWTD in determining appropriate biosolids application rates for commercial forest plantations. She will assist with questions on benefits and safety of biosolids use in commercial forestry. Biosolids application rate are based on a number of factors including soil nitrate concentrations. The focus of this year's research will be to measure variability in soil nitrate concentrations across application units. This will be carried out by soil sampling in pits as well as across transects in three forest units. Results will be presented to KCWTD and stakeholders as required.

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Application Number: A78405  
Faculty Member: Douglas Deur  
Role: Principal Investigator  
Title: **Community Histories of Otter Cove and Isle au Haut, Acadia National Park**  
Agency: USDI National Park Service  
Period: 7/21/2008 - 7/21/2013  
Amount: \$12,000  
Supplement and Extension

The purpose of this Task Agreement is to facilitate cooperation between the National Park Service and the University of Washington in producing ethno-historical studies of two traditional use areas within Acadia National Park - Otter Cove (on Mt. Desert Island) and the island of Isle au Haut. Over the course of this research, researchers from both organizations will compile archival materials and conduct oral history interviews to document the histories of these two areas and their associated communities as they relate to lands and resources within Acadia National Park. Separate research reports will be produced for Otter Cove and Isle au Haut, presenting the history of each community thematically, with particular attention to the uses of land and resources within what is today Acadia National Park. This research project is intended to inform the management of lands and resources within the park, facilitate consultations regarding resource management and public education, and aid the National Park Service in developing public interpretation of these areas.

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Application Number: A72245  
Faculty Member: Sharon Doty  
Role: Principal Investigator  
Title: **The Use Of Fungal And Diazotrophic Endophytes As A Means For Climate Change Mitigation And Adaptation In Agroeco**  
Agency: USDA  
Period: 6/16/2012 - 6/15/2016  
Amount: \$750,000  
New

By utilizing beneficial microbial plant symbionts to increase water use efficiency, provide essential nutrients, and improve plant growth and stress tolerance, the overall goal of this project is to develop tangible options to mitigate climate change impacts on agriculture and forestry more quickly than could

be reached by relying solely on crop improvement approaches via breeding or transgenics. Using corn, rice, and Douglas-fir as model systems, we will 1) develop the most effective nitrogen-fixing endophytes for improved growth with minimal need for chemical fertilizers; 2) screen fungal endophytes to impart stress tolerance and increased water use efficiency; 3) assess the significance of endophytic symbiosis in mitigating the impacts of climate change; and 4) develop outreach programs and educational opportunities to insure that the knowledge gained in this research is widely disseminated. Through this study, we will develop optimized inoculum and methods for improved plant growth, stress tolerance, biomass, and yield of grain crops and timber forests with limited inputs of nutrients and water. Elevated CO<sub>2</sub> stimulates crop growth most when N and water are not limiting. Thus, plants with symbiotic N fixation are most likely to capitalize on the benefits of increasing atmospheric CO<sub>2</sub>. We will evaluate the physiological benefits of the endophytic symbionts identified from Aim 1 and 2 under current and elevated CO<sub>2</sub> conditions. Utilizing process-based crop physiology models and life cycle assessments, we will then evaluate agro-ecological and economic benefits of the use of endophytic symbionts. Outreach and dissemination of the research findings will also be a priority, through our teaching both at the university level and to K-12 groups and teachers, training graduate students and postdoctoral fellows, speaking frequently at international conferences, participation in key roles in the International Symbiosis Society, and engaging the agricultural community directly.

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Application Number: A74628  
Faculty Member: Gregory Ettl  
Role: Principal Investigator  
Title: **Stand Management Coop**  
Agency: King County Wastewater Treatment Division  
Period: 1/1/2012 - 12/31/2012  
Amount: \$7,500  
Supplement and Extension

2012 Membership dues to Stand Management Coop from Metropolitan King County.

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Application Number: A75042  
Faculty Member: Gregory Ettl  
Role: Principal Investigator  
Title: **Establishing the Mount Rainier Institute at the Center for Sustainable Forestry at Pack Forest**  
Agency: USDI National Park Service  
Period: 5/25/2012 - 11/30/2014  
Amount: \$30,000  
New

This collaborative project will lay the groundwork for a partnership between Mount Rainier National Park (MORA) and the University of Washington (UW) to plan and launch a residential environmental education program entitled "The Mount Rainier Institute." The Institute will initially provide residential environmental education programs and services for school children during the school year but, over time, will grow to include year round programming for families and adult learners. In particular, the Institute will emphasize programming and services designed to address two key societal issues: 1) engaging diverse youth in outdoor and environmental education potentially leading to higher education and career pathways in related fields; and 2) increasing youth competency in math and science, particularly among traditionally underrepresented students. The Institute will be located at the

University of Washington's Center for Sustainable Forestry at Pack Forest. This facility is just 30 minutes from Mount Rainier National Park. Students will benefit not only from the opportunity to study forest ecology and management at Pack Forest—a research and demonstration forest showcasing various best practices in forest management—but also from the opportunity to make multiple visits to MORA and other regional destinations to learn about geology, ecology, Northwest heritage, and sustainability in magnificent outdoor classrooms. During Phase 1 of this project (FY 2012), the UW and National Park Service will work together to hire a Program Manager to oversee the development of a business plan for the implementation and operation of the Institute. The business plan will assess the feasibility of the project and describe components including, but not limited to, the following: 1) Institute mission, purpose and goals; 2) partner roles and responsibilities; 3) curriculum development; 4) costs of facilities, utilities, and other supporting infrastructure; 5) staffing and human resources; 6) marketing and advertising; 7) potential audience; and 8) budget (income and expenditures). This Task Agreement funds Phase 1. Phase 2 (FY 2013) will be devoted to preparations for the first year of operations based on the recommendations emerging from the business plan. This will include activities such as: procuring funding; developing curriculum; and completing marketing materials. Phase 3 (FY 2014) will involve logistical preparations for operation of the Institute: setting up business administrative structure and systems; hiring instructors; logistical preparations (i.e., transportation, facilities, and equipment); and student registration. The result will be full implementation of a world-class environmental education program beginning in the fall of 2014.

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Application Number: A77665  
Faculty Member: Gregory Ettl  
Role: Principal Investigator  
Title: **Stand Management Coop**  
Agency: Pilchuck Tree Farm  
Period: 1/1/2012 - 12/31/2012  
Amount: \$11,672  
Supplement and Extension

2012 Membership Dues to Stand Management Coop from Pacific Denkmann Tree Farm

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Application Number: A74242  
Faculty Member: Jerry Franklin  
Role: Principal Investigator  
Faculty Member: Jim Lutz  
Role: Co-Investigator  
Title: **Integrated, observation-based carbon monitoring for wooded ecosystems in Washington, Oregon, and California Park**  
Agency: Oregon State University  
Period: 11/1/2011 - 6/30/2012  
Amount: \$33,304  
Non-Competing Supplement

This is an additional subaward to University of Washington with a total requested budget of \$33,304. This sub-award transfers funds currently in the OSU budget for the field GPS data collection UW. Money is already in the existing UW sub-award for the salary to perform post processing of the GPS data to be collected.

This project is an approved, funded project with an existing sub-award from OSU to UW. In the original proposal budget, we planned to have OSU PI Robert Kennedy manage this field work. Since then, we have realized that managing a field technician would be a unique activity for Kennedy during the period of the project, while UW co-I James Lutz will be managing several field crews during this period. Transferring this funding to UW allows for more efficient management of this task and allows Lutz to combine this funding with separate funding to hire an experienced and qualified person since many of the best candidates seek full summer employment.

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Application Number: A77471

Faculty Member: Jerry Franklin

Role: Principal Investigator

Faculty Member: Jim Lutz

Role: Co-Investigator

Faculty Member: Van Kane

Role: Co-Investigator

Title: **Relationship between Fire History and Forest Structure at Crater Lake National Park Using LiDAR**

Agency: USDI National Park Service

Period: 9/1/2011 - 10/1/2014

Amount: \$3,948

Non-Competing Supplement

There is a strong need for research at Crater Lake National Park and other parks aimed at quantifying long-term effects of fire on forest structure across broad spatial scales to facilitate the development and evaluation of fire management objectives. The goal of this research is to use existing LiDAR data to understand how time-since-fire (TSF) and fire severity controls patterns of forest structure development across elevation and compositional gradients. This research directly addresses three key impediments related to the successful implementation and monitoring of fires for resource objectives. First, the data will provide the basis for evaluating the effectiveness of contemporary fires at restoring and/or maintaining landscape-scale forest structures. Secondly, it allows fire managers to develop relationships between burn severity signatures and long-term successional probabilities for modeling future landscape patterns. Third, spatially explicit data on forest structure will be useful for managing for a wide variety of resource goals such as wildlife habitat or watershed health for endangered fisheries.

Our specific research objectives are: (1) Determine how post-fire development of forest structure varies along gradients of elevation, fire severity, and TSF by directly mapping stand development stage, canopy height, height to live crown, canopy vertical structure, basal area, and gap and patch size; (2) Compare forest and patch structures created by contemporary wildland fires with pre-20th century fires; (3) Develop park-wide atlases of fire severity measurements and forest structural attributes.

