UNIVERSITY *of* WASHINGTON
School of Forest Resources

RESEARCH NEWSLETTER ISSUE TWO, VOLUME 11

News

Grants.gov rejection   OSP instituted the most recent change in deadlines to review proposals to allow for sufficient time for any Grants.gov submission errors to be identified and corrected in enough time to meet the agency deadline. SFR had not previously had any issues with it, so it was a big surprise when a Grant.gov submission failed in July. At issue was a difference in Adobe software converting the attachments. (Some were done by members of the research group and some were done by me.) The Grants.gov system identified that as a fatal flaw and would not accept the proposal for routing to the agency for review. OSP petitioned for permission to submit late, but the petition was denied, since there was no fault on the government. A tremendous amount of work was lost with no recourse.

Now that we understand the issue, we can take steps to make sure that it doesn't happen again. First, ALL documents must be submitted as Word documents, to be converted by the grant management staff. PDFs will not be accepted. Second, all documents need to be submitted with sufficient time to convert and upload – late or last minute changes have the potential to bring down the entire proposal, so don't take a chance on it. The OSP deadline for final documents is 3 days before the submission date; an additional day prior to that will give enough margin that we don't get caught short and take this very unnecessary risk.

Required training for researchers   The Office of Research has introduced a web site to address the need for information about training: http://www.washington.edu/research/compliance/required_training/. It was developed with multiple central UW compliance offices and UW researchers, with one goal, to ensure that members of the UW research community can easily identify training required for their area of research. The site provides one-stop access to information on required trainings related to the conduct of research and includes:
  - An overview of all research-related trainings that can be filtered by research area
  - Detailed description of each training, including the required frequency
  - Easy access to training registration
  - The specific federal and state regulation or UW policy that mandates the training requirement
  - The ability to share results from a pre-filtered set of results
To request a demonstration of the webpage, contact research@uw.edu to.

New benefits rates have been published. They are generally higher, but the amount varies, depending on the job classification; see GIM #3 at http://www.washington.edu/research/osp/gim/gim3.html. The new rates are being applied now, effective July 1, 2011, so you will see the impact on your budgets immediately and the new rates should be applied to all new projects. The rates we most frequently use are:

Faculty	27.2%
Graduate students	16.1%
Hourly	14.9%
Professional staff	33.6%
Classified staff	33.4%

Human Subjects changes   Approval in Principle (AIP) is a mechanism developed many years ago by the Human Subjects Division (HSD) to allow new federal awards to be released before IRB approval was obtained for the research project, with the limitation that the released funds could not be used for any activities involving human subjects. Researchers have been increasingly, and inappropriately, asking for Approval in Principle as a temporary substitute for IRB approval that allows federal funds to begin flowing. HSD has learned from several federal agencies that Approval in Principle, as historically implemented at the UW, is inconsistent with federal regulations and is no longer acceptable. **Effective immediately**, HSD is replacing Approval in Principle with an easier but more restricted process called **Limited Activities Determination (LAD)**. Far fewer grants will qualify for LAD status than qualified for Approval in Principle; if you have anticipated getting AIP for an upcoming project, it may no longer be possible. For more information, see http://www.washington.edu/research/hsd/topics/Limited+Activities+Determination+%28LAD%29.

Awards

Application Number: A62968
Faculty Member: Jonathan Bakker
Role: Principal Investigator
Title: **Prairie Habitat Restoration for Endangered Species**
Agency: USDI Fish and Wildlife Service

Period: 7/1/2011 - 6/30/2012
Amount: $80,000
Competing Supplement

The prairie ecosystems of Puget Sound contain a disproportionate number of federal and state listed species. Habitat degradation and destruction have been identified in recovery documents and by biologists as key factors contributing to the rarity of these species. These threats are ubiquitous, of high magnitude, and ongoing (imminent). There is not enough extant habitat of reasonable quality to support these species, so restoration of highly degraded sites such as abandoned agricultural fields is urgently needed. Furthermore, restoration activities need to occur at ecologically meaningful scales to provide adequate habitat to support viable new populations of these species. This project addresses these recovery needs by adaptively improving our methods for restoring highly degraded sites. By doing so, it will result in habitats that can support viable populations of these species. Restoring this habitat will also benefit other species, common and rare, within prairie ecosystems. Finally, this project specifically addresses the recovery of golden paintbrush by establishing two new populations of this species. We have initiated experimental treatments (combinations of site preparation and seeding) at four sites, two in South Puget Sound and two in North Puget Sound. Multiple research arrays are being established at each site, as are scaled-up plots that are 10-100x larger than the experimental plots. Year 4 activities will include seeding the scaled-up plots, monitoring all plots at all sites, data analysis, and outreach.

