



UNIVERSITY *of* WASHINGTON

School of Forest Resources

RESEARCH NEWSLETTER ISSUE ONE, VOLUME 10

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NEWS

Lynn Chronister, director of OSP, announced at the Monthly Research Administrators' Meeting that they are tightening up and clarifying the GIM 19 deadlines, especially the 2 day rule. There will be no more calling a proposal ready and then withdrawing it to upload changes after the 2-day deadline has passed: now a waiver will be needed for that just as if it were a new proposal submission. The OSP reviewers will not look at a proposal until it is marked "ready to submit" and they will not allow corrections after the 2 day deadline. So, for example, if a proposal isn't marked ready until 3 days out, there is only 1 day for the reviewer to look at it and make comments, and for us to make the corrections and get it back in. It is easy to imagine many situations where that would be very difficult.

Another issue we've heard a lot about lately is putting administrative and clerical salaries on grants and contracts. There has been a lot of feedback from researchers across campus, leading to a review of the job class codes that are in the restricted categories. The list has been reduced to about 25% of what it was formerly. Clarification on what constitutes unusual or unique circumstances is being developed which will make it easier to prove the reasonableness of administrative costs being directly charged, especially for research groups and centers who need

administrative support. Further, if administrative support is requested and spelled out in the proposal, and is not disallowed by the sponsor, that will be deemed sponsor approval. There is always the risk that an auditor would disagree, but as long as we use common sense and moderation, it should be easier to get the necessary set up through OSP and GCA.

AWARDS

Application Number: A54630
Faculty Member: Jonathan Bakker
Role: Principal Investigator
Title: **Prairie Habitat Restoration for Endangered Species**
Agency: USDI Fish and Wildlife Service
Period: 7/1/2010 - 6/30/2011
Amount: \$80,000
Supplement

Habitat degradation and loss are key factors contributing to the rarity of various plants and animals associated with the prairie ecosystems of Western Washington. Furthermore, restoration activities need to occur at ecologically meaningful scales to provide adequate habitat to support viable new populations of these species. This project breaks new ground by developing techniques for restoring highly degraded sites through an adaptive, iterative, scaled approach. By doing so, it will significantly increase the breadth of potential sites that can be considered for restoration, and will result in the creation of new habitats that specifically include the establishment of new populations of Golden Paintbrush and the restoration of habitat components and resources required by several rare butterfly species.

Application Number: A58885
Faculty Member: David Briggs
Role: Principal Investigator
Title: **Stand Management Coop**
Agency: Pilchuck Tree Farm
Period: 1/1/2010 - 12/31/2010
Amount: \$5,338
Supplement and Extension

2010 Membership Dues to Stand Management Coop from Pilchuck Tree Farm.

Application Number: CGF7571D
Faculty Member: Sharon Doty
Role: Principal Investigator
Title: **Microbial strains from poplar trees for growth enhancement of plants**
Agency: UW Center for Commercialization
Period: 7/1/2010 - 12/31/2010
Amount: \$29,905
New

We have isolated several microbial strains, both bacteria and yeast, that improve growth of commercially important plant including rice, corn, and turfgrass. We propose to test our strains in a greenhouse study in order to gain strong quantitative assessments of plant growth, health, and yields. We will determine which microbial strains provide the highest growth enhancements under nitrogen-limitation for each crop species, and optimize conditions for the inoculations.

Application Number: A54714

Faculty Member: Soo-Hyung Kim

Faculty Member: Joshua Lawler

Role: Principal Investigator

Role: Co-Investigator

Title: **Assessing the impacts of climate change on urban forests in the Puget Sound region**

Agency: Cascade Land Conservancy

Period: 1/1/2010 - 12/31/2011

Amount: \$64,000

New

Climate change can create both challenges and opportunities for sustaining urban forests. Little research has been done to guide decisions on how to best manage urban forests while adapting for changes in future climate. We propose to develop tools for assessing the impacts of climate change on urban forests in the Puget Sound region. The tools which will include bioclimatic envelope models of target species to predict their range shift will be used to evaluate vulnerabilities and opportunities associated with developing conservation strategies and restoration priorities in the region's urban forests in a changing climate.