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Application Number: A78401

Faculty Member: Joshua Lawler

Role: Principal Investigator

Title: **Identify Potential Barriers, Corridors, and Refugia for Species in the Face of Climate Change**

Agency: USDI National Park Service

Period: 9/1/2011 - 3/1/2015

Amount: \$163,999

Non-Competing Supplement

In the coming century, climate change will result in shifts in distributions of plants and animals, which are likely to significantly alter the flora and fauna of National Parks. Understanding where changes are likely to be the greatest, where refugia may occur, and where landscape connectivity could be increased will help managers and planners facilitate climate-change adaptation for many species. To increase this understanding, we will conduct a climate-change assessment for the North Coast and Cascades Network. The assessment will identify climate refugia as well as barriers to, and opportunities for species movements in a changing climate and will be based on projected changes in climate, vegetation, and the distribution of key focal species.

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Application Number: A75063

Faculty Member: Jim Lutz

Role: Principal Investigator

Title: **Annually resolved impacts of fire management on carbon stocks in Yosemite and Sequoia & Kings Canyon National Parks**

Agency: USDI National Park Service

Period: 8/5/2010 - 12/31/2013

Amount: \$36,398

Supplement and Extension

Forest biomass on Sierra Nevada landscapes constitutes one of the largest carbon stocks in the state of California, and the stability of that carbon stock is tightly linked to fire and the ecological factors that drive the fire regime. Recent research suggests that over a century of fire exclusion and fuel accumulation in Western forests have actually reduced the amount of carbon that such suppressed landscapes store, while increasing the likelihood of catastrophic, stand-replacing fire. For over 30 years, fire management at Yosemite (YOSE) and Sequoia and Kings Canyon (SEKI) National Parks has led the nation in restoring fire to park landscapes, however the impacts of that restoration on the stability and magnitude of carbon stocks are not yet known. This work proposes to quantify these effects over a 30 year timescale by leveraging detailed fire history, vegetation, and fuels datasets at YOSE and SEKI to quantify biomass in areas where fire has been suppressed vs. areas where fire has been restored.

Our dynamic approach to quantifying the carbon contained in trees will also involve dendrochronological analyses of recent tree growth. Although the dynamic approach will likely yield the best accounting of carbon pool dynamics over time, both the static and dynamic approaches need to be included in this project for the following reasons: 1) much of the information developed from the static approach (A51771) underpins the dynamic approach; 2) conducting the more complex dynamic approaches will allow us to evaluate how much more information is generated given the greater expenditure of time and funding required for the latter; and most importantly 3) the static approach is very feasible for any land management unit that has archived comprehensive vegetation plot data (e.g. FMH and FIA plots), and by “validating” this approach through the dynamic approach in our proposed study, potential users of these methodologies in other places can better decide which approach is best for their situation.

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Application Number: A76033

Faculty Member: L. Monika Moskal

Role: Principal Investigator

Title: **Broad Scale Stand Establishment Of Research Plots For Inventory And Tree Species Identification Using Lidar**

Agency: USDI Bureau of Land Management  
Period: 5/1/2012 - 5/1/2014  
Amount: \$130,000  
Supplement and Extension

Precision forestry leverages advanced sensing technologies and analytical tools to support site-specific economic, environmental, and sustainable decision making for the forestry sector in a timely and effective way. The discipline is highly reliant on accurate, timely and detailed forest inventory characterization and structural information, spanning extensive land holdings. Discrete, high density, lidar point clouds derived from aerial laser scanning have become invaluable datasets for precision forestry applications. This project will establish a 2-state sampling system acquiring individual decimeter tree mapping with real-time positioning using Global Positioning System (GPS) for forest inventory (and potential species identifications) at the Rouge River research sites in the state of Oregon, for the purpose of acquiring individual tree location from lidar data, forest inventory driven habitat assessment and leaf area. Field plot data will be specifically utilized for extraction of Lidar-driven inventories and compared to traditional methods of forest inventory. Moreover, the new innovative aspect of the research proposed in this project will focus on deriving forest inventories, leaf area and tree species information from lidar for habitat assessment. This will serve as the basis for future work to use the data to calibrate other remote sensing approaches as well as explore additional potential of the data in conjunction with the wide array of scientific project at the Rouge River research site.

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Application Number: A76477  
Faculty Member: L. Monika Moskal  
Role: Principal Investigator  
Title: **Spatiotemoral Assessment of Wetlands and Ponds in Douglas Co**  
Agency: Foster Creek Conservation District  
Period: 6/1/2012 - 6/30/2013  
Amount: \$174,808  
New

The watershed wide project will include mapping the hydroperiod (inundation timing and duration) of wetlands and will be used to classify wetland types. The project will also measure and quantify changes to the hydroperiod and composition of wetland types in the watershed over the last forty years. Using this information the project will assess the dependence of individual wetlands and ponds on groundwater. The project will also assess the presence of vernal pools not tied to groundwater, but to temperature and precipitation patterns. The diversity of species in vernal pools surveyed elsewhere is extremely high, and includes large numbers of endemic invertebrate species. These pools have the potential to be greatly affected by climate change. The assessment will provide knowledge for development of strategies to conserve the biodiversity supported by these systems, and prioritize and/or help stratify wetlands for further study and conservation action. The project will publish the resulting wetland inventory through an interactive online map

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Application Number: A71334  
Faculty Member: Sarah Reichard  
Role: Principal Investigator  
Title: **Creating A Georeferenced Database For The Collections At The University Of Washington Botanic Gardens**

Faculty Member: Soo-Hyung Kim  
Role: Co-Investigator

Agency: Institute of Museum and Library Services  
Period: 8/1/2012 - 7/31/2014  
Amount: \$138,371  
New

The Washington Park Arboretum is a 230 acre collection of well-documented woody plants from temperate climates around the world. The collection, developed for over 75 years, has significant research and teaching value but the data are held in multiple databases and spreadsheets with access limited mostly to those maintaining them. In the 1950s a 100 ft. by 100 ft. grid system was installed and in the 1980s, paper maps of the specimen locations were developed from the grid. All management of the collections is still done using these maps and, as plants have been accessioned and deaccessioned and the maps redrawn, significant error has been introduced. A recent survey has indicated that the grid system may also be unreliable. We seek funding to remap the collections in the Arboretum, and integrate the data into a single georeferenced database with open access.

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Application Number: A77661  
Faculty Member: Luke Rogers  
Role: Principal Investigator  
Title: **Data Processing And Field Sample Design For Medford, Or Lidar Acquisition And Related Modeling To Characterize Forest Structure**  
Agency: USDA Forest Service  
Period: 7/1/2012 - 6/30/2017  
Amount: \$55,000  
New

The primary purpose of the proposed project is to process LIDAR point data and canopy surfaces to derive descriptive statistics for a LIDAR acquisition centered on Medford, OR. The area covered by the acquisition (approx. 1,000,000 acres) includes federal land managed by the Bureau of Land Management (BLM) and USDA Forest Service (USFS) as well as privately-owned lands. In addition, SEFS will apply a LIDAR-optimized sampling protocol, built on earlier work by Hawbaker et al. (2009) and a prior SEFS-PNW project, to develop sample locations (plot locations) that sample the full range of variability in forest types over the acquisition area. Finally, SEFS will use survey-grade GPS receivers to collect accurate locations for plots in various study areas (not in the Medford, OR area) to support additional analysis being conducted by PNW scientists.

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Application Number: A78160  
Faculty Member: Eric Turnblom  
Role: Principal Investigator  
Title: **Rotation Age Wood Quality analysis in Type II Installations**  
Agency: USDA Forest Service  
Period: 8/16/2012 - 8/15/2013  
Amount: \$3,600  
New

This project is to determine the relationship of rotation age on wood quality for Douglas-fir and to understand how silvicultural treatments may be used to influence the stiffness, and hence quality, of

Douglas-fir by conducting an analysis on existing Stand Management Cooperative Type II Installation data. Existing data will be updated and summarized prior to analysis.

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Application Number: A76673

Faculty Member: Aaron Wirsing

Role: Principal Investigator

Title: **The effects of environment and animal behavior on reliability of Argos satellite telemetry locations for wolverines in the North Cascades of Washington**

Agency: USDA Forest Service

Period: 3/16/2012 - 9/24/2012

Amount: \$20,668

New

Use of automated telemetry systems, particularly Argos-compatible satellite transmitters, to track wide-ranging terrestrial species in remote areas has become widespread in recent years as systems become more affordable and improvements are made in transmitter design, satellite constellation, and data-processing techniques. However, there has been little published research evaluating Argos location reliability in terrestrial systems, and none with the new Kalman filtering algorithm. The North Cascades wolverine (*Gulo gulo*) program uses Argos-compatible collars to track its animals in an area characterized by highly variable vegetation and topography that may in turn have variable effects on Argos location reliability. My objectives are to evaluate the effects of multiple environmental variables as well as animal behavior on the accuracy and precision of Argos locations in this study area. This information will be used to determine the scales at which Argos locations for wolverines are useful and where bias in location quality or quantity may exist. A better understanding of the magnitude of error attributable to the Argos system, animal behavior, and environmental factors will help inform decisions about the appropriateness of Argos technology for specific research applications.