Application Number: A63785
Faculty Member: David Briggs
Role: Principal Investigator
Title: **Stand Management Coop**
Agency: Port Blakely Tree Farms LP
Period: 1/1/2011 - 12/31/2011
Amount: $16,523
Supplement and Extension

2011 Stand Management Coop Membership Dues for Port Blakely Tree Farms.

Application Number: A67870
Faculty Member: David Briggs
Role: Principal Investigator
Title: **Stand Management Coop**
Agency: Pilchuck Tree Farm
Period: 1/1/2011 - 12/31/2011
Amount: $6,339
Non-Competing Renewal

Application Number: A60759
Faculty Member: Sharon Doty
Role: Principal Investigator
Title: **Pytoremediation with endophytes**
Agency: Edenspace Systems Corporation
Period: 4/1/2011 - 9/30/2011
Amount: $48,000
New

Project goal is to explore endophyte-assisted phytoremediation of organic pollutants, focusing on the microbes living within poplar and willow, two plant genera with proven phytoremediation capabilities. These internal microbes, termed endophytes, have excellent plant growth-promoting properties. In addition, they have the potential for improving the remediation capability of the host plant. Since endophytes colonize the vascular tissues and intercellular spaces of the plant without causing disease, they can partner with the plant to degrade the pollutants that pass through the plant. Project is currently working with a number of microbial strains that degrade TCE and PAHs. By inoculating poplar with these strains and selecting for effective colonization or conjugative transfer of catabolic genes to the existing endophytic microbial population, objective is to cultivate the optimum partnership for enhanced phytoremediation.

Application Number: A67916
Faculty Member: Soo-Hyung Kim
Role: Principal Investigator
Title: **Development, validation, and verification of new modules for corn model MaizSim and potato model SpudSim**
Agency: USDA
Period: 6/1/2011 - 5/31/2016
Amount: $30,000
New

Project goal is improvement of the crop simulation models for corn - MAIZSIM and potato - SPUDSIM by developing enhanced modules and algorithms for simulating crop physiological and growth responses under arid conditions. Using the data collected under irrigated conditions of the Pacific Northwest and other regions, project will integrate the new modules and algorithms with the MAIZSIM and SPUDSIM models. These models will be tested against field data collected under a range of environmental, soil, and management conditions using several cultivars. Cultivar specific parameters will be identified and developed. Specific project goals include 1) develop new modules to partition carbon, nitrogen, phosphorous, and potassium in individual leaves, modules for simulation of leaf growth and

reproductive stages and organs in corn crop; 2) develop algorithms to calculate the effects of nutrient and water stress on leaf addition rates; and 3) determine variety related parameters for the corn and potato models.

Application Number: A56239
Faculty Member: Joshua Lawler
Role: Principal Investigator
Title: **Habitat climate-change sensitivity database**
Agency: National Wildlife Federation
Period: 2/15/2010 - 3/31/2011
Amount: $20,000
New

This project will develop and on-line database that both ranks the ecological systems of the Pacific Northwest with respect to their relative sensitivity to climate change and documents the ways in which they are sensitive. The database will include information and rankings for roughly 50 different ecological systems, chosen in conjunction with Northwest Wildlife Federation and Oregon, Idaho, and Washington fish and wildlife agencies. For each system, the database will contain information on the relative sensitivity to changes in fire regimes, hydrology, insect outbreaks, and invasive species, as well as the relative sensitivity of the dominant species in the system. The information for each of the systems will be collected with a combination of workshops, literature searches, input from individual experts, and data from a species-sensisive database that is currently under development.