Application Number: A58908

Faculty Member: Joshua Lawler

Role: Principal Investigator

Title: **Connectivity analysis toolkit**

Agency: Wilburforce Foundation

Period: 6/1/2010 - 7/31/2010

Amount: \$18,000

New

Project goal is to make new connectivity analysis methods developed by the National Center for Ecological Analysis and Synthesis Connectivity Working Group useable by a broad group of grantees and other conservation planners. Project will build on new methods that overcome key limitations of current tools used by grantees to map wildlife linkages. However, these methods are currently only useable by a researcher with experience in command-line programming in Python or C++. Project will develop an accessible GUI-based toolkit for connectivity analysis incorporating significant new methods to greatly enhance the assessment of wildlife connectivity.

Application Number: A59241

Faculty Member: Luke Rogers

Role: Principal Investigator
Title: **Department of Revenue parcel database reporting**
Agency: WA Department of Revenue
Period: 6/1/2010 - 6/30/2011
Amount: \$40,000
New

Project goal is continued development of UW-led efforts to automate the development of an annually updated Washington State Parcel Database.

Application Number: A57794
Faculty Member: Miranda Wecker
Role: Principal Investigator
Title: **Habitat Work Schedule data entry for Watershed Resource Inventory Area 20**
Agency: Clallam County
Period: 3/15/2010 - 6/30/2010
Amount: \$6,000
New

Project goal is the entry of Habitat Work Schedule (HWS) data for the North Pacific Coast Lead Entity Watershed Resources Inventory Area 20 (WRIA 20) into the system established to compile all historical watershed and salmon restoration projects that have been undertaken over the last couple of decades in WRIA 20. Project will also explore ways to streamline the entry of HWS data.

PROPOSALS

Application Number: A59981
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: \$17,852
New

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.

Using the database of over 700 stewardship and sustainable design organizations within the Seattle-Tacoma area, this study will:

- (1) Explore the empirical basis for understanding the influence of various dimensions of motivations on involvement and participation in stewardship and sustainable design organizations.
 - (2) Contribute to an enhanced understanding of the structure and function of, including variation among, various stewardship and sustainable design organizations.
 - (3) Serve as an empirical basis for the transferability of insights fostering the stewardship of social-ecological sustainability goals across the nation.
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Application Number: A60010

Faculty Member: Stanley Asah

Role: Principal Investigator

Title: **Exploring Cultural Forest Ecosystem Services within a Framework for Forest Stewardship**

Agency: USDA Forest Service

Period: 9/15/2009 - 12/31/2013

Amount: \$45,000

Non-Competing Supplement

Faculty Member: Clare Ryan

Role: Co-Investigator

The Millennium Ecosystem Assessment (MEA) established the scientific basis for actions needed to enhance the conservation and sustainable use of ecosystems and their contributions to human wellbeing. (MEA, 2005). The MEA focuses on ecosystem services (ESs) grouped into four broad categories: (i) Supporting services like nutrient cycling, (ii) Provisioning services like timber and food (iii) Regulating services like nutrient cycling/carbon sequestration, and (iv) Cultural services like recreation and aesthetics.

The USDA Forest Service is developing the concept of ecosystem services as a framework for forest stewardship. The concept development will include: (i) identify, define and explain ESs to increase public perception and understanding of the goods and services produced from public lands; (ii) use ESs as a platform for involving partners in forest planning, project design and funding; (iii) help managers integrate ESs into decision making; and (iv) assess the impacts of project-level management activities on identified ESs. With a particular focus on cultural ESs, this study seeks to facilitate the collective identification and definition of ESs by relevant stakeholders.

The original research objectives were:

- (1) Bring together relevant forest sector stakeholders to collectively identify and define ESs particularly, cultural ecosystem services.
- (2) Contribute to problem analysis identifying management challenges that an ESs framework can address.
- (3) Serve as the primary basis for a quantitative assessment of cultural ESs for hypotheses testing, scenario analysis, and decision making.
- (4) Identify knowledge gaps and research needs pertinent to the use of ESs as a framework for forest management.
- (5) Examine potential threats, including fire and fire management actions, to cultural ESs.