## Awards September, 2012

Application Number: A74408

Faculty Member: Ernesto Alvarado

Role: Principal Investigator

Faculty Member: Robert Norheim

Role: Co-Investigator

Title: **Archival of data from JFSP-funded projects conducted by the Fire and Environmental Research Applications Team**

Agency: USDI Bureau of Land Management

Period: 6/1/2012 - 9/30/2013

Amount: \$48,727

Non-Competing Revision

Faculty Member: David Peterson

Role: Co-Investigator

The Fire and Environmental Research Applications Team (USDA Forest Service, Pacific Northwest Research Station, Pacific Wildland Fire Sciences Lab) (FERA) proposes to document and archive datasets from eleven (11) completed JFSP-funded projects. FERA scientists have received funding for numerous projects since the inception of JFSP, and these eleven in particular have generated high quality datasets that are potentially valuable to other researchers. In addition, the two Co-PIs have a long track record of successful bioinformatics and metadata projects, funded by the Olympic Natural Resources Center,

Federal Geographic Data Committee , National Biological Information Infrastructure, National Park Service, and JFSP. These projects have made numerous valuable datasets available online via PNWIN and FIREHouse, and developed over 800 metadata records for geospatial and biological datasets.

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Application Number: A77096

Faculty Member: Ernesto Alvarado

Role: Principal Investigator

Title: **Wildland Fuel and Fire Management in a Changing Climate**

Agency: USDA Forest Service

Period: 5/11/2009 - 3/31/2014

Amount: \$914,186

Non-Competing Supplement

The amendment to the Joint Venture Agreement with the USFS proposed here will generate, develop, apply and transfer science-based information, strategies and tools for fire management in public, and Tribal lands.

Specific objectives for this amendment are to:

- Evaluate physical properties of fuels and fire behavior to parameterize and validate the Wildland-Urban Fire Dynamics Simulator (WFDS) in Florida as part of the large scale RxCadre project.
  - Collect and analyze research data conducted in WUI fires at the San Diego County, California and NW Texas using the NIST-WUI 2 GIS-based protocols to provide validation of the WFDS and improve the fuelbed inputs for the WFDS model in homogeneous fuelbeds.
  - Continue the integration of FVS and FCCS to generate dynamic fuelbeds from stand data from FIA and CFI plots, and different silvicultural treatments.
  - Study the effectiveness of fuel treatments on wildfire severity at the Wallow Fire in areas surrounding the communities near the Apache-Sitgraves National Forest and the White Mountain Apache Reservation in Arizona.
  - Continue during the summer season a study to characterize the combustion environment of slash pile burning in the Okanogan-Wenatchee National Forest to improve the efficiency of pile burning in the western US.
  - Develop and implement a method for sensitivity testing of Rothermel, FCCS and WFDS fire models to changes in environmental conditions such as fuel, wind, and slope.
  - Continue the analysis and comparison of the best non-stationary statistics methods of analyzing long-term ecological datasets and use of statistical tests of stationary and wavelet analysis to ecological time series.
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Application Number: A78494

Faculty Member: Gordon Bradley

Role: Principal Investigator

Title: **Pacific NW Coop Ecosystem Studies Unit Program Support**

Agency: USDI National Park Service

Period: 7/15/2012 - 3/1/2016

Amount: \$36,323

New

The University of Washington (UW) and the National Park Service (NPS) have been collaborating since 2001 to host and administer the Pacific Northwest Cooperative Ecosystem Studies Unit (PNW CESU)

program. The PNW CESU is part of the national CESU network, which is a consortium of federal agencies, universities, and other partners with a mission to work together on research, technical assistance, and education projects to enhance understanding and management of natural and cultural resources. Currently, staff at the PNW CESU is also servicing some of the administrative and business needs for the Great Basin Cooperative Ecosystem Studies Unit (GB CESU), also a member of the national CESU network. This project is a continuing collaboration between UW and NPS to support administrative functions of the PNW CESU and GB CESU including public outreach and development of financial assistance agreements for a wide variety of technical, research, and educational projects relevant to the mission of the CESU network. The project objectives are to provide program support to the PNW CESU, including funding for the Program Coordinator (PC). The duties of the PC include acting as the primary point of contact for the 28 PNW CESU members, providing assistance to the NPS Research Coordinator (RC) in reviewing and processing Task Agreements and modifications, overseeing the maintenance of the unit's project tracking database and website, managing the production of newsletters, and providing logistical support in holding periodic partner meetings. The PC and NPS RC also work together in reviewing and processing Task Agreements and modifications for the GB CESU, and maintaining a GB CESU project tracking database. NPS will be substantially involved in collaborating with UW to review and process Task Agreements, produce summary reports, provide advice on maintaining databases and on web site maintenance, and by coordinating on partner meetings and newsletters for the PNW CESU. Public benefits include cooperative research concerning the resources of the National Park System and other federal agencies, maintenance of a public web site that contains current and searchable information on all research, technical assistance, and education projects funded by NPS and other federal agencies through the PNW CESU, publicly-available newsletters (posted on the web site), and annual reports to Congress for both the PNW and GB CESUs.

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Application Number: A77547

Faculty Member: Douglas Deur

Role: Principal Investigator

Title: **Cultural Landscape Inventory of the Chulitna River-Sixmile Lake Area**

Agency: USDI National Park Service

Period: 8/15/2011 - 8/13/2014

Amount: \$68,310

Non-Competing Supplement

This project is a collaborative effort to conduct consultation, planning, and completion of a Cultural Landscape Inventory (CLI) for the Chulitna River-Sixmile Lake area within Lake Clark National Park and Preserve (LACL). The Chulitna-Sixmile Lake cultural landscape is important to present-day Dena'ina and may be threatened by proposed development in the immediate area. For the past 100 years, the people of Nondalton have largely derived their subsistence fish, game, and water fowl from the Chulitna River and Sixmile Lake drainages. Archeological sites in the nearby Kijik National Historic Landmark Archeological District document sites associated with at least 900 years of Dena'ina history. A CLI will be undertaken to document the entire array of historic and contemporary resources of cultural significance to the Dena'ina in the Chulitna and Sixmile drainages, including the Tazimina River and the upper Newhalen River. This effort will be supported by a current partnership between LACL and the Nondalton Tribal Council to complete an Integrated Resource Management Plan for the study area. National Park Service (NPS) staff will work with University of Washington (UW) in planning the initial consultation with the state of Alaska, Nondalton Tribal Council, the Kijik Corporation, and other interested tribes. UW staff will be responsible for data collection and analysis, and will produce a final report in collaboration with NPS. The CLI can be used by park associated tribes to support their efforts to identify and preserve

traditionally significant resources. The project report and products can be used by other NPS units and other resource management agencies as a template to help inventory important ethnographic landscapes.

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Application Number: A67186

Faculty Member: Ivan Eastin

Role: Principal Investigator

Title: **Research opportunities in forest products marketing as a result of global green consumerism**

Agency: USDA

Period: 1/12/2012 - 1/11/2017

Amount: \$202,500

New

Faculty Member: Indroneil Ganguly

Role: Co-Investigator

The international competitiveness of the US forest products industry is affected by the interplay of various economic, social, environmental and political factors. The proposed graduate students' training program aims to provide students with the necessary skills and exposure to understand the contemporary issues and externalities that affect the US forest products' industry and assess their impact on international competitiveness. Curricular emphasis will be given to developing a deeper understanding of phenomenon like illegal logging and global warming which have resulted in an increased interest in 'green' living and environmental procurement policies, globally. The students will be encouraged to explore the linkages between the international competitiveness of the US forest products industry and trade restrictions, including public procurement policies, green building programs and various tariff/non-tariff barriers (thereby addressing USDA's strategic goals 1 and 2 for FY 2007-2012). As a result of developing a strategic partnership with a Native American college, this program will identify qualified students from tribal communities to transfer the necessary technical and forestry business skills into Native American communities.

The proposed training program will train three masters and one doctoral student in the area of 'Agricultural Management and Economics' (TESA no. 4) with specialization in forest trade policy. The disciplinary focus for the program is agricultural marketing and management (Code M) and international competitiveness of the forest products industry (Code I). The program includes relevant interdisciplinary components designed to enhance students' understanding of environmental science, international marketing, decision modeling and public policy analysis (Code G).

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Application Number: A78029

Faculty Member: E. David Ford

Role: Principal Investigator

Title: **Diameter growth of western hemlock**

Agency: USDA Forest Service

Period: 9/16/2012 - 12/15/2013

Amount: \$67,164

New

An important challenge on the Olympic Experimental State Forest is to grow western hemlock trees that have the diameters of trees found in old-growth forests, some 39 inches, but to do this in a shorter time than might typically have been taken in old-growth forest itself. Various techniques might be anticipated to increase diameter growth, most notably thinning. Typically thinning trees from a forest stand has the effect of increasing diameter increment. However, the intensity of thinning and the regularity of its

application to achieve trees of 39 inches diameter is not known because most thinning experiments have been conducted on forests where the maximum diameter is less than 30 inches, i.e., typical of the commercial forest production cycle that terminates after some 70 years.

In our research we will conduct retrospective analyses of tree diameter growth through analysis of tree ring growth. Ring samples will be obtained either by using standard tree cores or the IML Resistograph B-Series, a device that bores a small diameter hole into the tree and measures ring width through detecting changes in density. We will solve for models of diameter decline with age and see which perform best particularly for old and large trees that we can sample. This work should contribute to calibration of growth models in their application beyond the normal forest rotation age.

