



UNIVERSITY *of* WASHINGTON

School of Forest Resources

RESEARCH NEWSLETTER ISSUE TWO, VOLUME 12

NEWS (CRIS reporting; Changes in NSF's BIO submissions;) Page 1

AWARDS Page 2

PROPOSALS SUBMITTED Page 6

News

Final Reports Required

The University of Washington recently adopted a new policy about project closeouts that will affect you. Some of you may have already seen messages from closeout@u.washington.edu, directing you to send copies of final reports to the sponsor and to the Office of Sponsored Programs at the end of your projects.

Here in the SFR Financial Services office, we also need copies of your reports: final reports as well as progress reports for current projects. Please send the reports to: Laura Davis, ldavis@u.washington.edu.

Q: What's this all about?

A: Basically, this is all about compliance: doing what we promised, so we can keep getting grants. The UW policy explains it this way:

In accepting sponsor funding, the University has an obligation to comply with the sponsor's reporting requirements. Failure to submit these final reports can lead to closer monitoring by the sponsor, future award delays, or the sponsor withholding future funding to the Principal Investigator, the Principal Investigator's Department and the University.

(For the complete policy, please see: <http://www.washington.edu/research/osp/gim/gim39.html>)

Q: Why do I need to provide my reports to Financial Services?

A: We enter reports into the USDA's CRIS website for all of our funded research projects. We report on all of our projects, not just USDA-funded projects, because the USDA uses our **total** grant income to allocate our McIntire-Stennis funding. Since every dollar counts, we report on everything we can.

Q: What do I need to write, in a nutshell?

A: Most sponsors require final reports at the end of the project. Some also require progress reports along the way. Check the terms of your award for the specific schedule and report requirements, or ask Laura Davis in Financial Services if you need help tracking that down. In addition to specific sponsor-required elements, a typical report should contain:

1. Outputs: What was completed, and how did you share the information?
2. Outcomes/Impacts: What were the results, conclusions, or indications for further study?
3. Publications: What did you publish, or what is in pre-publication?
4. Participants: Who worked on the project?
5. Modifications: Were there any major changes to the project?

NSF BIO submission procedural change

As funding has grown tighter, the pressure on funding agencies has increased. (At the National Science Foundation, unsolicited submissions have increased by 47% over the past decade.) The Directorate for Biological Sciences (BIO) of the NSF recently responded by revising the submission procedure for all BIO proposals. Further details are below, but the bottom line is that most RFPs will require a pre-proposal. This looks like a good news/bad news announcement. The good news is that the preliminary proposal will be short (no budget is required), the bad news is that a high percentage of them will be rejected (bringing us back to good news, in that they expect up to 35% of the invited full proposals to be funded). One thing to keep in mind is that each PI will be limited to 2 pre-proposals per year (another reason to develop good collaborative relationships, to increase the potential submissions).

Effective with the January round of deadlines, proposals to the core programs within the Division of Molecular and Cellular Biosciences (MCB), Division of Environmental Biology (DEB), and Division of Integrative Organismal Systems (IOS) will require a preliminary proposal. DEB and IOS will both implement an **annual cycle of preliminary and full proposals** beginning in January 2012. Preliminary proposals will be accepted in January. Following review by a panel of outside experts, each applicant will be notified of a binding decision to Invite or Not Invite submission of a full proposal. Please note that each investigator is limited to submitting two preliminary proposals a year to either Division, whether as a PI, co-PI or lead senior investigator of a sub award.

All proposals submitted to DEB or IOS in response to the core program solicitations, and to the Research at Undergraduate Institutions (RUI) and Long-term Research in Environmental Biology (LTREB) solicitations, must pass the preliminary proposal stage. The only exceptions are LTREB Renewals. RAPIDs, EAGERs, conferences/workshops and supplemental funding requests will not be affected by this change. However, OPUS and RCN proposals will only be accepted by the core programs in DEB and IOS once a year at the August deadline for full proposals.

Full details can be found in a **new Program Solicitation** that will be posted on each Division's website ([\(DEB\)](#) and [\(IOS\)](#) . A single set of Frequently Asked Questions (FAQs) about these changes also can be found at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf11079 and linked from each Division website. In addition, both IOS and DEB will be hosting webinars to provide further information, please see the Division websites for details and contact information if you have questions or concerns.

Awards

Application Number: A63996

Faculty Member: David Briggs
Role: Principal Investigator
Title: **Stand Management Coop**
Agency: Forest Capital Partners, LLC
Period: 1/1/2011 - 12/31/2011
Amount: \$16,386
Supplement and Extension

2011 Membership dues to the Stand Management Coop.

Application Number: A65092
Faculty Member: David Briggs
Role: Principal Investigator
Title: **Stand Management Coop**
Agency: Plum Creek Timber Company
Period: 1/1/2011 - 12/31/2011
Amount: \$26,294
Supplement and Extension

2011 Membership dues to Stand Management Coop from Plum Creek Timber Company.

Application Number: A56969
Faculty Member: Joshua Lawler
Role: Principal Investigator
Title: **Source and sinks: Elucidating mechanisms, documenting patterns, and forecasting impacts**
Agency: US Department of Defense-Strategic Environmental Research and Development Program
Period: 3/1/2011 - 1/31/2016
Amount: \$1,257,809
New

Faculty Member: John Marzluff
Role: Co-Investigator

Project goal is to develop an understanding of the relative importance of the factors that influence source-sink dynamics in general and to explore the implications of source-sink dynamics for the management of an at-risk species in particular. Populations are often spatially structured. Understanding the effects of spatial structures such as sources and sinks, metapopulations, patchy networks, and isolated populations on population dynamics is critical for successful management. The project will 1) identify attributes of species, landscapes, and ecological systems that promote source-sink dynamics, 2) identify sources and sinks for Black-capped Vireos on and around Ft. Hood, and 3) explore the potential contribution of different sources and sinks—as well as the effects of differential management of these sources and sinks—to the population dynamics of the Black-capped Vireo throughout its range.