As a result of the analysis of the first phase of interviews, the University Cooperators and PNW scientists have decided to add the following new objectives:

- (1) Perform an in depth exploration of emergent constructions (e.g., enhanced sense of place, trust, medium for inter-cultural understanding, venue for self-expression, stewardship opportunities) of cultural Ecosystem Services as nested benefits within a more holistic systems framework.
- (2) Conduct a more in-depth investigation and analysis of the emergent constraints to the provision of cultural ecosystem services within the Deschutes National Forest.
- (3) Conduct a survey of the residents of the Deschutes County to assess the prevalence/cultural demand and preferences of Ecosystem Services among this population.

Application Number: A59971

Faculty Member: Jonathan Bakker

Role: Principal Investigator

Title: **LTREB: Linking plant traits to demography and community dynamics**

Agency: National Science Foundation

Period: 7/1/2011 - 6/30/2016

Amount: not available

New

Understanding plant population and community responses is fundamental to predicting vegetation dynamics in an era of global change. Plant traits have received increased attention in the last few decades and have been scaled up from an original focus on individual traits to community-level traits and ecosystem functions. However, this approach assumes that traits

influence demography. We propose to evaluate the strength of the assumed links between traits and demography, and between traits and community dynamics. These links are difficult to study because it is difficult to collect and analyze the required data. However, we can obtain these data from two core sets of long-term vegetation plots from within the ponderosa pine-bunchgrass ecosystem of northern Arizona. We will continue to remeasure these plots over the next 10 years and will use the resulting long-term data sets to analyze the linkages between traits and demography, and between traits and community dynamics.

Application Number: A59562

Faculty Member: Renata Bura

Role: Principal Investigator

Faculty Member: Richard Gustafson

Role: Co-Investigator

Title: **Development of Sensors for Hydrolysis of Cellulosic Biomass to Sugars and Fermentation of Sugars to Biofuels and Biochemicals**

Agency: Consortium for Plant Biotechnology Research

Period: 1/1/2011 - 12/31/2011

Amount: \$79,405

New

Bioconversion of lignocellulosic biomass to biofuels and biochemicals is a complex process. To become economically viable it will require high conversion yields and operation near optimal conditions (i.e. minimum chemical, enzyme, and energy usage). The rapid, complete and efficient conversion of cellulosic substrates by enzymatic hydrolysis, however, remains a challenging goal, despite intensive research. A major reason for this lack of an efficient process is the heterogeneity of the biomass feedstock. High yields and optimal operation for diverse biomass will require rapid chemical analysis that can follow the progress of conversion processes in real time enabling global optimization of the biorefinery to achieve its production and efficiency goals.

Many companies are building the large scale biomass to ethanol facilities (Iogen, Abengoa, Poet) or running small scale demonstration plants worth millions of dollars (Lignol, Mascoma). The analytical instruments that may be used for monitoring these processes are relatively simple or not generally suitable for commercial operations. For example, the only chemical parameters being routinely measured in hydrolysis bioreactors are pH and pO₂, and in fermenters is ethanol concentration. Established laboratory techniques such as High Pressure Liquid Chromatography (HPLC) and Gas Chromatography (GC) are capable of producing exhaustive information about concentration of products following enzymatic hydrolysis and fermentation but the analysis is time consuming, expensive, requires skilled personnel, and is difficult to automate.

The objective of this research is to develop instrumentation for rapid chemical analysis of enzymatic hydrolysis of cellulose to produce sugars and fermentation to produce biofuels and biochemicals. The specific goals include the following:

- Develop an array of sensors that can be used commercially to follow the progress of hydrolysis, physico-chemical changes of the substrates and enzyme activity in real time.
- Develop an array of sensors that can be used commercially to follow the progress of fermentation of sugars to bioethanol and biochemicals.

In this project we will follow the progress of enzymatic hydrolysis by analyzing the composition of pretreated solids using a novel imaging flow cytometer and concurrently measuring sugar concentrations using Raman spectroscopy. Fermentation progress will be monitored with Raman

spectroscopy to measure the concentration of fermentation products such the ethanol, xylitol, arabitol, glycerol, lactic acid, acetic acid as well as inhibitors (5-hydroxymethyl furfurals, furfurals, phenolic compounds) and nutrients in the media. The new methods will be cheap, fast, robust and simply to use.