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Application Number: A71219

Faculty Member: Sergey Rabotyagov

Role: Principal Investigator

Title: **Climate and Human Dynamics as Amplifiers of Natural Change: A Framework for Vulnerability Assessment and Mitigation Planning**

Agency: National Science Foundation

Period: 6/1/2012 - 5/31/2017

Amount: \$314,581

New

In order to understand and accurately predict land use responses to potential climatic and economic policy changes, we propose to develop a field-scale economic model of joint choice of land use and cropping practices for the study area. Available remote sensing data will be used to classify fields by land use and crop choice over time. Availability of this data over time will allow us to incorporate crop sequence dynamics into the economic model of landowner behavior. In addition, we recognize the importance of and account for changes on both the extensive margin (transitions of land in and out of agricultural crop production), as well as the intensive margin (choice of crop rotations and tillage practices) in our modeling strategy. A model which incorporates both the extensive and intensive margin changes will be used to accurately assess water quality impacts in the watershed.

Next we outline the model structure, the Simulation-optimization model. While comparisons of the costs and estimated environmental gains amongst various scenarios will be quite informative, a fundamental question of relevance for the design of almost any policy is to be able to characterize the least cost solution that could achieve a particular environmental target. In addition to the desire to compare the efficacy of various policies to such an ideal solution, there is an additional reasons to be interested in such a characterization. The least cost solution to a given environmental target is the predicted outcome associated with a well functioning trading program where all gains from trade are exhausted. While there are numerous obstacles to the implementation of such an idealized trading program for water quality dominated by nonpoint sources, it still provides a target of interest .

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Application Number: A78484

Faculty Member: Sarah Reichard

Role: Principal Investigator

Title: **Rare Plant Conservation Support**

Agency: USDI Bureau of Land Management

Period: 9/13/2011 - 9/5/2016

Amount: \$12,000

## Non-Competing Supplement

Washington Rare Plant Care and Conservation will provide technical assistance to the Bureau of Land Management on rare plant conservation. The scope of the work will include collecting seeds of rare and important plant species for ex-situ conservation, researching, testing, and maintaining germplasm of the species, propagating and reintroducing species in native habitats, monitoring populations of rare and important plant species, training students and volunteers, and developing educational materials and programs for the public on plant conservation. The work will be done in cooperation with the national network of Botanical gardens to preserve biological diversity working with the Center for Plant Conservation.

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Application Number: A78014

Faculty Member: Sandor Toth

Role: Principal Investigator

Title: **Modeling edge effects on yield in spatial harvest scheduling for the Olympic Experimental State Forest, Washington**

Agency: USDA Forest Service

Period: 8/1/2012 - 7/31/2013

Amount: \$49,833

New

Current forest harvest scheduling models in use on Washington State trustlands assume that forest edges have no impact on yield within stands. In the absence of edge effects, the models pay no attention to how much edge in what spatial configuration is produced over time and across the landscape. Excessive edge creation, however, has proved to pose several problems, especially in the coastal forest regions such the Olympic Experimental State Forest. Forest edges with certain orientations are prone to wind throw, shading or increased lighting. In net, forest edges can have a pronounced impact on expected merchantable yield. The goal of this project is to explore if computationally viable and spatially scalable modeling techniques exist to capture the effects of edge on yield in harvest scheduling models. We will present and test alternative integer programming models on forest problems of various sizes. The test problems will comprise existing datasets provided by the Washington State Department of Natural Resources (DNR). The University of Washington deliverables will include the mathematical description of the alternative models, a software implementation, and the description and results of the computational tests.

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Application Number: A78852

Faculty Member: Miranda Wecker

Role: Principal Investigator

Title: **IP Modeling Peer Review Workshop**

Agency: Wild Salmon Center

Period: 10/1/2012 - 12/31/2012

Amount: \$34,000

New

Staff of the UW Olympic Natural Resources Center will assist the Wild Salmon Center to conduct a peer review process to critique the results of a recent project under which ONRC applied existing modeling methods for evaluating the "intrinsic potential" for supporting salmon species of selected coastal stream

segments. Model analyses were conducted and maps generated for chinook, coho, steelhead, chum and sockeye salmon species in the Quillayute, Hoh, Queets and Bear Rivers. ONRC carried out that work through a transparent process involving researchers, managers and stakeholder from all areas in the Washington Coast Salmon Recovery Region. This contract will support ONRC's activities in organizing a 1-day workshop to review the results of recent IP modeling work. Approximately 10-15 technical experts will be invited and asked to critically review the analyses carried out by ONRC under the previous Wild Salmon Center contract. ONRC will host this workshop at its facility in Forks. ONRC staff will lead the discussion and facilitate the development of recommendations for improving the models for application to rivers within Washington's coastal region. Using the comments development during the workshop, ONRC will update the results of its IP analyses and generate a final report containing the maps generated and relevant project conclusions.

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Application Number: A78169  
Faculty Member: Stephen West  
Role: Principal Investigator  
Title: **Sustainable Forestry Forum**  
Agency: USDA Forest Service  
Period: 4/1/2012 - 12/31/2013  
Amount: \$10,000  
Non-Competing Supplement

The purpose of this funding is to support the planning, management and facilitation, of the Water Markets from Sustainable Forestry Forum to be held in Seattle in December, 2012. This is a follow up to the successful Forum on the same topic which took place in April, 2012.

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Application Number: A77666  
Faculty Member: Kathy Wolf  
Role: Principal Investigator  
Title: **Stewardship Mapping Geocoding for the Seattle Green Cities Research Alliance**  
Agency: USDA Forest Service  
Period: 8/1/2011 - 9/30/2013  
Amount: \$40,000  
Supplement and Extension

Forest health is an important goal across the landscape gradient throughout the Puget Sound region. Civic environmental stewardship is one potential strategy to improve forest conditions. Current project activity is providing a preliminary, baseline assessment of stewardship activity and locations, focusing on the metro Seattle area. Project support to date (budget IDs: 2011-JV-11261985-071 (USFS) and 62-2991(UW)) is funding a geospatial mapping analysis of stewardship organizations (that includes stewardship programs and volunteer participant densities) in association with an organizational network analysis. This supplemental request extends the end date of the project, and provides funds to support the development of technical reports, journal manuscripts, and other written products.

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Application Number: A77414  
Faculty Member: Darlene Zabowski  
Role: Principal Investigator

Faculty Member: Robert Edmonds  
Role: Co-Investigator

Title: **Assessing the Effects of Nitrogen Deposition on High-Elevation Plant and Soil Communities**

Agency: USDI National Park Service

Period: 7/15/2012 - 4/30/2015

Amount: \$82,800

New

Increasing levels of nitrogen (N) deposition have been identified as critical concerns for ecosystems worldwide. High-elevation plant communities are generally adapted to low soil resource supply and increases in N may result in significant changes in biomass and species composition. Understanding the effects of N deposition on alpine plant and soil communities is needed for the development of “critical loads” to inform and improve air quality policy and protect high-elevation ecosystems. The term “critical loads” is used to describe the point at which the natural system is damaged by air pollution. This project will use fertilization of alpine plant communities to document effects on plant and soil community dynamics and to derive initial estimates of critical loads of N for alpine systems in North Cascades, Mount Rainier, and Olympic National Parks and will provide insight for park management policies. The overall objective is to evaluate the effects of atmospheric N deposition on the structure and function of alpine ecosystems in these parks. Specific tasks are: (1) to initiate an in situ N addition experiment to determine alpine vegetation and soil process response to N enrichment; (2) identify critical loads of N for dominant high-elevation plant species; (3) provide data on Pacific Northwest high-elevation plants and mycorrhizas for the adaptation of the ForSAFE-VEG model to US alpine plant ecosystems; and (4) collect all data in a manner that will allow them to be compared with similar experiments in other national parks. National Park Service staff will be involved in several ways, including working with the cooperator to identify and select sample sites, establish vegetation plots, and collect data. Public benefits of this project including improved protection of public lands, protection of Class I Airsheds within Pacific Northwest national parks and Wilderness Areas, and improved understanding of potential changes to park ecosystems. The experimental application of nitrogen to alpine ecosystems will enhance our understanding of the rate and magnitude of changes that may occur in high-elevation ecosystems without improved air quality standards. This research will allow scientists and managers to estimate the amount of pollution exposure (i.e., nitrogen) below which significant effects are not expected to occur. This level of nitrogen (the critical load) is a valuable tool both in the scientific and regulatory arenas for protection of ecosystem process.

## Proposals July, 2012

Application Number: A77096

Faculty Member: Ernesto Alvarado

Role: Principal Investigator

Title: **Wildland Fuel and Fire Management in a Changing Climate**

Agency: USDA Forest Service

Period: 5/11/2009 - 3/31/2014

Amount: \$914,186

Non-Competing Supplement

The amendment to the Joint Venture Agreement with the USFS proposed here will generate, develop, apply and transfer science-based information, strategies and tools for fire management in public, and Tribal lands.