Application Number: A66366
Faculty Member: Jim Lutz
Role: Principal Investigator
Title: **Climate Impacts on Burn Severity**
Agency: USDI US Geological Survey
Period: 7/1/2009 - 6/30/2012
Amount: $85,434
Supplement and Extension

We will use Landsat TM data from 1984 to 2009 to quantify the fire regime in forested areas in and near Yosemite National Park (one Landsat scene). We will compare the satellite measurements of fire severity with existing ground data related to fire effects, and we will validate the spectral signature of burned areas with field measurements. Measurements of burn severity will be correlated with existing climate data (PRISM, NARR, and RAWS). Finally, climate-fire relationships in Yosemite National Park will be compared with similar relationships examined by other project participants in Glacier National Park and Yukon Charley National Reserve for a synthesis of climate-fire relationships in western North America.

Application Number: A65888
Faculty Member: John Marzluff
Role: Principal Investigator
Title: **Neuroecology of American Crow Recognition of People**
Agency: UW Royalty Research Fund
Period: 6/16/2011 - 6/15/2012
Amount: $31,685
New

This proposal is a major, collaborative addition to the PI's research focus that will move from observing the behavior of wild animals to a coupled understanding of their behavior and the neural bases enabling behavior. The proposal will build a research base sufficient to support competitive proposals in an area for which he currently has little professional standing. A number of field studies have been conducted on American Crows aimed at understanding their population and social ecology. Most recently, those efforts have demonstrated that these animals recognize individual humans who have wronged them in the past and retain this information for over 5 years. They demonstrate individual learning of this information and infer social learning by observation as well. Recent advances in the ability to peer within the brains of small animals as they behave suggested an opportunity to further understand the neural bases of recognition in the crow. Then a collaboration with Dr. Donna Cross and Dr. Robert Miyaoka in the Department of Radiology tested the feasibility of PET scanning for crows. In the past two months a small pilot study was completed that shows this technique works on crows and that crows activate several regions in their forebrain (olfactory bulb, hippocampus, and other areas of the hyperpallium) differentially when they view a known dangerous person relative to a known, harmless person. While exciting and likely to produce a unique publication, these results are insufficient to couch future proposals to NSF or NIH. In addition, upgrades to existing facilities are needed to support more of this research; such a place would increase chances of subsequent funding. This project is to conduct 30 more PET scans of crows that will demonstrate the activation of their brain regions when viewing 1) no person, 2) a person, but not a face, 3) a familiar crow, 4) a crow predator, the red-tailed hawk, 5) a never before seen person perceived as dangerous because they will be holding a taxidermy mounted crow that appears to be dead. A crow holding facility will be built atop Guthrie Hall and improvements will be made to the experimental chamber.

Application Number: A63851
Faculty Member: Miranda Wecker
Role: Principal Investigator
Title: **Habitat Work Schedule (HWS) Data Compilation and Entry - WRIA 20**
Agency: Clallam County
Period: 11/1/2010 - 6/30/2011
Amount: $6,769

New

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

Olympic Natural Resources Center (ONRC) will provide NPCLE with professional services necessary to enter HWS data into the system and to compile all historical watershed and salmon restoration projects undertaken since 1990 in WRIA 20.

Application Number: A63927
Faculty Member: Miranda Wecker
Role: Principal Investigator
Title: **Washington Outer Coast NET MAP Data Compilation and Mapping**
Agency: Clallam County
Period: 7/1/2010 - 6/30/2011
Amount: $8,000
New

The Washington Coast Sustainable Salmon Partnership (WCSSP) requires technical assistance for GIS data compilation and mapping utilizing the NET MAP system as part of the development of its Salmon Recovery strategy for Washington's outer coast.

Olympic Natural Resources Center (ONRC) will provide WCSSP with professional services necessary to compile and map habitat variables critical to salmon restoration in the outer coast watersheds.

Proposals

Application Number: A67499
Faculty Member: Ernesto Alvarado   Faculty Member: James Agee
Role: Principal Investigator   Role: Co-Investigator
Title: **Wildland Fuel and Fire Management in a Changing Climate**
Agency: USDA Forest Service
Period: 4/1/2009 - 3/31/2014
Amount: $582,224
Non-Competing Supplement

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

Tribal lands. This agreement supports USFS PNW FERA and School of Forest Resource's research vision to:

A. Enhance programmatic fire planning, large fire decision support, hazardous fuel characterization and management, hazard assessment, fire behavior prediction, fire danger rating, and carbon flux assessments.