There is a compelling national need for a fuels and chemicals industry based on lignocellulosic raw materials. The proposed research may be exploited immediately by companies building lignocellulosic biorefineries using bioconversion. In the long term, extensive molecular engineering will be accomplished via enzyme-based and fermentation processing. All such processes will benefit from, and many will require, comprehensive and robust process analysis to continuously optimize the process. One could not imagine running a modern chemical plant or refinery without extensive instrumentation and advanced control. Future biorefineries will require similar or greater levels of instrumentation and sophisticated controls. The proposed research will provide a large step toward meeting that long-term need.

Application Number: A59478

Faculty Member: John Calhoun

Role: Principal Investigator

Title: **Building a Web-Based Interface to the Restoration Silviculture Initiative**

Agency: USDA Forest Service

Period: 6/1/2009 - 12/31/2012

Amount: \$5,000

Non-Competing Supplement

Decision-making may properly be regarded as a problem solving activity which is terminated when a satisfactory solution is found. Therefore, decision making is a reasoning or emotional process which can be rational or irrational, can be based on explicit assumptions or tacit assumptions. The rational-iterative approach is one such decision-making process that is particularly suitable for management of forest ecosystems. Repeated iterations of feedback between analysts and decision-makers lead to the development of an understanding of the tradeoffs among objectives for the decision-makers.

Many small, non-industrial land owners now face the important decision of continuing to invest in forestry in the face decreasing revenue potential, or to divest. This is particularly true where riparian regulations are in effect; this project will continue to develop management models and coordinate their online deployment. Of particular emphasis is content directed at riparian management decision-making.

Application Number: A58979

Faculty Member: Sharon Doty

Role: Principal Investigator

Title: **Climate Mitigation And Low-Input Crop Production Through The Use Of Fungai and Diazotrophic Endophytes**

Agency: USDA

Period: 1/2/2011 - 12/31/2015

Amount: \$3,174,696

Faculty Member: Soo-Hyung Kim

Role: Co-Investigator

New

Elevated CO₂ stimulates crop growth when N and water are not limiting. We propose to develop tangible options to mitigate climate change impacts on agriculture by utilizing beneficial microbial endophytes identified in the Doty and Rodriguez labs to increase water use efficiency, provide essential nutrients, and improve plant growth and tolerance to heat, drought, and salinity. Using corn and rice as model systems we will 1) develop the most effective inoculum of nitrogen-fixing endophytes for improved growth to minimize chemical fertilizer inputs; 2) quantify the effects on these model crop systems of inoculation with our fungal endophytes that impart stress tolerance and increase water use efficiency; and 3) assess the significance of endophytic symbiosis in mitigating the impacts of climate change. We will evaluate the physiological benefits of the endophytes under current and elevated CO₂ conditions. Utilizing crop simulation models, we will then assess agro-ecological and economic benefits of the use of endophytic symbionts in corn and rice systems.

Application Number: A59613
Faculty Member: Gregory Ettl
Role: Principal Investigator
Title: **CSF-PF/WA Stte Parks on-Call Projects**
Agency: WA State Parks and Recreation Commission
Period: 7/15/2010 - 6/30/2011
Amount: \$40,000
New

The purpose of this Agreement is to provide select technical assistance to the CSF-PF Applied Forest Ecologist/Stewardship Forester (FOREST ECOLOGIST), identified in IAA 911-xxx, so that individual can ensure that COMMISSION identified forest health activities can be undertaken in a timely and professional manner. Specify terms and conditions for this assistance are described in this on-call convenience contract.