Specific objectives for this amendment are to:

- Evaluate physical properties of fuels and fire behavior to parameterize and validate the Wildland-Urban Fire Dynamics Simulator (WFDS) in Florida as part of the large scale RxCadre project.
  - Collect and analyze research data conducted in WUI fires at the San Diego County, California and NW Texas using the NIST-WUI 2 GIS-based protocols to provide validation of the WFDS and improve the fuelbed inputs for the WFDS model in homogeneous fuelbeds.
  - Continue the integration of FVS and FCCS to generate dynamic fuelbeds from stand data from FIA and CFI plots, and different silvicultural treatments.
  - Study the effectiveness of fuel treatments on wildfire severity at the Wallow Fire in areas surrounding the communities near the Apache-Sitgraves National Forest and the White Mountain Apache Reservation in Arizona.
  - Continue during the summer season a study to characterize the combustion environment of slash pile burning in the Okanogan-Wenatchee National Forest to improve the efficiency of pile burning in the western US.
  - Develop and implement a method for sensitivity testing of Rothermel, FCCS and WFDS fire models to changes in environmental conditions such as fuel, wind, and slope.
  - Continue the analysis and comparison of the best non-stationary statistics methods of analyzing long-term ecological datasets and use of statistical tests of stationary and wavelet analysis to ecological time series.
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Application Number: A77790  
Faculty Member: Ernesto Alvarado  
Role: Principal Investigator  
Title: **Fire, Climate, and Smoke Research**  
Agency: USDA Forest Service  
Period: 7/19/2010 - 12/31/2014  
Amount: \$72,500  
Supplement and Extension

This Joint Venture Agreement will support the USFS Atmosphere and Fire Interactions Research Team (AIRFire) research to improve understanding of the role of weather and climate in fire and other ecological disturbances and to develop decision support tools for ecosystem management, fire operations, planning, and smoke management based on meteorology, air quality engineering, and climate dynamics.

The purpose of this agreement is to advance climate, fire, and smoke science in support of building a better understanding of how fire is affected by and affects the atmosphere, including weather and climate, and how this knowledge can be used to develop scenarios and tools to better inform land managers.

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Application Number: A77884  
Faculty Member: Sally Brown  
Role: Principal Investigator  
Title: **Mountains to Sound Gateway**  
Agency: King County Department of Natural Resources and Parks  
Period: 7/1/2012 - 6/30/2013  
Amount: \$40,000  
Supplement and Extension

This agreement is a continuation of a long-standing agreement between the King County Wastewater Treatment Division and the School of Forest resources. Dr. Brown will assist the KCWTD in determining appropriate biosolids application rates for commercial forest plantations. She will assist with questions on benefits and safety of biosolids use in commercial forestry. Biosolids application rate are based on a number of factors including soil nitrate concentrations. The focus of this year's research will be to measure variability in soil nitrate concentrations across application units. This will be carried out by soil sampling in pits as well as across transects in three forest units. Results will be presented to KCWTD and stakeholders as required.

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Application Number: A77490

Faculty Member: Ivan Eastin

Role: Principal Investigator

Faculty Member: Indroneil Ganguly

Role: Co-Investigator

Title: **2012 BRDI**

Agency: Humboldt State University

Period: 1/1/2013 - 12/31/2015

Amount: \$1,031,405

New

Faculty Member: John Perez-Garcia

Role: Co-Investigator

The objective of this research is to develop a comprehensive economic understanding of the proposed technology and developing strategies for long term economic sustainability of the program. For short term economic viability of the proposed technology, the revenues attained from the biochar production process have to outweigh the capital and operating costs associated with the process. However, the long term economic success and sustainability of the proposed pyrolysis technology can only be attained through the enviro-economic viability (micro and macro level) of the proposed technology, with specific reference to geo-socio-economic conditions. Moreover, acknowledging the lack of information regarding biochar and its environmental and economic benefits among the general population, region-specific strategies need to be adopted to develop effective educational programs based on the perceptions and concerns of local stakeholders.

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Application Number: A78223

Faculty Member: Gregory Ettl

Role: Principal Investigator

Title: **Bureau of Land Management - Stand Mgt Coop**

Agency: USDI Bureau of Land Management

Period: 3/21/2011 - 3/20/2016

Amount: \$80,000

Supplement and Extension

This proposal is for year 2 of 5 of the Bureau of Land Management's membership in the UW Stand Management Cooperative. Per Bureau policy, this will be a five year agreement, 2011-2016.

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Application Number: A77881

Faculty Member: Kern Ewing

Role: Principal Investigator

Faculty Member: Sarah Reichard

Role: Co-Investigator

**Title: Yesler Swamp Trail Project-Phase 1**

Agency: Friends of Yesler Swamp

Period: 2/1/2013 - 12/31/2013

Amount: \$80,000

New

The neighborhood organization Friends of Yesler Swamp seeks funding the Seattle Dept of Neighborhoods with The UW as the Fiscal Sponsor, for engineering, environmental mitigation and Phase 1 construction of Yesler Swamp Trail, a proposed boardwalk (about 200 ft. of boardwalk crossing the waters of the swamp) through Yesler Swamp. Professionally prepared, detailed permit-level design documents and environmental mitigation plan are complete, and environmental permits are expected shortly.

Located in one of Seattle's few remaining wooded swamps, this boardwalk will be part of a permanent, handicapped-accessible trail that will provide educational opportunities for the community and access for volunteers to restore Yesler Swamp. It will be free and open to the public. Yesler Swamp is a unique natural area located in the heart of an urban neighborhood, and the trail will make this tranquil, beautiful spot free and open to the public. The trail will be only a few blocks from the busy intersection of NE 45th Street and Mary Gates Drive, close to Laurel Village where a multi-cultural population of University students and their families live, work and play. The trail will offer informative signage and educational opportunities for children, UW students, and the public. It will be a short walk from the University Village, the Ronald McDonald House, and the Laurelhurst Elementary school.

The project promises to benefit not just the local neighborhood, but the larger Seattle community. The trail will also offer a much-needed recreational opportunity for handicapped visitors. The trail will be accessible along the entire route, offering a natural environment of woods, wildlife, and water to everyone.

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Application Number: A78029

Faculty Member: E. David Ford

Role: Principal Investigator

**Title: Diameter growth of western hemlock**

Agency: USDA Forest Service

Period: 9/16/2012 - 12/15/2013

Amount: \$67,164

New

An important challenge on the Olympic Experimental State Forest is to grow western hemlock trees that have the diameters of trees found in old-growth forests, some 39 inches, but to do this in a shorter time than might typically have been taken in old-growth forest itself. Various techniques might be anticipated to increase diameter growth, most notably thinning. Typically thinning trees from a forest stand has the effect of increasing diameter increment. However, the intensity of thinning and the regularity of its application to achieve trees of 39 inches diameter is not known because most thinning experiments have been conducted on forests where the maximum diameter is less than 30 inches, i.e., typical of the commercial forest production cycle that terminates after some 70 years.

In our research we will conduct retrospective analyses of tree diameter growth through analysis of tree ring growth. Ring samples will be obtained either by using standard tree cores or the IML Resistograph B-Series, a device that bores a small diameter hole into the tree and measures ring width through

detecting changes in density. We will solve for models of diameter decline with age and see which perform best particularly for old and large trees that we can sample. This work should contribute to calibration of growth models in their application beyond the normal forest rotation age.

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Application Number: A77735

Faculty Member: Fernando Resende

Role: Principal Investigator

Title: **Conversion of Beetle-killed Lodgepole pine into Bio-oil via ablative Pyrolysis**

Agency: USDA

Period: 1/1/2013 - 12/31/2014

Amount: \$228,109

New

Bark beetles are important components of western forest ecosystems and some level of tree mortality caused by them is normal and desired for proper ecosystem function. High levels of tree mortality, however, have negatively impacted communities and altered wildfire severity and intensity. Fallen trees lead to a heavy surface load on the ground, generating a fire hazard. In case of fire, heat intensity and duration of fire increase on the forest ground. This in turn impacts the soil and the forest's ability to produce other services to society. As dead trees decay and fall to the ground, they also pose an additional risk to public and private property.

The use of beetle-killed trees to produce liquid fuels can mitigate these problems and simultaneously add value to the dead trees. Fast pyrolysis converts solid lignocellulosic biomass into a liquid fuel called bio-oil. Bio-oil can be used in applications like heating, power, and production of chemicals. In the presence of catalysts or with proper upgrade, the bio-oil produced from fast pyrolysis could also be used as a transportation fuel.

In this work, we propose the use of a mobile fast pyrolysis unit to carry out the conversion of beetle killed lodgepole pine into a stable bio-oil. A mobile unit would reduce the costs and difficulties associated with harvesting and transportation of dead trees for other applications. Out of the several types of pyrolysis reactors available, an ablative reactor would be effective to carry out the conversion at small scales, because it does not require grinding of the biomass to very small sizes like most fast pyrolysis systems do. A lab-scale ablative pyrolysis reactor will be designed and constructed to carry out the conversion of the killed lodgepole pine into bio-oil. Zeolite catalysts will be used to generate a stable bio-oil.

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Application Number: A78014

Faculty Member: Sandor Toth

Role: Principal Investigator

Title: **Modeling edge effects on yield in spatial harvest scheduling for the Olympic Experimental State Forest, Washington**

Agency: USDA Forest Service

Period: 8/1/2012 - 7/31/2013

Amount: \$49,833

New

Current forest harvest scheduling models in use on Washington State trustlands assume that forest edges have no impact on yield within stands. In the absence of edge effects, the models pay no attention to how much edge in what spatial configuration is produced over time and across the

landscape. Excessive edge creation, however, has proved to pose several problems, especially in the coastal forest regions such the Olympic Experimental State Forest. Forest edges with certain orientations are prone to wind throw, shading or increased lighting. In net, forest edges can have a pronounced impact on expected merchantable yield. The goal of this project is to explore if computationally viable and spatially scalable modeling techniques exist to capture the effects of edge on yield in harvest scheduling models. We will present and test alternative integer programming models on forest problems of various sizes. The test problems will comprise existing datasets provided by the Washington State Department of Natural Resources (DNR). The University of Washington deliverables will include the mathematical description of the alternative models, a software implementation, and the description and results of the computational tests.