B. Promote attainment of desired future conditions and ensure the long-term integrity of ecosystems under a changing climate scenario, reduce air quality impacts and carbon emissions, and contribute to carbon management.

C. Improve fire management effectiveness and safety of firefighters and communities, and advance national and regional policy goals to reduce management costs.

D. Enhance restoration of healthy, resilient, fire-adapted ecosystems through evaluation of integrated fire/fuel management practices.

E. Develop a research-management partnership of USFS research stations and national forests to develop the decision support needed by the US Forest Service to incorporate climate change into management and planning of federal lands in the western US.

Specific objectives for this amendment to the joint venture agreement are:

• To continue a third phase of data collection in the spring and fall of 2011 of live fuel consumption and environmental variables from a series of prescribed fires in federal lands of Florida to improve fuel consumption models for the southern forest region of the United States.

• To continue a second year study of fuel amount and composition following dormant and growing season prescribed fires for flatwoods pine ecosystems in the Florida Panhandle.

• To continue the work for integration of the forest vegetation simulator (FVS) and FCCS to generate dynamic fuelbeds derived from stand data collected from FIA and CFI plots, and silvicultural treatments.

• Recode CONSUME 3.0 into python programming language to make this fire management tool a web application for fuel consumption and smoke emissions from wildfires.

Application Number: A68720
Faculty Member: Jonathan Bakker
Role: Principal Investigator
Title: **LTREB: Linking plant traits to demography and community dynamics**
Agency: Northern Arizona University
Period: 7/1/2012 - 6/30/2017
Amount: $
Resubmission

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: A68434
Faculty Member: Susan Bolton
Role: Principal Investigator
Title: **Literature Review of Wetland Forests**
Agency: WA Department of Natural Resources
Period: 9/16/2011 - 6/30/2013
Amount: $55,898
New

A systematic literature review will be conducted in collaboration with CMER to assess the current state of knowledge of the interactions of forest practices on forested wetlands. Currently there is much uncertainty about the effects of forest harvesting and road construction and road maintenance on forested wetlands. This literature review will synthesize what is currently known and develop a conceptual framework for assessing the potential effects of forest practices on forested wetlands. The framework will be used to develop recommendations for evaluating forest practices and their effects on wetlands. Testable hypotheses will also be developed for use in adaptive management. Cost-effective metrics for assessing wetland status and the effects of forest practices will also be developed.

Application Number: A67995
Faculty Member: Susan Bolton
Role: Principal Investigator
 Faculty Member: Stanley Asah
Role: Co-Investigator
Title: **Barriers to wider dissemination of improved cookstoves**
Agency: National Institutes of Health (NIH)
Period: 4/1/2012 - 3/31/2014
Amount: $153,621
New

Improved cookstoves projects have been implemented worldwide for many years, yet there is still inadequate acceptance and uptake of new stoves. This contributes to poor human health outcomes, emissions of climate changing gases and sometimes local deforestation for fuelwood. The UW student chapter of Engineers without Borders (EWB) has been implementing an improved cookstove in Bolivia since 2007. The acceptance of the stoves and satisfaction of the users is high. There is a high demand

from other communities for the project. This research seeks to understand why there is not a proactive acceptance of the stove by other communities rather than waiting for years for a project to come to them. What factors inhibit either households or communities from acquiring the stoves on their own? Several individuals have been trained and are experienced stove builders. What factors keep them from entrepeneurially offering stoves to others? Using social diffusion concepts and social marketing theory, individuals and communities with stoves and those waiting for stoves will be interviewed.

Application Number: A67870
Faculty Member: David Briggs
Role: Principal Investigator
Title: **Stand Management Coop**
Agency: Pilchuck Tree Farm
Period: 1/1/2011 - 12/31/2011
Amount: $6,339
Non-Competing Renewal

2011 Membership Dues to Stand Management Coop from Pacific Denkman Tree Farm

---

Application Number: A67579
Faculty Member: David Briggs
Role: Principal Investigator
Title: **Stand Management Coop**
Agency: Lone Rock Timber Company
Period: 1/1/2011 - 12/31/2012
Amount: $15,818
Non-Competing Renewal