Technical expert assistance to the CSF-PF FOREST ECOLOGIST will ensure that the FOREST ECOLOGIST is able to implement select, COMMISSION identified forest health activities, including:

- Undertaking forest health surveys to assess the condition of COMMISSION natural resources;
 - Creating appropriate records of field surveys, analyzing data and providing management recommendations for the COMMISSION, with consideration of stakeholders for specific areas in and around the state park system;
 - Marking timber, creating timber contracts and overseeing forestry operations implemented across COMMISSION natural resources;
 - Monitoring the response of forest attributes to restoration actions;
 - COMMISSION will provide available agency natural resources information, timely reviews of CSF-PF products, and CSF-PF will be responsible for assuring completion of projects.
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Application Number: A59693
Faculty Member: Gregory Ettl

Role: Principal Investigator
Title: **CSF-PF/WA State Parks Joint Appointment**
Agency: WA State Parks and Recreation Commission
Period: 7/15/2010 - 6/30/2011
Amount: \$60,000
New

The purpose of this Agreement is for the CSF-PF to provide technical expert assistance to a COMMISSION lead, in forest health assessment and management that protects and restores COMMISSION natural resources while engaging the public in their appreciation and stewardship. This contract describes the hiring of an Applied Forest Ecologist/Stewardship Forester (FOREST ECOLOGIST) who will serve both the CSF-PF and the COMMISSION. The FOREST ECOLOGIST will be a CSF-PF employee but with part of salary and benefits paid by the COMMISSION for work performed for the COMMISSION.

Application Number: A58218
Faculty Member: Jerry Franklin
Role: Principal Investigator
Title: **Lidar applications for detection of fuel characteristics at Mount Rainier National Park**
Agency: USDI National Park Service
Period: 7/1/2010 - 6/1/2012
Amount: \$40,962
New

Faculty Member: Van Kane
Role: Co-Investigator

This Task Agreement details the steps by which the National Park Service (NPS), and the University of Washington (UW) will collaborate in developing fine-scale LiDAR data layers and methodology in support of a fuel mapping project at Mount Rainier National Park (MORA). The LiDAR data will be used to link NPS field plots to canopy characteristics for eventual mapping throughout the park. The fuel mapping project will support fire and vegetation management planning efforts at MORA, as well as assisting in development of fuel mapping methodology to be used at other Pacific Northwest NPS units. Deliverables will include regression and imputations of predictive variables, and digital spatial data layers of LiDAR derived canopy characteristics. One or more jointly authored papers are expected, including methods for mapping fuel loads, and analysis of the contribution of LiDAR to fuel load mapping.

Application Number: A59858
Faculty Member: Jerry Franklin
Role: Principal Investigator
Title: **OPUS Structural development of temperate coniferous ecosystems and its relationship to function and biodiversity**
Agency: National Science Foundation
Period: 1/1/2011 - 12/31/2012
Amount: \$194,569
New

Synthesis of existing scientific information on structural development of temperate coniferous forests and the relation of structure to ecosystem function and composition (biodiversity) is the subject of this proposal. Numerous research projects on the structure of temperate coniferous forest ecosystems have been undertaken and reported during the last 40 years. A general model of developmental patterns and processes has been constructed and is widely used in both basic and applied science. However, there has been no attempt to systematically relate structural development to ecosystem functions – such as those related to production (capture and cycling of energy/carbon), regulation of hydrologic, nutrient, and other material cycles – and aspects of biodiversity and community ecology (e.g., species diversity and food webs). The synthesis proposed here involves two major synthetic efforts: (1) Hypothetical and empirical exploration of the relationship between temperate coniferous forest development and ecosystem function and biodiversity; and (2) Preparation of a scientific monograph on temperate coniferous forest structure, multiple pathways of structural development (including effects of disturbances), and relationships of structure to ecosystem function and biodiversity. The synthesis will incorporate data from the published literature, unpublished dissertations, and unpublished data from previous studies, including an extensive series of long-term plots. The synthesis will also compare and contrast structure and function of temperate coniferous forest with temperate hardwood and boreal forests. Funding is requested to provide salary support for and travel and technical support for the PI in these synthesis tasks.