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Application Number: A78160

Faculty Member: Eric Turnblom

Role: Principal Investigator

Title: **Rotation Age Wood Quality analysis in Type II Installations**

Agency: USDA Forest Service

Period: 8/16/2012 - 8/15/2013

Amount: \$3,600

New

This project is to determine the relationship of rotation age on wood quality for Douglas-fir and to understand how silvicultural treatments may be used to influence the stiffness, and hence quality, of Douglas-fir by conducting an analysis on existing Stand Management Cooperative Type II Installation data. Existing data will be updated and summarized prior to analysis.

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Application Number: A78169

Faculty Member: Stephen West

Role: Principal Investigator

Title: **Sustainable Forestry Forum**

Agency: USDA Forest Service

Period: 4/1/2012 - 12/31/2013

Amount: \$10,000

Non-Competing Supplement

The purpose of this funding is to support the planning, management and facilitation, of the Water Markets from Sustainable Forestry Forum to be held in Seattle in December, 2012. This is a follow up to the successful Forum on the same topic which took place in April, 2012.

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Application Number: A78070

Faculty Member: Stephen West

Role: Principal Investigator

Title: **Eastern Gray Squirrel Ecology and Interactions with Western Gray Squirrels on Joint Base Lewis-McChord**

Agency: WA Department of Fish and Wildlife

Period: 7/1/2011 - 6/25/2012

Amount: \$900

## Non-Competing Supplement

Introduced eastern gray squirrels are implicated as a cause for the decline of State-threatened western gray squirrels, but little is known about competitive interactions between these species. In conjunction with WDFW's Western Gray Squirrel Augmentation Project on Joint Base Lewis-McChord, we have equipped eastern and western gray squirrels with radio-collars and conducted experimental removals of eastern gray squirrels to investigate resource use and interactions between these species. Results of this study will aid management and recovery of western gray squirrels. We seek funding for the final six months of this multi-year study.

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Application Number: A77666

Faculty Member: Kathy Wolf

Role: Principal Investigator

Title: **Stewardship Mapping Geocoding for the Seattle Green Cities Research Alliance**

Agency: USDA Forest Service

Period: 8/1/2011 - 9/30/2013

Amount: \$40,000

Supplement and Extension

Forest health is an important goal across the landscape gradient throughout the Puget Sound region. Civic environmental stewardship is one potential strategy to improve forest conditions. Current project activity is providing a preliminary, baseline assessment of stewardship activity and locations, focusing on the metro Seattle area. Project support to date (budget IDs: 2011-JV-11261985-071 (USFS) and 62-2991(UW)) is funding a geospatial mapping analysis of stewardship organizations (that includes stewardship programs and volunteer participant densities) in association with an organizational network analysis. This supplemental request extends the end date of the project, and provides funds to support the development of technical reports, journal manuscripts, and other written products.

## Proposals August, 2012

Application Number: A78489

Faculty Member: Ernesto Alvarado

Role: Principal Investigator

Title: **Wildland Fuel and Fire Management in a Changing Climate**

Agency: USDA Forest Service

Period: 5/11/2009 - 3/31/2014

Amount: \$78,591

Non-Competing Supplement

This Amendment of the Joint Venture Agreement will support the continuation of collaboration with the USFS Fire and Environmental Research Applications Team (FERA) mission to inform management of natural resources through research and development in fuels and combustion science, fire and landscape ecology, climate change, and integration of the physical and ecological sciences. This joint venture agreement supports the research conducted by the FERA Team at the USFS PNW Pacific Wildland Fire Sciences Laboratory in Seattle for the Interagency Joint Fire Sciences Program, the USFS National Fire Plan, and the USFS Region 6. The research will be conducted and applied to public lands under the administration of the USFS and other federal and state agencies. This specific amendment will

extend the wildfire sciences research to the wildland urban interface in the southwest and southern United States. Specific objectives for this amendment to the joint venture agreement are:

- To initiate a project to implement in the field strategies to adapt to climate change and wildfires in National Forests of the Pacific Northwest in collaboration with local land and fire managers.
  - To assist in data collection and analysis of field research conducted in wildland urban interface fires using the NIST WUI 1 and the NIST WUI 2 GIS-based data collection methodology to provide field validation of the WFDS Model.
  - To continue conducting pre-and post fire data collections in fire vulnerable forest and communities in California, Texas, Colorado, and Arizona to improve the fuel bed information for the WFDS fire behavior model.
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Application Number: A78310

Faculty Member: Renata Bura

Role: Principal Investigator

Title: **Raman Spectroscopy for Real-Time Measurement and Control of Biofuels Production**

Agency: The Camille and Henry Dreyfus Foundation, Inc.

Period: 1/1/2013 - 12/31/2014

Amount: \$120,000

New

Faculty Member: Richard Gustafson

Role: Co-Investigator

Reduce dependence on fossil fuels by using Raman spectroscopy to create chemical sensors to monitor and control the processes that convert lignocellulosic biomass to fuels and chemicals. The Dreyfus Fellow will be involved in developing chemometric models and physical separations that will reduce the effect of signal-masking fluorescent compounds in solution.

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Application Number: A78405

Faculty Member: Douglas Deur

Role: Principal Investigator

Title: **Community Histories of Otter Cove and Isle au Haut, Acadia National Park**

Agency: USDI National Park Service

Period: 7/21/2008 - 7/21/2013

Amount: \$12,000

Supplement and Extension

The purpose of this Task Agreement is to facilitate cooperation between the National Park Service and the University of Washington in producing ethno-historical studies of two traditional use areas within Acadia National Park - Otter Cove (on Mt. Desert Island) and the island of Isle au Haut. Over the course of this research, researchers from both organizations will compile archival materials and conduct oral history interviews to document the histories of these two areas and their associated communities as they relate to lands and resources within Acadia National Park. Separate research reports will be produced for Otter Cove and Isle au Haut, presenting the history of each community thematically, with particular attention to the uses of land and resources within what is today Acadia National Park. This research project is intended to inform the management of lands and resources within the park, facilitate consultations regarding resource management and public education, and aid the National Park Service in developing public interpretation of these areas.

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Application Number: A78338

Faculty Member: Ivan Eastin

Role: Principal Investigator

Faculty Member: Indroneil Ganguly

Role: Co-Investigator

Title: **Waste to Wisdom: Utilizing forest residues for the production of bioenergy and bioproducts**

Agency: Humboldt State University

Period: 1/1/2013 - 12/31/2015

Amount: \$583,371

New

Faculty Member: Elaine Oneil

Role: Co-Investigator

Faculty Member: John Perez-Garcia

Role: Co-Investigator

The objective of this research is to develop a comprehensive economic understanding of the proposed technology and developing strategies for long term economic sustainability of the program. For short term economic viability of the proposed technology, the revenues attained from the biochar production process have to outweigh the capital and operating costs associated with the process. However, the long term economic success and sustainability of the proposed pyrolysis technology can only be attained through the enviro-economic viability (micro and macro level) of the proposed technology, with specific reference to geo-socio-economic conditions. Moreover, acknowledging the lack of information regarding biochar and its environmental and economic benefits among the general population, region-specific strategies need to be adopted to develop effective educational programs based on the perceptions and concerns of local stakeholders.

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Application Number: A78401

Faculty Member: Joshua Lawler

Role: Principal Investigator

Title: **Identify Potential Barriers, Corridors, and Refugia for Species in the Face of Climate Change**

Agency: USDI National Park Service

Period: 9/1/2011 - 3/1/2015

Amount: \$163,999

Non-Competing Supplement

In the coming century, climate change will result in shifts in distributions of plants and animals, which are likely to significantly alter the flora and fauna of National Parks. Understanding where changes are likely to be the greatest, where refugia may occur, and where landscape connectivity could be increased will help managers and planners facilitate climate-change adaptation for many species. To increase this understanding, we will conduct a climate-change assessment for the North Coast and Cascades Network. The assessment will identify climate refugia as well as barriers to, and opportunities for species movements in a changing climate and will be based on projected changes in climate, vegetation, and the distribution of key focal species.

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Application Number: A78484

Faculty Member: Sarah Reichard

Role: Principal Investigator

Title: **Rare Plant Conservation Support**

Agency: USDI Bureau of Land Management

Period: 9/13/2011 - 9/5/2016

Amount: \$12,000  
Non-Competing Supplement

Washington Rare Plant Care and Conservation will provide technical assistance to the Bureau of Land Management on rare plant conservation. The scope of the work will include collecting seeds of rare and important plant species for ex-situ conservation, researching, testing, and maintaining germplasm of the species, propagating and reintroducing species in native habitats, monitoring populations of rare and important plant species, training students and volunteers, and developing educational materials and programs for the public on plant conservation. The work will be done in cooperation with the national network of Botanical gardens to preserve biological diversity working with the Center for Plant Conservation.