Application Number: A66960
Faculty Member: John Perez-Garcia
Role: Principal Investigator
Title: **Exploring the Economics of Forest Restoration**
Agency: USDA Forest Service
Period: 7/15/2010 - 6/30/2012
Amount: \$15,000
Supplement and Extension

The PNW Research Station's Urban Wildland Interaction Team (UWI) is developing a new program focusing on forest restoration economics. The purpose of this agreement is to generate, disseminate, and integrate economic analysis techniques into forest restoration activities in the Pacific Northwest region. Specifically, the objectives of this agreement are to investigate the state of economics as an analysis tool for restoration projects, estimate market and non-market impacts of restoration activities in the Pacific Northwest, identify ways to incorporate economics into restoration planning and evaluation, describe barriers to integration, and develop and communicate a baseline understanding of methods and data required to estimate benefits and costs to land owners and managers. Knowledge gaps and research needs of forest managers and landowners conducting restoration activities in the region will also be examined. Washington and Oregon will be the study area.

Application Number: A65785
Faculty Member: Stephen West
Role: Principal Investigator
Title: **Ecology and Conservation of the Western Gray Squirrel (*Sciurus griseus*) in the North Cascades**
Agency: Seattle City Light
Period: 4/1/2011 - 3/31/2012
Amount: \$31,420
New

Project goal is to complete a study that began in 2008 investigating the distribution, life history, and response of squirrels to fire management treatments in the North Cascades using radio-telemetry. The Western Gray Squirrel (*Sciurus griseus*) -- listed as a Washington State threatened species in 1993 -- is confined to three geographically isolated areas: the southern Puget Trough of Pierce County, southern Washington in Klickitat, Yakima and Skamania counties, and north-central Washington in Chelan and Okanogan counties. Recovery of the species has become a priority; however distributional and life history data on the western gray squirrel, particularly for the North Cascades population, is limited. This population is genetically isolated from others in Washington and ecologically unique as it exists in a mixed-conifer forest habitat composed primarily of Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*) that lacks oak (*Quercus* spp.), an important source of forage and maternal nests

elsewhere in the range. The North Cascades are also distinguished by high average annual snowfall, frequent wildfire, and dynamic forest management. A history of logging and fire suppression has created dense, diseased, and fire-prone forest stands, leading to several catastrophic wildfires in recent years and intensive fire fuel reduction plans with potentially adverse effects on western gray squirrels. Preliminary results indicate high use of fire fuel treated areas by squirrels. A small experiment on the effectiveness of alternate educational presentations to stakeholders showed that all educational strategies significantly increased understanding and support for research; differences between strategies were less transparent.

Application Number: A44081

Faculty Member: Sandy Wyllie-Echeverria

Faculty Member: L. Monika Moskal

Role: Principal Investigator

Role: Co-Investigator

Title: **Inferring Limitations on the Invasive Seagrass *Zostera Japonica* From Environmental Characteristics and LiDAR-Derived Topography**

Agency: National Oceanic and Atmospheric Administration

Period: 6/1/2009 - 5/31/2012

Amount: \$60,000

New

Species invasions are occurring at alarming rates, and constitute a major threat to biodiversity. Seagrass ecosystems, already declining in urbanizing estuaries, face further threats from species invasions. Thought to have been introduced to North America in the 1950s, the asian seagrass *Zostera japonica*, now ranges from British Columbia to Northern California. A congener of the native *Z. marina*, *Z. japonica* typically lives higher in then intertidal than the native seagrass, but the two species occur in mixed stands at Padilla Bay and other broad shallow sites in the region. *Z. japonica* may have adverse impacts on *Z. marina* in mixed stands, and may exclude the native seagrass in disturbed areas. For such reasons, Padilla Bay National Estuarine Research Reserve (NERR) lists this species as a priority for research.

Proposals

Application Number: A69080

Faculty Member: Stanley Asah

Role: Principal Investigator

Title: **Public Attitudes and Perceptions of Forest Fires and Smoke: Management Implications**

Agency: USDA Forest Service

Period: 10/1/2011 - 6/30/2015

Amount: \$90,000

New

Fire management is challenged with acquiring social acceptability of forest fires/smoke. Managers need to know how the public “sees, feels, and thinks about” forest fires and smoke, so as to better judge what sorts of communication strategies could effectively enhance the social acceptability and smooth implementation of fire management actions. Decisions about outreach and education, the location, timing, and specific parameters for prescribed fires, priorities for initial attack, incident response, and the extent of mop-up activities will benefit from knowledge of public perceptions and attitudes. This knowledge could improve management decisions, guide communication strategies—content and delivery mechanisms—and consequently, enhance the social acceptability of fire and smoke management actions and may improve public compliance with fire management specifications. Communication approaches that make public perceptions and attitudes salient—the Psychology of Influence and Persuasion—a relatively effective and low-cost strategy, is underutilized as a lever for managing forest fires and smoke. Yet, there is a need for the efficient and effective allocation of increasingly burdening fire and smoke management resources.