Application Number: A59304

Faculty Member: Richard Gustafson

Role: Principal Investigator

Faculty Member: Renata Bura

Role: Co-Investigator

Title: **Application Of Consequential Life Cycle Analysis To Assess Sustainability Of Biofuels Produced From Woody Biomass In The Pacific Northwest**

Agency: USDA

Period: 10/1/2010 - 9/30/2015

Amount: \$830,960

New

Faculty Member: Clare Ryan

Role: Co-Investigator

Faculty Member: Sergey Rabotyagov

Role: Co-Investigator

The Pacific Northwest (PNW) has abundant forest biomass resources. There is evidence that large volumes of this biomass can be used without adverse environmental consequences. A consequential life cycle assessment (CLCA) is needed to determine if forest biomass can be sustainably used for biofuels production. The goal of this research is to conduct a CLCA and economic analysis of a PNW biofuels industry using woody biomass feedstock. We will apply the analysis to assess sustainability and economic development opportunities of a PNW based biofuels industry and to inform policy recommendations to support sustainable practices. To meet this goal we will:

Develop material and energy balance models of biorefineries to provide data for CLCA and to assess biorefinery profitability.

Develop and apply econometric models that estimate changes in land use, product use, and raw material demands as a function of forest biomass used for biofuels.

Develop and apply life cycle material and energy balance models for resource use, waste, and generation by the biorefineries and the resources identified in the econometric model. Develop policy recommendations to facilitate development of a PNW biofuels industry operating in an optimally sustainable fashion as determined from the CLCA results. The research will provide a comprehensive impact assessment of using PNW woody biomass for the production of biofuels and will show the best use of forests to produce renewable fuels while maximizing environmental benefits. Policy makers will use the CLCA data and policy recommendations to craft legislation that support sustainable woody biomass use.

Application Number: A57978

Faculty Member: Thomas Hinckley

Faculty Member: Jim Lutz

Role: Principal Investigator

Role: Co-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 - 1/29/2013

Amount: \$11,190

New

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.

Application Number: A59130

Faculty Member: Joshua Lawler

Role: Principal Investigator
Title: **Pests, Predators, and Multiple Stressors in Agroecosystems**
Agency: US Environmental Protection Agency
Period: 1/1/2011 - 12/31/2012
Amount: \$100,000
New

We will use concepts and models from spatial ecology to evaluate pest management options. We propose to parameterize a spatially-explicit population model to assess the effect of precipitation extremes (from climate change), land use change, rodent control, and their interactions, on rodents and a sensitive non-target species, the San Joaquin kit fox. We will use our models to evaluate scenarios of pesticide management under current conditions and plausible future climate and land use conditions, to attempt to maximize the combined effect of rodenticide and foxes on squirrel populations, while minimizing fox exposure to rodenticides. These models will be parameterized in the Central Valley of California, an agricultural area with Mediterranean climate. We expect that the modeling approach will be applicable across a range of agricultural systems and spatial scales.

Our model will provide a framework for making decisions about this particular system, but our approach can also be applied by the EPA or other decision makers to better regulate pesticides in cases where their use impacts sensitive non-target wildlife. Our results will also have clear implications for Integrated Pest Management (IPM) methods.

Application Number: A59573
Faculty Member: William McKean
Role: Principal Investigator
Title: **Cost Effective Increase in Soil Quality and Reduction in Agricultural Atmospheric Carbon Emissions by Conversion of Wheat Straw to Soil Amendments and to Higher Value Products**
Agency: Washington State University
Period: 1/1/2011 - 12/31/2015
Amount: \$323,964
New

In this project we will treat Pacific Northwest agricultural residues (wheat straw) by a mild, cost effective chemical process to produce high value pulp/paper fibers while simultaneously removing a portion the biomass lignin and of the hemicellulose in soluble form. We will recover the lignin and deliver it to WSU and to our other collaborators for application to soil as is or blended with biochar or biological sludge or inorganic nutrients. Sufficient modified or unmodified lignin will be produced for greenhouse, small plot and field testing over four years for testing of soil fertility, of soil resistance to erosion, of water holding capacity, of rate of mineralization and of reduction in atmospheric emission of GHG/volatile carbon oxides. We will modify pulping conditions in cooperation with WSU scientists to enhance lignin based soil changes and to enhance retention of inorganic nutrients and the bonding to biochar and sludges. In addition, simple sugars will be produced from soluble hemicellulose for hydrogenation testing by collaborator to qualify this source for added value glycol production (no cost to project). Through this project, we will demonstrate the feasibility of in situ processing to convert

agricultural waste products to improve the soil and produce high value byproducts, as well as reduce the atmospheric carbon emissions.