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Application Number: A78524  
Faculty Member: Sarah Reichard  
Role: Principal Investigator  
Title: **Washington Rare Plant Conservation**  
Agency: National Fish and Wildlife Foundation  
Period: 1/1/2013 - 12/31/2013  
Amount: \$42,000  
New

Over 300 of Washington's native plants are considered to be endangered, threatened or sensitive to decline. Habitat loss and degradation, invasive species, and climate change are among the myriad of threats that interact with one another to cause extirpation of rare plant populations. Declining levels of public funding over the last several decades resulted in a dearth of information on the status of these species. Consequently, the status of these species is poorly documented, which, in the short term, hinders accurate assessments of impacts of threats and in the long-term hinders our ability to understand the conservation needs for preserving plant biodiversity. Rare plant monitoring and seed banking of Washington's rare plants work in concert to achieve their long-term survival by addressing both the short-term threats to natural populations and the long-term need for germplasm to produce plant material for reintroductions and augmentations. Monitoring and seed collecting is carried by a corps of volunteers trained to monitor rare plant populations and collect seeds for storage in the Miller Seed Vault. The project is conducted in partnership with the Natural Heritage Program and state and federal agencies. In 2013, approximately 130 populations will be revisited and reported on by volunteers, seeds will be collected from 15 populations of rare plants, and approximately 40 new volunteers will be trained in monitoring and seed collecting techniques.

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Application Number: A78533  
Faculty Member: Aaron Wirsing  
Role: Co-Investigator  
Title: **Predation by brown bears on Pacific salmon**  
Agency: Royalty Research Fund (RRF)  
Period: 2/16/2013 - 2/15/2014  
Amount: \$28,986  
New

Our overall scientific objective of this study is to build on records of bear predation collected from the salmon perspective by studying bears in a non-invasive and safe manner. The initial results of this study will serve as the basis for a proposal to external funding sources (e.g., the National Science Foundation). Specifically, we propose to address a series of important questions at the heart of the interactions between bears and salmon, to define the functional relationship between salmon abundance and rate of predation, the extent to which the bears transport nutrients into the forest, and to understand the foraging choices made by bears. Our operating hypothesis is that salmon density and physical attributes of streams will affect bear behavior. For example, movements between streams and numbers of bears fishing on each stream will reflect salmon density and ease of catching fish, a function of stream size and habitat complexity. We propose a pilot study to address these questions, using a combination of motion-activated cameras and collection of DNA samples from fur at a series of well-studied salmon streams accessible from the UW's field station in Aleknagik, Alaska. The information on bears will be combined with data on the numbers of salmon in each stream (live, killed or dying or senescence) and the body parts of salmon eaten by bears. The project will bring together wildlife and fisheries faculty members with complementary backgrounds who have not worked together in the past, and will involve an extremely successful summer field class led by the P.I. of this proposal. The long-term goal is to generate adequate data to prepare a proposal for external funding.

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Application Number: A77901

Faculty Member: Kathy Wolf

Role: Principal Investigator

Title: **Urban Forest Stewardship, Veterans, and Nature Therapy**

Agency: WA Department of Natural Resources

Period: 8/15/2012 - 12/31/2014

Amount: \$77,000

New

In recent years veterans have served our nation in ways that differ from the past. They have been active in non-traditional battle situations, such as urban settings and fighting against insurgents (rather than military personnel). Many service men and women have also been deployed multiple times. The general experiences of war and these special circumstances contribute to residual emotional and/or physical disorders after return from duty. In particular, vets may be at risk for various emotional stresses and disorders. Meanwhile, extensive scientific evidence indicates that human experiences of nature improve mental and physical health of individuals, and consequently, of communities. Both nature-based activity (such as stewardship) and passive encounters (such as nature views from one's home) can provide benefit. Stewardship is but one way that people can interact with nature and ecology. The context for this study will be urban forest stewardship work that is associated with employment or community service. This project will evaluate the healing potential of nature as veterans participate in urban forest stewardship in the Pacific Northwest region. Puget Sound Corps was established by the 2011 Washington State Legislature to focus Veterans Corps and Washington Conservation Corps (WCC) crews on Puget Sound restoration work. One subprogram, administered by WA Department of Natural Resources, will focus on urban forestry. Veterans who are enrolled in the jobs programs will be actively recruited to be the primary group of participants in the study. A second potential pool of research participants are veterans and active duty soldiers who have served in Iraq or Afghanistan and are involved in urban forest stewardship as community service work. A research overlay on such programs will study the effects of working in nature and explore the personal benefits of stress and anxiety reduction, and other psychosocial benefits that may emerge through stewardship activity. Combined quantitative and

qualitative methods will be used for outcomes assessments. Results will be shared in technical and peer-reviewed publications.

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Application Number: A78428

Faculty Member: Kathy Wolf

Role: Principal Investigator

Title: **Contributions of Volunteers to Nonprofit Organizational Resilience: Examining the Urban Environmental Stewardship Context**

Agency: Cornell University

Period: 7/1/2013 - 6/30/2016

Amount: \$79,569

New

Nonprofit organizations are a vital force of civil society, fostering community engagement and civic participation, and promoting social values. Nonprofits produce public collective goods such as ecosystem conservation or public health, often relying on substantial volunteer labor to do so. Volunteers and nonprofit organizations are inextricably linked and a significant amount of the value generated by nonprofit organizations is attributable to volunteers, distinct from and yet complementary to the contributions of paid employees. However, most of the research on volunteers is focused on the individual social psychology of the volunteer and not the interplay between the volunteer and the organizational context. Research is needed that moves beyond individual volunteers and links them to the organizations for which they play such a significant role. As agents of change within nonprofit organizations, volunteers can enhance the ability of organizations to respond to a changing social, political, and economic environment through the building of organizational resilience (OR). It is critical for nonprofits to be resilient due to turbulent social and environmental context in which they operate. However, the majority of OR theory and research has been developed in the for-profit sector over the last decade, and has primarily focused on the negative economic impacts of 9/11 and Hurricane Katrina. The current literature in organizational science has not addressed the proposition that organizational resiliency is linked both to volunteer contributions to organizations and the processes through which nonprofit organizational staff engage volunteers. This research proposes to expand the science of organizations knowledge base to include three distinct dimensions of volunteers' organizational contributions: cognitive, behavioral, and contextual. This project will study OR in the non-profit sector and specifically, the organizational mechanisms through which volunteers enhance OR. We hypothesize that when volunteers are effectively engaged by nonprofit organizations, resiliency can be enhanced. The context for this study will be the civic environmental stewardship programs of cities across the United States. Cornell University and U of WA social scientists will collaborate with urban environmental nonprofit organizations to determine what assets individual volunteers contribute to organizations, and examine the processes by which non-profit organizations utilize volunteers to achieve organizational resilience.

## Proposals September, 2012

Application Number: A78402

Faculty Member: Susan Bolton

Role: Co-Investigator

Title: **Gardens, Green Space and Health in the Informal Urban Settlements of Lima, Peru**

Agency: Royalty Research Fund (RRF)

Period: 1/15/2013 - 12/31/2013

Amount: \$40,000

Resubmission

When impoverished people migrate from rural to urban areas, their ability to grow food and their contact with natural environments decrease, often with negative impacts on their physical health and overall well-being. Urban agriculture increases access to high nutrition foods, diversifies diet, lessens exposure to volatile food prices, improves nutrition, generates income and increases the time that mothers have to raise their children. Urban green space improves air quality and reduces respiratory disease. It provides opportunities for gathering and recreation improving physical fitness and building social capital. It reduces stress and mental fatigue. The proposed study is based in Eliseo Collazos (EC), an impoverished urban community in northern Lima, Peru. It will examine how socio-economic factors influence the efficacy of participatory garden implementation and how household gardens provide health and other benefits to community members. The study has three primary aims.

- 1) Assess how household socio-economic variables influence the successful implementation and cultivation of gardens in EC through demographic surveys, the participatory design and construction of 40-60 household gardens and garden diaries.
- 2) Assess how household gardens impact the physical and mental health of individuals and households through repeated physical and mental health assessments.
- 3) Assess how household gardens effect meaningful change in the lives of community members as defined by community members through Participatory Impact Assessment (PIA) exercises.

The study will provide evidence that interdisciplinary collaboration, participatory design and capacity building enhance the effectiveness of public health interventions. It will serve as pilot for a longer term NIH R01 or NSF CNH grant.

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Application Number: A79339

Faculty Member: Thomas DeLuca

Role: Principal Investigator

Title: **Range-wide Variation: The Role of Edaphic Factors in Driving Local Adaptation Across the Subspecies of *Pinus Contorta***

Agency: Society for Conservation Biology

Period: 9/1/2013 - 9/1/2015

Amount: \$175,245

New

As changes in climate continue to impact habitat, species will be forced to adapt or migrate to accommodate their environmental requirements. Species are, however, thought to be locally adapted to a specific combination of climatic and edaphic conditions. Subtle changes in these factors may leave long-lived, immobile tree species especially vulnerable to habitat loss. However, the magnitude of this change is unknown. In this research, will use *Pinus contorta* (Douglas Ex. Louden) to quantify the role of edaphic factors in driving local adaptation of tree species. *Pinus contorta* is one of the most widely distributed trees in North America, growing from Baja California to the Yukon Territory. This species' broad distribution is divided into four geographically and morphologically distinct subspecies (*ssp. murrayana*, *latifolia*, *contorta*, and *bolanderi*), with each subspecies growing under and hypothesized to be locally adapted to a unique set of edaphic and climatic conditions. Consequently, populations across the range of the species may not respond concordantly to climatic change, and conservation may

require subspecies-level action. Loss of these key species would lead to subsequent disruption of ecosystem functioning and loss of many forest-dependent species. We aim to quantify the degree to which edaphic factors are driving local adaptation across the species, and provide land managers with information on appropriate conservation strategies necessary for the maintenance of each subspecies.