The main goal of this study is to provide managers with blueprint outreach and communication strategies that use public perceptions and attitudes to cost effectively improve community compliance with, social acceptability of, and political will to support, fire/smoke management. We intend to establish and target specific segments of the public with particular messages that will most likely persuade that segment of the public to accept fire/smoke management practices. To accomplish this goal, it is important that we assess not only what fire managers and practitioners think is relevant, but also what is pertinent to the concerned publics.

Application Number: A68873

Faculty Member: Jonathan Bakker

Role: Principal Investigator

Title: **CAREER: Trait-based Community Assembly**

Agency: National Science Foundation

Period: 7/1/2012 - 6/30/2017

Amount: \$847,222

New

Ecology has long focused on interactions between groups defined by taxonomic status and/or life form, but an alternate conceptual framework focused on plant functional traits may provide stronger predictive capabilities. However, much of the trait-based research to date has been observational. Community assembly experiments offer a promising arena in which to assess the utility of a trait-based approach because the starting conditions are known and often include wide variation in spatiotemporal context. Simultaneously, applying a trait-based approach to community assembly could improve our understanding of, and ability to predict, changes in dominance and structure. The specific objectives of this proposal are i) to examine the role of context dependency in mediating the correlation between plant traits and abundance, and ii) to build and validate trait-based models predicting vegetation

dynamics. Two experimental areas will be key foci of this project: an extant large-scale community assembly experiment (70 combinations of site, year, site preparation method, and seeding mix) and a suite of new experimental communities assembled such that they differ in degree of functional diversity but not in species diversity. Key traits will be quantified for each species in the regional species pool (~ 300 species), and community-level trait distributions will be determined for each experimental community in each year (up to 9 years after assembly). Vegetation dynamics, including changes in abundance, species loss, and invasion by new species, will also be tracked for each community. The importance of spatiotemporal context will be examined by testing whether communities established in different sites or years exhibit the same correlations between plant traits and abundance. Statistical models predicting vegetation dynamics as a function of spatiotemporal context, starting conditions, and species- and community-level traits will be built and validated.

Application Number: A68910

Faculty Member: Sally Brown

Role: Principal Investigator

Title: Evaluation of Municipal Wastewater Reuse to Promote Agricultural and Aquaculture Sustainability in an Urban-Rural Watershed, Coupeville, Washington

Agency: Washington State University

Period: 5/16/2012 - 5/15/2015

Amount: \$170,765

New

The overarching long-term goal of this project is to provide stakeholders in the Coupeville region on Whidbey Island, Washington, with the information to make science-based decisions related to the reuse of secondary effluent to improve water quality and enhance the sustainability of agriculture and aquaculture on a watershed scale. The city of Coupeville is evaluating the feasibility of reusing its secondary effluent to irrigate local cropland, and in the process promote agricultural sustainability while improving the quality of nearby waters that support shellfish aquaculture. Two reuse alternatives are under consideration: surface storage of reclaimed water for use by farmers in the summer; and aquifer storage and recovery. Stakeholders have expressed a number of concerns regarding these options including the practicality of a surface reservoir in the region, the cost of treating water to the level required for direct recharge of groundwater (i.e., reverse osmosis), and the fate of pollutants in the reclaimed water including salinity and metals, but especially "emerging contaminants", here referred to as pharmaceuticals and personal care products (PPCPs). This project will evaluate these key concerns through four components; irrigation research, phytoremediation research, education and outreach.

Application Number: A67917

Faculty Member: Gregory Ettl

Role: Principal Investigator

Faculty Member: David Peterson

Role: Co-Investigator

Title: The Western Mountain Initiative: Vulnerability and Adaptation to Climate Change in Western mountain Ecosystems

Agency: USDI US Geological Survey

Period: 8/1/2010 - 12/31/2013

Amount: \$140,000

Supplement and Extension

Climate warming is affecting Western mountain ecosystems, directly through changes in water dynamics and indirectly through altered disturbance regimes. The Western Mountain Initiative team explores the effects of climate change on ecological disturbance, responses of forest vegetation, mountain hydrology, and the coupled hydro-ecological responses that determine vulnerability of Western mountain ecosystems to change. Extensive data sets, empirical studies, surveys, and monitoring programs are linked via models to hindcast and forecast the effects of changing climate on forest dynamics, distribution, and productivity; fire occurrence and insect outbreaks; recovery of vegetation after disturbance; hydrologic changes and glacier dynamics; and the consequences of an altered water cycle for terrestrial and aquatic ecosystems and chemistry. We will address the extent to which climate drivers are mediated by regional- or watershed-scale controls on ecosystem processes, thus quantifying vulnerability to climate change in mountain ecosystems. Region-specific results and emergent West-wide patterns will be shared with resource managers through workshops and a comprehensive web-based toolkit on climate-change science and adaptation management.