2011 Membership dues to Stand Management Coop from Lone Rock Timber Mgmt. Co.

Application Number: A68334
Faculty Member: Jerry Franklin   Faculty Member: Van Kane
Role: Principal Investigator   Role: Co-Investigator
Faculty Member: Jim Lutz
Role: Co-Investigator
Title: **Relationship between Fire History and Forest Structure at Crater Lake National Park Using LiDAR**
Agency: USDI National Park Service
Period: 10/1/2011 - 12/31/2013
Amount: $48,512
New

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

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

Application Number: A68768
Faculty Member: Christian Grue
Role: Principal Investigator
Title: **Eastern Gray Squirrel Ecology and Interactions with Western Gray Squirrels in the Puget Sound Region**
Agency: WA Department of Fish and Wildlife
Period: 9/16/2007 - 6/29/2012
Amount: $4,000
Supplement and Extension

Of the three extant regional populations of the western gray squirrel in Washington State, the populations of the South Puget Sound are the most imperiled. Numbers in this region have declined precipitously in recent decades. One of the hypothesized determinants of decline has been land conversion from wild lands to suburban development. A second factor often cited for this decline is competition from the introduced eastern gray squirrel, a species that does very well in suburban environments in contrast to the western gray squirrel. This project will investigate the interrelationships between these species, and suggest courses for management.

Application Number: A68086
Faculty Member: Charles Halpern
Role: Principal Investigator

Title: **Long-Term Responses of Vegetation to Variable-Retention Harvests in the PNW**
Agency: USDA Forest Service
Period: 6/16/2008 - 6/15/2013
Amount: $65,000
Non-Competing Supplement

In the Pacific Northwestern region of the US, structural or "green-tree" retention has replaced clearcut logging on federal forest lands subjected to timber harvest. The Demonstration of Ecosystem Management Options (DEMO) experiment was established in 1994 to examine the responses of diverse groups of forest organisms to structural retention harvests in mature forests of the Pacific Northwest. Studies of vegetation response form the foundation of this experiment. Our goals are threefold: (1) to elucidate the 10-yr responses of overstory and understory communities to varying levels and patterns of retention; (2) to provide basic information on changes in forest structure that can aid in understanding the responses of other groups of forest organisms to structural retention; and (3) to assess the need for, and desirability of, future silvicultural treatments based on the distribution and density of regenerating trees.

Application Number: A68270
Faculty Member: Jim Lutz
Role: Principal Investigator
Title: **Climate Impacts on Burn Severity**
Agency: USDI US Geological Survey
Period: 7/1/2009 - 6/30/2012
Amount: $75,630
Non-Competing Supplement

We will use Landsat TM data from 1984 to 2009 to quantify the fire regime in forested areas in and near Yosemite National Park (one Landsat scene). We will compare the satellite measurements of fire severity with existing ground data related to fire effects, and we will validate the spectral signature of burned areas with field measurements. Measurements of burn severity will be correlated with existing climate data (PRISM, NARR, and RAWS). Finally, climate-fire relationships in Yosemite National Park will be compared with similar relationships examined by other project participants in Glacier National Park and Yukon Charley National Reserve for a synthesis of climate-fire relationships in western North America.

Application Number: A68308
Faculty Member: L. Monika Moskal
Role: Principal Investigator
Title: **Forest Practices and Wetland Systematic Literature Review**
Agency: WA Department of Natural Resources

Period: 9/1/2011 - 8/31/2012
Amount: $84,843
New

We will review and synthesize pertinent scientific literature to identify and evaluate effects of how harvesting wetlands and constructing roads in and adjacent to wetlands in the forested landscape affect wetland functions that sustain water regimes, water quality and fish and amphibian habitat. We will also developing testable hypothesis on how forest practices can potentially limit the capacity of wetlands to support harvestable levels of fish, the long-term viability of other covered species, and water quality standards. Furthermore, we will will address questions to describe the watershed context in which the risks from forest practices activities to these wetland functions are highest and will describe the level of confidence/uncertainty associated with each risk for specific wetland functions. Finally, we will identify appropriate parameters and metrics that can be used to quantify and assess wetland functions and changes to wetland functions.