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Application Number: A79113  
Faculty Member: Kern Ewing  
Role: Principal Investigator  
Title: **Yesler Swamp Trail Project - Parks Levy Opportunity**  
Agency: Friends of Yesler Swamp  
Period: 9/1/2013 - 12/31/2015  
Amount: \$  
New

Yesler Swamp is a small wetland area on the corner of the the UW campus. After many years of neglect, teams of UW faculty and student began restoration efforts. They were aided by Friends of Yesler Swamp, a neighborhood community organization dedicated to rehabilitating and restoring the swamp. Over time, the Friends role grew to include organizing volunteers for restoration work and raising funds, leading to an award from the Seattle Department of Neighborhoods to hire a landscape architecture firm to design a trail for the swamp. The plan includes environmental protections, including geotechnical and structural engineering, a pin pile design to support a boardwalk, the use of untreated wood and necessary mitigations to protect the fragile ecosystem. When completed, the trail will be comprised of a raised boardwalk that allows year round access for volunteers, as well as opening the area for safe enjoyment by the entire community, including ADA accessibility. This proposal is to support the Friends of Yesler Swamp's application for a City of Seattle Opportunity Fund award to construct the boardwalk trail (no funds are coming to the University, and the work is not being undertaken by the University, but the construction of the boardwalk trail will provide a substantial benefit to the University of Washington Botanic Garden master plan).

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Application Number: A79024  
Faculty Member: Jerry Franklin  
Role: Principal Investigator  
Faculty Member: Jim Lutz  
Role: Co-Investigator  
Title: **Integrated, observation-based carbon monitoring for wooded ecosystems in Washington, Oregon, and California**  
Agency: Boston University  
Period: 7/1/2012 - 4/30/2014  
Amount: \$157,859  
Transfer from Another Institution

The project goal is to develop an integrated satellite, plot, and LiDAR-based system to characterize and monitor the effects of land management and natural processes on carbon fluxes in the wooded ecosystems across large geographic areas. Key characteristics of the system will be explicit, map-based calculation of uncertainties in estimates of both carbon stocks and fluxes yearly from 1990 to present, and a modular structure that will allow rapid inclusion of new data for improving maps and reducing uncertainties as the system matures. Core components of the project are a time-series-based approach

to mine the Landsat Thematic Mapper archive to monitor an unprecedented range of change processes on the landscape and to develop temporally-stable data for mapping, a proven nearest-neighbor mapping approach to integrate satellite data, environmental data, and USDA Forest Service Forest Inventory and Analysis (FIA) data, and small-footprint LiDAR data used to assess map error. Processes whose carbon effects will be mapped include all levels of forest harvest and fire, including both mechanical thinning and low-intensity fire, as well insect-related mortality, post-disturbance regrowth and encroachment, and land-use change. The resultant West Coast-wide maps of carbon will be useful for state agencies tasked with carbon monitoring roles, federal land management agencies needing context and guidance for land management decisions, and carbon modelers needing detailed maps of disturbance and growth effects on carbon change to train, calibrate, and validate the process-based models needed for futuring and decision support.

For eight study areas, UW researchers will use established field data gathered within 0-2 years of the acquisition of previously collected airborne LiDAR data to estimate carbon stores for each plot site using allometric biomass algorithms developed for the local forest type. Regressions will be developed to relate LiDAR data gathered over the plot sites to the estimated carbon store. Those regressions will then be used to predict forest carbon stores across the extent of the LiDAR study area. The results of the LiDAR carbon maps will then be compared with the Landsat carbon maps to train the Landsat-based carbon mapping and to estimate error rates for the Landsat carbon maps. UW also will enable use of three of the study areas by collecting accurate plot GPS coordinates and verifying previously collected field data.

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Application Number: A79460  
Faculty Member: Soo-Hyung Kim  
Role: Principal Investigator  
Title: **Modeling Particle Film Effect on Photosynthesis**  
Agency: USDA  
Period: 8/1/2012 - 9/30/2013  
Amount: \$10,000  
New

Research has demonstrated that the white, reflective particle film used to repel a wide range of insects also reduces plant temperature and heat stress, while reflecting UV radiation and altering the phytochrome-sensitive wavelengths of visible light. Field studies have documented that the reduction of plant temperature results in increased photosynthesis and often, water use efficiency, and the reduction of UV radiation has reduced oxidative stress. Research will identify critical plant growth stages and mechanisms by which the particle film increases photosynthesis, water use efficiency and improved food quality.

This fundamental knowledge will be incorporated with particle film application for insect control in order to effectively time and apply the particle film materials in a commercial setting. The results will enhance the multi-functionality of particle film technology for use in a broad range of crops.

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Application Number: A79293  
Faculty Member: Joshua Lawler  
Role: Principal Investigator

**Title: Prioritizing land acquisition for the San Joaquin kit fox: Efficient planning in the face of land-use and climate change**

Agency: Bureau of Reclamation

Period: 9/1/2013 - 9/30/2015

Amount: \$116,350

New

The San Joaquin kit fox (*Vulpes macrotis mutica*, here after kit fox) is an endangered subspecies of the kit fox that lives in the southern end of the Central Valley. Although the kit fox faces many, potentially interacting threats, like many endangered species, habitat loss is a major factor contributing to the subspecies' decline. Therefore, habitat protection plays a critical role in the conservation of the kit fox and prioritizing lands for protection is necessary to ensure optimal use of limited funds. Such prioritization is complicated by the fact that threats to the kit fox, and the landscapes they inhabit, are dynamic. Both climate change and land-use change have the potential to alter the distribution of kit fox habitat as well as the distribution of the predators, competitors, and prey. We propose to evaluate the relative effectiveness of different land-acquisition strategies and rank proposed conservation sites in terms of effects on kit fox population size in the face of both climate and land-use changes. We will use a spatially explicit, individual-based population model to examine the relative effectiveness of different land-acquisition strategies including 1) expanding existing reserves for core populations; 2) creating new reserves for unprotected populations; 3) enhancing connectivity between populations, and 4) combinations of these strategies. To explore the performance of these strategies in the face of climate change, we will model climate-induced changes in kit fox habitat as well as the effects of climate change on interactions with predators and exposure to pesticides. Similarly, to explore how robust the different strategies are to land-use change, we will investigate the potential effects of projected land-use changes on habitat and dispersal.

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Application Number: A79158

Faculty Member: Jim Lutz

Role: Principal Investigator

**Title: Yosemite and Wind River Dendrometers**

Agency: Smithsonian Tropical Research Institute

Period: 10/1/2012 - 12/31/2013

Amount: \$15,800

New

We will install 200 band dendrometers on trees in the Yosemite Forest Dynamics Plot and 200 band dendrometers on trees in the Wind River Forest Dynamics Plot. Trees will be selected by species and diameter class. Installation protocol will follow that of the CTFS Carbon Project.

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Application Number: A79667

Faculty Member: Fernando Resende

Role: Principal Investigator

**Title: Recondensation of Lignin Fragments During Fast Pyrolysis: A Model Compounds Study**

Agency: Royalty Research Fund (RRF)

Period: 1/16/2013 - 1/15/2014

Amount: \$38,499

Resubmission

Fast pyrolysis is a potential method for converting lignin extracted from biomass into liquid fuels for transportation. The major challenge with fast pyrolysis of lignin is the recondensation of its fragments, which forms solid char, leading to problems of reactor clogging and char agglomeration. The problem of recondensation must be properly addressed in order for fast pyrolysis to become technically feasible. The research proposed will be the first to investigate the process of char formation at a molecular level. To achieve this goal, model compounds emulating the monomers of lignin will be pyrolyzed. The knowledge generated will lead to potential solutions for the problem of char formation during pyrolysis of lignin, and it will also point to feedstocks that are less prone to form char, thereby maximizing the amount of liquid products formed.

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Application Number: A78852  
Faculty Member: Miranda Wecker  
Role: Principal Investigator  
Title: **IP Modeling Peer Review Workshop**  
Agency: Wild Salmon Center  
Period: 10/1/2012 - 12/31/2012  
Amount: \$34,000  
New

Staff of the UW Olympic Natural Resources Center will assist the Wild Salmon Center to conduct a peer review process to critique the results of a recent project under which ONRC applied existing modeling methods for evaluating the "intrinsic potential" for supporting salmon species of selected coastal stream segments. Model analyses were conducted and maps generated for chinook, coho, steelhead, chum and sockeye salmon species in the Quillayute, Hoh, Queets and Bear Rivers. ONRC carried out that work through a transparent process involving researchers, managers and stakeholder from all areas in the Washington Coast Salmon Recovery Region. This contract will support ONRC's activities in organizing a 1-day workshop to review the results of recent IP modeling work. Approximately 10-15 technical experts will be invited and asked to critically review the analyses carried out by ONRC under the previous Wild Salmon Center contract. ONRC will host this workshop at its facility in Forks. ONRC staff will lead the discussion and facilitate the development of recommendations for improving the models for application to rivers within Washington's coastal region. Using the comments development during the workshop, ONRC will update the results of its IP analyses and generate a final report containing the maps generated and relevant project conclusions.