Application Number: A69035

Faculty Member: E. David Ford

Faculty Member: Gregory Ettl

Role: Principal Investigator

Role: Co-Investigator

Title: Calculation of Carbon Budgets in Shaded Tsuga Heterophylla and Abies Amabilis

Agency: USDA Forest Service

Period: 6/1/2009 - 12/31/2014

Amount: \$120,000

Supplement and Extension

This work continues research from which we have found that diffuse light of major importance, penetrating even dense coniferous canopies. By measuring diffuse light directly we find that both western hemlock and Pacific silver fir are able to grow in height up to 30 cm per year in 20-30% of full light and maintain adequate photosynthesis. Low thinning of mature even aged stands produces a heterogeneous light environment.

We seek to develop and test silvicultural systems, for both production and conservation objectives, that may utilize ecological conditions, or minimize their deleterious effects, and to do this in partnership with forestry interests on the Peninsula. We seek to develop silvicultures that utilize characteristics of the shade loving species found in this region and we seek to develop continuous cover silvicultural systems with low disturbance and where trees have high initial diameter growth.

Application Number: A68007

Faculty Member: Jerry Franklin

Role: Principal Investigator

Title: **Wind River Field Station**

Agency: USDA Forest Service

Period: 10/1/2011 - 7/31/2016

Amount: \$59,955

New

Faculty Member: Ken Bible

Role: Co-Investigator

This Joint Venture Agreement (JVA) between the UW and the USFS PNW Research Station is to conduct research and educational outreach activities at the Wind River Field Station (WRFS), formerly the Wind River Canopy Crane Research Facility. The purpose of the WRFS is to monitor key ecosystem processes and climate variables, develop new monitoring capabilities, provide management and oversight for ongoing projects and promote new research and educational/outreach activities. This project is to continue support of the UW's long-term monitoring of key ecosystem processes and climate variables, development of new monitoring capabilities utilizing the potential of the Climate Tower Network and to allow oversight of ongoing research and education activities in the Wind River Experimental Forest (WREF), and the promotion of new research, education and outreach activities in the WREF.

Application Number: A69312

Faculty Member: Jerry Franklin

Role: Principal Investigator

Title: **Warm Springs Reservation LiDAR Inventory**

Agency: Confederated Tribes of Warm Springs Oregon

Period: 7/22/2011 - 8/31/2011

Amount: \$0

New

Faculty Member: Van Kane

Role: Co-Investigator

The Confederated Tribes of the Warm Springs Reservation of Oregon will undertake an inventory of their forested lands using airborne LiDAR data to be collected this summer. While no money is available now to fund a UW project, the Tribes expect to fund a project to analyze the data in the future. UW's School of Forest Resources is a potential recipient of the funding. Applied research into the methods and applications of LiDAR data for forest inventories is an active area of forest research. Participating in this study would lead to one or more methodology papers that would further establish UW's leadership in this field of research. Depending on the amount of funding available, some funding for a graduate student may be available.

To support that analysis, the Tribes will re-measure ~20% of their field sites so that the ground and LiDAR data are concurrent. To optimize the selection of these sites for re-measure, they are seeking to work with Dr. Van R. Kane, research associate working under Dr. Jerry Franklin. The work would consist

of applying statistical methods to determine the sites that best represent the diversity of forested conditions. The work is expected to take one to two days and is being offered with no request for funding. Performing this work will provide experience in these methods, which is an area of active applied research in its own right, and establishes a relationship between UW and the Tribes.

As a condition of sharing their forest inventory data for the analysis, the Tribes are asking UW to execute a non-disclosure agreement .

Application Number: A68433

Faculty Member: James Fridley

Role: Principal Investigator

Title: **SmartWEPP: A New Generation Water Management Tool Using Smartphone Technology**

Agency: USDA

Period: 9/1/2011 - 8/31/2014

Amount: \$299,830

New

This study will develop SmartWEPP, a water management tool using smartphone technology for improving site-specific local decision-making. SmartWEPP will be based on the USDA's Water Erosion Prediction Project (WEPP) model of which interface is currently under development for online geospatial information system (GIS) application. SmartWEPP will allow in-field professionals, stakeholders and interested general public to estimate watershed discharge and sediment yield with minimum amount of inputs, using built-in global positioning system (GPS) within smartphones, a complex hydrology model, and comprehensive online database on a public server.

Specifically, we propose to (1) engage stakeholders to further develop our understanding of (a) how they use water management tools for their decision-making, especially in the field, and (b) the key inputs and outputs that the stakeholders would like to use; (2) improve and develop online GIS WEPP interfaces and database that are specifically designated for the smartphone applications; (3) develop smartphone applications for three major smartphone platforms (Android, Symbian, and Apple); (4) acquire the stakeholders' feedback on the developed smartphone applications and further improve them; (5) disseminate and transfer information and technology derived in this study to stakeholders and decision-makers through various technology transfer venues, including a website, classroom education, extension programs, workshops, conferences, and peer-reviewed publications.

Application Number: A68603

Faculty Member: Robert Harrison

Role: Principal Investigator

Title: **Effects of Organic Matter Retention & Management on Long-Term Productivity of Pacific Northwest Coastal Douglas-Fir Plantations**Doug

Agency: National Council for Air and Stream Improvement
Period: 7/16/2011 - 3/31/2012
Amount: \$40,000
Non-Competing Supplement

The goal of this project is to gain a better understanding of the long-term consequences of various levels of organic removals, nutrient allocation, and soil compaction, as well as the appropriate ameliorative or growth enhancement treatments that can be used to sustain productivity through multiple rotations on the Pacific Northwest's most productive soils. Although N fertilization is commonly used in Pacific Northwest Douglas-fir stands for enhancing, it is not known to what extent organic matter will be enhanced by N fertilization through successive applications, or how it compensates for the nitrogen removed from the system through harvest. This study will begin to fill this critical data gap in the Pacific Northwest Region.