Application Number: A68526
Faculty Member: L. Monika Moskal
Role: Principal Investigator
Title: **Terrestrial LiDAR Scanning (TLS) at Panther Creek Research Plots for Inventory and Tree Species Identification**
Agency: USDI Bureau of Land Management
Period: 7/1/2011 - 8/31/2012
Amount: $93,847
New

Precision forestry leverages advanced sensing technologies and analytical tools to support site-specific economic, environmental, and sustainable decision making for the forestry sector in a timely and effective way. The discipline is highly reliant on accurate, timely and detailed forest inventory characterization and structural information, spanning extensive land holdings. Discrete, high density, LiDAR point clouds derived from aerial and terrestrial laser scanning have become invaluable datasets for precision forestry applications. This project will acquire terrestrial LiDAR scans (TLS) for forest inventory and soil study plots at the Panther Creek research site in the state of Oregon, for the purpose of capturing ground based 3D point clouds and scanner hemispherical camera based photography. The data will be utilized for extraction of inventories and compared to traditional methods of forest inventory and aerial LiDAR based inventories (and calibration). Moreover, the new innovative research proposed in this project will focus on deriving tree species information from TLS. This will serve as the basis for future work to use the TLS data to calibrate other remote sensing approaches as well as explore additional potential of TLS data in conjunction with the wide array of scientific project at the Panther Creek research site.

Application Number: A68375
Faculty Member: Sarah Reichard
Role: Principal Investigator
Title: **Rare Plant Conservation Support**
Agency: USDI Bureau of Land Management
Period: 8/1/2011 - 7/31/2016
Amount: $23,000
New

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

Application Number: A68634
Faculty Member: Clare Ryan
Role: Principal Investigator
Title: **Communication in NEPA Decision-Making: Writing an Effective Environmental Document**
Agency: USDA Forest Service
Period: 8/15/2009 - 6/30/2013
Amount: $28,000
Non-Competing Supplement

Dramatic changes in demographics and population growth, the structure of international markets, technology trends, and processes of new governance and public decision-making shape the contemporary reality in which public resource management agencies such as the U.S. Forest Service must operate. Over the past couple of decades environmental documents have become very voluminous collections of data aimed largely at trying to withstand legal challenges. In many cases these documents are not clearly written, are poorly organized, and are presented in a format that is difficult to follow and have become incomprehensive to not only the general public but have not aided in decisionmaking. Understanding effective ways to communicate NEPA decisions may lead to quicker implementation of decisions, fewer conflicts and challenges to agency decisions, and ultimately improved management of public lands and natural resources; this is the goal of the proposal.

Application Number: A68735
Faculty Member: Christian Torgersen

Role: Principal Investigator
Title: **Toward a Landscape Ecology of Stream Subsidies**
Agency: National Science Foundation
Period: 9/28/2012 - 9/27/2015
Amount: $234,868
New

To quantify and describe patterns of spatial delivery and ecological responses to salmon-derived nutrients, we will apply principles of landscape ecology, including spatially explicit sampling and pattern analysis. Landscape ecology principles have primarily been applied to watershed-scales in streams and rivers; they have less frequently been applied at reach or sub-reach scales. Studies that combine observations at multiple spatial scales are even more rare. Examining ecological responses to salmon-derived nutrients in a spatially explicit way should elucidate the mechanisms of how geomorphic structure and bioturbation interact to affect and control the responses of biofilm, macroinvertebrate, and fish behavior, assemblage structure, production, and function. Coupling detailed reach-scale analyses to distributed watershed-scale sampling should elucidate how materials "exported" at one scale may actually as subsidies to downstream reaches, leading to distinctly different responses to spawning at reach and watershed scales. In this proposal we address the following questions:
(1) Do different species of salmon create different patterns of ecological responses in different landscapes?
(2) How does the distribution pattern of a subsidy and associated disturbance affect ecosystem processes?
To investigate these questions, we employ paired experimental and observational approaches in salmon streams located in Idaho, Alaska, and Michigan.