Application Number: A59570
Faculty Member: L. Monika Moskal
Role: Principal Investigator
Title: **Tacoma Canopy Cover Assessment**
Agency: WA Department of Natural Resources
Period: 8/1/2010 - 8/1/2011
Amount: \$29,888
New

Successful management strategies require a base of knowledge and information about forest resources in order to develop action plans and establish long-term goals.

The mission of the University of Washington (UW) Precision Forestry Cooperative (PFC) is to develop advanced technologies to improve the quality and reliability of information needed for planning, implementation, and monitoring of natural resource management, to ensure sustainable forest management, and to increase the competitiveness of Washington's forest sector. As part of PFC, the Remote Sensing and Geospatial Analysis Laboratory (RSGAL) aims to provide a research rich environment and exceptional resources that drive scientific investigations of multiple scale dynamics of landscape change through the innovative application of remote sensing and geospatial tools, and promotes a transdisciplinary approach for sustainable management solutions to pressing environmental issues. Consistent with these missions, the main purpose of this project is to provide guided analytical training to urban foresters, land managers, and city planners in an innovative technique to accurately quantify tree canopy cover using high-resolution aerial imagery and calculate forest change pattern metrics. The benefit of undergoing such training is the ability to deliver the results from the report produced in the workshop with confidence and authority for advocacy purposes.

During a free, 2-day workshop at the University of Washington (Seattle Campus) participants will be provided with:

- 1) Multiple dates of preprocessed sample imagery (1990s-2009).
- 2) An accurate technique for analyzing these data that is repeatable on future dates, other locations, or other datasets (e.g., canopy cover, impervious surfaces, agriculture, land-use land cover LULC).
- 3) Skills in quantifying and assessing the accuracy of the technique.
- 4) Skills in producing and understating landscape metrics for multi-temporal change analysis.
- 5) A summary report of their findings. This workshop module (description of method, training exercise, and report template) will then be freely available online to the general public. This workshop fills a need for city and county personnel in the state of Washington, who may not otherwise be able to afford training in the use of these new technologies in order to protect natural resources in their communities.

Post workshop, Dr. Moskal and Dr. Styers will work on a comparative report of finding for all communities that participated in the workshop and on a revision to the protocol based on the

feedback provided by the workshop participants. The report will be on the project website hosted by RSGAL along with revised workshop manual.

Application Number: A59333
Faculty Member: John Perez-Garcia
Role: Principal Investigator
Title: **Exploring the Economics of Forest Restoration**
Agency: USDA Forest Service-PNW
Period: 10/1/2010 - 12/31/2011
Amount: \$20,000
New

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: A59241
Faculty Member: Luke Rogers
Role: Principal Investigator
Title: **Department of Revenue parcel database reporting**
Agency: WA Department of Revenue
Period: 6/1/2010 - 6/30/2011
Amount: \$40,000
New

Project goal is continued development of UW-led efforts to automate the development of an annually updated Washington State Parcel Database.

Application Number: A60097
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 - 8/31/2012
Amount: \$30,000

Faculty Member: Gregory Ettl
Role: Co-Investigator

New

The overall objective of the FY2010 grant is to develop a research proposal that will allow the Deschutes National Forest to analyze the tradeoffs that exist behind different forest ecosystem services at certain project sites that yet are to be identified. The objectives of this scoping proposal are to determine a range of potential ecosystem services and their potential to be optimally provided, setting the stage for a larger project. Here we propose to: 1) identify a range of potential sites, 2) determine the spatial and temporal scale associated with native forest types and unique pilot sites, 3) identify key ecosystem services that are most important for each set of sites, 4) conduct a literature review of key ecosystem services identified, 4) develop a sampling scheme and rationale for a ground-based and modeled estimate of C for the Deschutes National Forest, and 5) draft an initial model for optimization based on potential combinations of ecosystem services. The deliverables will include a literature review of ecosystem services associated with vegetation types and unique habitats in the Deschutes NF and a proposal to evaluate optimal provision of those ecosystems in the future.