This amendment is to extend the MOA and supplement this project.

Application Number: A69211
Faculty Member: Thomas Hinckley Faculty Member: Ken Bible
Role: Principal Investigator Role: Co-Investigator
Title: **Wind River Canopy Crane Decommissioning**
Agency: USDA Forest Service
Period: 9/1/2011 - 7/31/2012
Amount: \$72,645
New

For over 15 years, the U.S. Forest Service in cooperation with the UW has supported forest canopy and ecosystem research at the Wind River Canopy Crane Research Facility in the T.T. Munger RNA in the Wind River Experimental Forest (WREF). Demand for crane time has dwindled in the last several years. In view of current and anticipated future budget constraints, the PNW Research Station will no longer be able to support operation of the crane gondola, but is committed to supporting the tower- and ground-based monitoring activities at the site in the form of a restructured facility called the Wind River Field Station.

This proposal is to confirm payment arrangements to dismantle the former Wind River Canopy Crane Research Facility's mobile portion of the HC550 Liebherr tower crane. Load and counter jibs, operator's cab and two gondolas are to be removed via mobile crane and low-boy carrier to the open field adjacent to the T.T. Munger RNA for sale. Work is to be performed by Northwest Tower Crane Service in the most environmentally responsible means available.

The University of Washington owns the Wind River Canopy Crane which is to be decommissioned due to budget constraints to reduce future operating expenses. The Forest Service owns the land that the

Canopy Crane sits on, and also wants to decommission the crane to reduce expenses. The Forest Service and the Cooperator are willing to combine resources to accomplish the decommissioning. The proposed project will benefit both entities by reducing future costs and liability.

Application Number: A69069
Faculty Member: Soo-Hyung Kim
Role: Principal Investigator
Title: **Modeling Particle Film Effect on Photosynthesis**
Agency: USDA
Period: 7/1/2011 - 12/31/2011
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.

Application Number: A69452
Faculty Member: Sarah Reichard
Role: Principal Investigator
Title: **2011 USFS Seed Collection**
Agency: USDA Forest Service
Period: 6/1/2011 - 4/30/2012
Amount: \$5,000
New

The U.S. Forest Service is mandated to manage threatened and endangered species to achieve their recovery and sensitive species to avoid trends toward listing and avoid loss to species viability (FS 2670). It has been a number of years since a rare and endangered plant conference has been held in the Pacific Northwest. UWBG is coordinating a conference focused upon rare and endangered plants to be held March 13-14, 2012 at their on-campus facility. The conference is entitled "Conserving Plant Biodiversity in a Changing World: 4. View from Northwestern North America." The purpose of this conference is to

bring together practitioners, consultants, and experts in the field of rare plants and plant conservation to share and update their findings on the distribution, abundance and threats to plant biodiversity in the Pacific Northwest. The conference offers an opportunity to share new information and collaborate with regional botanists and plant population biologists to find solutions to sustaining plants for the long-term in the face of a changing climate. USFS Region 6 has been involved in the conference planning and through this purchase order will be officially "sponsoring" the conference with financial assistance.

Application Number: A68984
Faculty Member: Sarah Reichard
Role: Principal Investigator
Title: **Rare Plant Monitoring**
Agency: USDI Fish and Wildlife Service
Period: 4/1/2011 - 3/31/2012
Amount: \$5,000
Non-Competing Supplement

The purpose of this conference is to bring together practitioners, consultants, and experts in the field of rare plants to share and update their findings on the distribution, abundance and threats to plant biodiversity in the Pacific Northwest. The conference offers an opportunity to share new information and collaborate with regional botanists, and plant population biologists to find solutions to sustaining plants for the long-term in the face of a changing climate. on by Rare Care, and approximately 20 new volunteers will be trained in rare plant monitoring techniques.

Application Number: A69117
Faculty Member: Luke Rogers
Role: Principal Investigator
Title: **Oregon LiDAR Processing**
Agency: USDA Forest Service
Period: 8/1/2011 - 7/31/2016
Amount: \$30,000
New

Airborne laser scanning (LIDAR) data can be used to characterize vegetation structure across large land areas. Data layers derived directly from the point cloud provide information describing vegetation size, density, and spatial distribution. When combined with appropriate ground plots, descriptive statistics computed from the point cloud can be used to model and predict forest inventory variables and structure (Strunk 2008, Means et al. 2000).

The primary purpose of the proposed project is to process LIDAR point data and canopy surfaces to derive descriptive statistics for land managed by the Bureau of Land Management (BLM) in Oregon

covered by LIDAR data acquired by the Oregon Department of Geology and Mineral Industries (DOGAMI) and to use previously computed statistics and ground measurements for plots on the Deschutes National Forest to develop models describing forest inventory variables. Specific tasks include:

- Develop procedures to organize and process LIDAR data covering areas managed by the BLM in Oregon to produce canopy height models and compute descriptive statistics for the canopy surface and LIDAR point cloud;
 - Develop models relating LIDAR metrics to forest inventory variables for the Deschutes National Forest;
 - Use the models to map forest inventory variables across the Deschutes National Forest (portions of the forest included in the 2009 and 2010 LIDAR acquisitions);
 - Assess the accuracy of the mapped results using independent data (stand exams from the National Forest and photo-interpreted information from other PNW Station scientists).
-