Application Number: A67996
Faculty Member: Christian Torgersen
Role: Principal Investigator
Title: **Floodplain diversity and spawning area productivity in the Yakima River, Part V: Linking variation in spawner phenotype with habitat characteristics**
Agency: National Oceanic and Atmospheric Administration
Period: 7/1/2011 - 6/30/2012
Amount: $97,612
Supplement and Extension

The proposed work takes advantage of the unique cultural and natural landscape in the Yakima basin by examining groundwater connectivity and floodplain complexity in relation to spawning site selection by salmon in a regulated river that is managed for both hatchery and wild populations. Long-term collaborations in the basin have been established through the Yakama/Klickitat Fisheries Project (Yakama Nation, WDFW, USFWS, NOAA, USGS, BOR; with funding from the Bonneville Power Administration), which has stimulated integrated science between multiple state, federal, and tribal

agencies and leveraged funds from multiple sources. Much of this work has focused on the effects of supplementation on wild anadromous and resident populations of salmon and trout. The Cle Elum Supplementation and Research Facility, part of the Yakima Fisheries project, has been remarkably effective at enhancing populations of spring Chinook salmon in the upper Yakima River Basin while reducing adverse ecological interactions.

The initial phases of the proposed work (funded by NOAA) involved collecting and georeferencing spatially continuous data on aquatic habitat and fish assemblages throughout the entire upper Yakima basin (160 km). Our current goal is to use these data to develop spatially explicit models that predict habitat selection by hatchery versus wild salmon. To further refine these models, we will analyze the relationship between individual spawner phenotype (e.g., size) and habitat selection.

Application Number: A68188
Faculty Member: Aaron Wirsing
Role: Principal Investigator
Title: **Collaborative Research: Does Anti-predator Behavior Modify Indirect Effects of Top Predators?**
Agency: National Science Foundation
Period: 10/1/2012 - 9/30/2017
Amount: $811,384
Resubmission

A recent review reveals that spatial responses to predators can vary with prey escape mode. By implication, predators could exert multiple and spatially opposing indirect effects on species serving as food for prey that are mediated by divergent spatial shifts of sympatric prey species with different means of escape. No study to date has explored this intriguing possibility. Accordingly, we propose to test whether recolonizing gray wolves (Canis lupus) in the Methow Valley of north-central Washington State, USA exert contrasting indirect effects on plants by inducing divergent winter habitat shifts by two sympatric herbivores – mule deer (Odocoileus hemionus) and white-tailed deer (Odocoileus virginianus) – with different escape tactics. Mule deer escape predators by stotting, a tactic that ostensibly provides an advantage against coursing predators over rugged terrain. In contrast, white-tailed deer escape predators with sprints that are most effective on gentle terrain with few obstacles. Thus, we predict that mule deer exposed to wolves will shift to, and forage more heavily in, shrub-steppe habitats where the terrain is broken, whereas white-tailed deer should shift to riparian habitats where the terrain is gentle. As a result, we expect that wolves will indirectly shelter plants growing in shrub-steppe habitats from white-tailed deer herbivory while exposing them to increased pressure from mule deer, and that these top predators will exert the opposite indirect effect in riparian habitats.

Application Number: A68363
Faculty Member: Kathy Wolf
Role: Principal Investigator
Title: **Chapter 2B of PS Science Update**

Agency: Puget Sound Partnership
Period: 7/1/2011 - 12/31/2011
Amount: $37,500
New

The Puget Sound Partnership (PSP) has developed the Puget Sound Science Update to present a state-of-the-science synthesis to support efforts to restore and protect the Puget Sound ecosystem. This document includes 4 science content chapters, a synthesis, and implications for policy makers. The chapters are intended to describe and discuss scientific understanding of the lands, waters, and human social systems within the Puget Sound ecosystem. The materials presented in the initial publication of the Puget Sound Science Update in 2010 are being used to launch an ongoing collaboration to expand the scope and refine the content of the Update. Over time, the Puget Sound Science Update will be developed to provide comprehensive reporting and analysis of scientific findings and understandings synthesized to support the science-based ecosystem-scale restoration of Puget Sound. Chapter 2B is entitled The Socio-Economic Condition of Puget Sound and is now represented only as an outline. This interagency agreement will support further development of narrative. The first activity will be to review the current outline, then redefine the scope and content of Chapter 2B (and associated subchapters). We will work with PSP Social Science Work Group to identify key needs for incorporating social science precedents and findings about socio- economic conditions into the Puget Sound Science Update. Chapter 2B will be drafted, then submitted for peer review, followed by revisions to prepare the final draft that is to be delivered to the Puget Sound Partnership.