Application Number: A69203

Faculty Member: Clare Ryan

Role: Principal Investigator

Title: **Measuring Watershed and Climate Impacts of the 'Environmental Stewardship Footprint': A Framework for the Green-Duwamish Watershed**

Agency: USDA Forest Service

Period: 10/1/2011 - 9/30/2014

Amount: \$50,001

New

This research will address the question: How do we assess the consequence of citizen-based environmental stewardship activities. Using the Green-Duwamish watershed as a case study, we will (1) identify and map forest and watershed restoration activities; (2) measure volunteers' and private landowners' interests in managing and restoring lands for watershed protection and for carbon sequestration purposes; and (3) develop an analytic framework for linking social and ecological outputs of these stewardship activities to larger scale social and ecological goals and indicators identified by PSAA and regional climate change targets.

This study will build on a previous research conducted as part of the Integrated Urban Forest Assessment (IUFA) project, a collaborative effort between University of Washington School of Forest Resources, U.S. Forest Service PNW Research Station, Cascade Land Conservancy, and King County Department of Natural Resources and Parks. This research is also part of a larger collaboration called the Green Cities Research Alliance (GCRA), which also includes City of Seattle, Washington DNR, and several conservation research and nonprofit organizations such as EarthCorps, International Forestry Consultants, Inc. There are currently several GCRA environmental stewardship assessment projects underway in Seattle and King County that would help address objectives 1 and 2. Workshops will be used for objective 3.

Application Number: A69440

Faculty Member: Sandor Toth

Role: Principal Investigator

Title: **Dynamic Reserve Selection: Modeling the Land Price Feedback Effect in Strategic Land Retentions in Western Washington**

Agency: USDA Forest Service

Period: 9/6/2007 - 10/1/2012

Amount: \$6,000

Supplement and Extension

The purpose of the proposed new work is to investigate if the conservation strategy of buying fewer and more expensive parcels under higher risk of conversion is indeed advantageous during the initial phase of an open space retention effort in competitive markets where the supply of land is uncertain. The above strategy was found to be optimal in previous work under this JVA by Tóth et al. (In Press) on Lopez Island, WA under most scenarios where two types of land price feedback effects, both driven by conservation acquisitions, were taken into consideration. The analysis in Tóth et al. (in press) assumed perfect knowledge of parcel availability. We want to test if the resulting conservation strategy is also valid when the spatial and temporal pattern of parcel availability for conservation purchases is uncertain.

Tóth will run a series of simulations where subsets of the 1,395 private forest parcels that exist on Lopez Island will be selected to be put on the market (hypothetically) in a sequential manner and subject to predefined probabilities. These probabilities will be directly proportional to the estimated conversion risks; that is the difference between the estimated market and forest values of the parcels. We will then apply a set of parcel selection strategies, including the one mentioned above, to each simulated land market scenario and see which one does the best. Our goal with this preliminary investigation is to see if a probabilistic dynamic reserve selection model is necessary to tackle the element of supply uncertainty outlined above.

Application Number: A68899

Faculty Member: Sandor Toth

Role: Principal Investigator

Title: **Integrating Carbon and Other Ecosystem Services into a Framework for Forest Management**

Agency: USDA Forest Service

Period: 9/1/2010 - 8/31/2013

Amount: \$89,142

Supplement and Extension

Faculty Member: Gregory Ettl

Role: Co-Investigator

Request additional funding to expand our work developing a forest planning framework based on ecosystem services for the Drink Planning Unit in the Deschutes National Forest. The Drink Unit is a

17,000 ac montane-subalpine forest that also serves as the municipal water supply for the City of Bend, Oregon. In addition to being the primary source of clean water for a significant population center, the area has high recreational, cultural and ecological values. To date, the Drink Planning Unit is being held as a habitat reserve with no harvests, and limited recreational activity. There is concern, however, that the lack of active fuel management might increase the risk of catastrophic wildfire, which in turn could lead to losses in water and wildlife habitat quality and other ecosystem functions. The goal of the project is to incorporate a set of management objectives that are explicitly linked to these key ecosystem functions in a spatial forest planning model. The model will aid decision makers in determining what actions, if any, should be taken in the Unit over time to best integrate the following list of ecosystem services: (1) fire risk minimization, (2) the minimization of expected sediment load in the water downstream, and (3) the maximization of expected spotted owl habitat.

In the first phase of the project, our team visited several potential sites within the Deschutes National Forest and worked with forest managers to select the Drink Unit as the demonstration site for the proposed integrated, ecosystem services-based forest planning model. We delineated a short-list of ecosystem services (see above) for inclusion in the model and identified the most critical data needs. Our team has also processed the available geographic and inventory datasets in preparation for the modeling work. We request additional funds to develop the spatial planning tool and populate it with real data from the Deschutes National Forest.

The following tasks require funding: (1) Finalize the mathematical model that integrates the three ecosystem services and links these services to treatment actions on the ground; (2) Work with Forest Service ecologists and field foresters to identify the set of alternative treatment schedules that are to be considered by the model for each treatment unit within the watershed; (3) Calibrate and run the Forest Vegetation Simulator, in collaboration with Forest Service personnel, to project treatment unit conditions into the future given the alternative treatment schedules; (4) Populate and run the planning tool with the projected data, and (5) Visualize and present the solutions to the Deschutes National Forest, the stakeholders and the scientific community.

Application Number: A69033

Faculty Member: Eric Turnblom

Role: Principal Investigator

Title: **Data Gathering for Updated Logging Residue Ratios**

Agency: USDA Forest Service

Period: 6/1/2009 - 12/31/2014

Amount: \$35,000

Supplement and Extension

The goal of the current study is to gather data directly from harvested sites to produce estimates of actual logging residues obtained from different harvesting techniques used in different timber types. A funding supplement expanded the scope of inference of the current study by, among other things, examining stands in pre-harvest condition to estimate biomass of expected logging residuals from standing trees. The methods and models currently used for this purpose are derived from an extremely

small, localized data set that have been shown to be inapplicable to most sub-regions in the Pacific Northwest. Forest stands on the Olympic Peninsula will be examined prior to harvest to gather the data necessary to estimate biomass in, for example, branches + foliage, unmerchantable tops, and stemwood and bark, for individual trees, enabling more complete estimation of the biomass resource. The work proposed herein will expand the scope of that proposed for the previous supplement to two more species.

Application Number: A69036
Faculty Member: Eric Turnblom
Role: Principal Investigator
Title: **Digital Bitterlich Sampling**
Agency: USDA Forest Service
Period: 9/1/2011 - 12/31/2014
Amount: \$70,000
New

Point sampling is a method of estimating the amount of basal area in a stand - the cross sectional area of all trees measured at 4.5 feet above the ground. In a Bitterlich- or point-sampling system, the area sampled is different for trees of different sizes - some trees farther away will be measured and other, closer trees will not. Point sampling concentrates on the larger trees which contribute most to volume and density, and therefore can best aid managers in decision-making. If the diameter of a tree can be measured from a digital photograph, then there is the potential to supplant analog field instruments with a digital camera, and improve efficiency. Improved efficiency in this case means lower maintenance and administration costs to the landowner. Such an outcome would help maintain current timberlands and perhaps promote new and future investments in future timberlands (instead of alternative land uses). For this reason alone such a system warrants investigation. Useful additional information gained from the digital method, not available from the analog methods, is a stem map. These data can be used to infer spatial structure of a stand and may inform stand dynamics models for more precise determination of silvicultural manipulation outcomes.

Application Number: A68908
Faculty Member: Daniel Vogt
Role: Co-Investigator
Title: **The Impact of Urban Pattern and Built Infrastructure on Stream Biotic Conditions and Water Quality in the Puget Sound Region**
Agency: USDA
Period: 1/1/2012 - 12/31/2014
Amount: \$564,549
New

Human settlements have a dramatic impact on water resources across many scales ranging from large regions to small catchments. In urbanized areas, combustion and fertilizer uses result in high nutrient loading, commercial and industrial activities release contaminants, and cross-contamination between sewage and stormwater drainage systems discharge microbial pathogens to surface waters. Additionally, runoff significantly increases, due to the construction of impervious surfaces, resulting in increased flooding and stream down-cutting. These combined impacts are manifest in the “urban stream syndrome”. This syndrome is characterized by changes in stream morphology and amount, timing and duration of discharge. Coupled with elevated nutrient and pollution inputs, this often results in degraded ecological functioning of the stream, as indicated by reduced nutrient cycling, metabolism, and benthic macroinvertebrate species diversity and richness metrics. Increasing urbanization and human use of aquatic areas are associated with increased incidence of aquatic-borne disease from contact with unhealthy natural environments, such as contaminated water, toxic algal blooms, and eating contaminated marine food products.

Although many have investigated the impacts of land use and land cover (LULC) on aquatic conditions, few have investigated how patterns of urban development and infrastructure interact and affect watershed hydrology, biochemistry, and ecological processes. We are proposing to investigate how patterns of urbanization, land use legacies, and built infrastructure in the watershed have differential effects on stream biological conditions and water quality in urbanizing basins. Specific scientific questions we will address in this work include:

- How do watershed conditions and water quality vary as a function of urban patterns (land use and land cover) across a gradient of urbanization?
- How do stormwater/wastewater infrastructures interact with land use and land cover patterns and affect contaminants and nutrient loads.
- What nonlinearities, thresholds, discontinuities, and path dependencies explain watershed biological conditions and water quality
- How do we translate this knowledge into tools that resource managers and decision makers can use to plan for future growth?

We will address the above questions via cross-sectional and longitudinal analyses. We will use a set of landscape metrics derived from information theory to model the ecological effects of the complex spatial patterns of land use and land cover. We will measure landscape patterns using selected spatial metrics that we have found relevant to hydrological and biogeochemical processes in urbanizing landscapes in previous research. We will then investigate how these patterns vary for the drainage in relation to water quality and benthic index of biotic integrity (BIBI) sampling locations using appropriate spatial statistical techniques. Our longitudinal analysis will utilize a space-for-time substitution to investigate the effect of watershed development age on stream water quality and biotic integrity. We will utilize county assessor information from each of the counties, along with other historical data, to categorize study watersheds by era of development in order to test this factor as a possible explanatory variable for stream water quality and BIBI. At a finer scale we are placing a particular emphasis on understanding physical and ecological processes within the riparian zone, the interface between

terrestrial and aquatic ecosystems. We will select a subset of watersheds for intensive field investigation of riparian biogeochemistry.

Application Number: A69102

Faculty Member: Aaron Wirsing

Role: Principal Investigator

Title: **CAREER: Does Matrix Quality in Fragmented Landscapes Affect the Intensity and Spatial Pattern of Predation?**

Agency: National Science Foundation

Period: 10/1/2012 - 9/30/2017

Amount: \$970,252

Competing Revision

Prey species in fragmented landscapes typically are assumed to occupy suitable habitat patches, or 'remnants', set amidst an inhospitable matrix. Most studies of the effects of fragmentation on animal populations have therefore focused on characteristics of remnant patches (area, isolation) while ignoring their surroundings. Yet, a growing literature suggests that matrix degradation affects population demography and extinction risk in remnants. The mechanisms underlying this process are poorly understood. Declining matrix quality could influence species in remnants by modifying predation, but this possibility has not been addressed. I propose to examine the effects of matrix quality on spatial patterns of snowshoe hare (*Lepus americanus*) depredation, and habitat use by hare predators, in a fragmented boreal forest landscape in north-central Washington State. Using a natural experiment involving six 20-ha forest remnants surrounded by matrix of varying quality, I will weigh support for two competing hypotheses: the refuge model, which posits that matrix deterioration enhances predation on prey individuals that leave the protective confines of remnant patches, and the incursion model, which holds that low matrix quality intensifies predation inside remnant patches, and thereby robs prey individuals of refuge habitat, by facilitating predator access.

Application Number: A68909

Faculty Member: Kathy Wolf

Role: Principal Investigator

Title: **Urban Forest Human Health and Well-being Benefits: Translating Evidence to Economic Valuation Models**

Agency: USDA Forest Service

Period: 8/1/2011 - 7/31/2015

Amount: \$137,419

New

Anecdotes suggest how urban trees and forests contribute to human health and well-being (HHWB). Nearly forty years of research confirms and provides fuller description of such benefits. The studies are

distributed across many disciplines and publications, making them difficult to access. A UW team prepared a series of web-based summaries of the studies (USFS support) in 2010. For this project the HHWB benefits will be translated to economic valuations. Our approach includes a multidisciplinary collaborative team to translate the evidence of HHWB benefits to economic values. We will prepare a comprehensive framework of valuation approaches, demonstrating why communities should invest in urban forestry to enhance social benefits. An expert panel will review and revise the core work of the project team. Also, at this time HHWB benefits are not adequately represented in the i-Tree suite of analysis tools. The HHWB research summaries and economic benefits framework will serve as the foundation for development of “i-Tree Community” to provide a practical analysis tool. This project will generate the economic basis of an i-Tree Community tool, expanding the current environmental benefit focus of i-Tree to include an expanded range of urban forest benefits, and build better support for urban forestry across U.S. cities.

Application Number: A69144
Faculty Member: Kathy Wolf
Role: Principal Investigator
Title: **K Wolf/USFS-Interagency Personnel Agreement**
Agency: USDA Forest Service
Period: 10/1/2011 - 10/8/2012
Amount: \$73,171
Non-Competing Supplement

USDA Forest Service Research and the Pacific NW Research Station are expanding research programs on urban natural resource stewardship (UNRS). In developing its 2005-2010 strategic plan, the PNW Research Station identified the need to initiate a program of research in urban forestry and develop a proposal to establish an urban long term research area (ULTRA) in Seattle. To help advance these initiatives, PNW scientists identified a particular need to add expertise in the human dimensions of urban forestry and natural resource stewardship and education. Dr. Kathleen Wolf of the University of Washington is a leading scholar in urban forestry in the Seattle area and nationally. The USFS entered into an IPA with her to help launch the UNRS effort in the PNW Station in October 2008. As a result of accomplishments, the scope of initial duties and tasks have expanded significantly since the original IPA and new tasks have been added. For these reasons the IPA will be extended through October 8, 2012 and increase the portion of salary covered by the Forest Service to 75%.

Application Number: A69195
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 - 3/31/2013

Amount: \$46,000

New

The objectives of this cooperative effort are to construct a comprehensive geocoded representation of the organizations that are conducting civic environmental stewardship concerning urban forest and urban ecosystems in the Seattle metro region. Why is this research important? Local governments, public agencies, and environmental NGOs are increasingly interested in sustainability and green infrastructure. Parks, natural areas, forests, and natural waterways that are well managed offer many public benefits - environmental, social, and economic. Funding is limited for resource management; the efforts of stewardship groups and organizations are critical to fill the gap. Organized, well-trained groups of citizens can work to restore nearby natural areas, and in their work, help to build stronger, healthier socio-ecological communities. A 2010 pilot study determined that about 700 organizations, NGOs, and groups conduct environmental stewardship projects in King and Pierce counties. This citizen-based activity is a considerable resource for addressing the environmental issues of our urban areas. Yet we know little about the patterns, scope, and outcomes of environmental stewardship. This project will provide the first phase of a detailed assessment of stewardship activity and locations, focusing on the metro Seattle area. We will conduct a geospatial mapping analysis of programs and participant densities, in association with an organizational network analysis that is now underway. The work is a replicate of the Stewardship Mapping research that has been done by the USDA Forest Service in New York City and is also underway in the cities of Chicago and Baltimore. The project findings will provide a "footprint" of stewardship activity and its correlation to environmental mitigation need (such as priorities identified in the Puget Sound Action Agenda). Results will enable organizations, agencies, and project sponsors to build more effective programs, and engage greater numbers of stewardship participants.