



The Western Airborne Contaminants Assessment Project

Studying the risks in western national parks

Tamara Blett, Ecologist, Air Resources Division National Park Service

Background

Some of the world's most toxic persistent chemicals are carried on air masses, from sources as far away as Europe and Asia, and as close as local farmer's fields. The objective of the Western Airborne Contaminants Assessment Project (WACAP) is to inventory airborne contaminants in national park ecosystems using a network of eight "primary" parks (Sequoia, Rocky Mountain, Denali, Noatak, Gates of the Arctic, Olympic, Mount Rainier, and Glacier) in the western U.S. The National Park Service (NPS) is concerned about airborne contaminants because they can pose serious health threats to wildlife and humans, as some of these compounds tend to "biomagnify" in the food chain. Biological effects of airborne contaminants can include impacts on reproductive success, growth, behavior, disease, and survival of fish, wildlife, and humans, if these compounds accumulate to toxic levels.

The NPS initiated this project in 2002 because:

- Potential risk to park resources was identified from preliminary studies in the arctic and other high elevation or high latitude areas, but little information about potential effects of toxics on national park resources was known.
- There was concern about subsistence-based populations in Alaska who consume natural foods that could be bioaccumulating toxic compounds.
- Parks contain relatively natural systems that can serve as early warning sites for the rest of the continent.
- NPS responsibilities and legal mandates are to protect ecosystems "unimpaired" for future generations -(NPS Organic Act)

This six year WACAP project was designed to: 1) determine if contaminants are present in western National Parks; 2) determine where contaminants are accumulating (geographically and by elevation); 3) determine which contaminants pose a potential ecological threat; 4) determine which indicators appear to be the most useful to address contamination; 5) determine the sources for contaminants measured at the National Park sites.

CESU Partnerships

This project is likely unique for a NPS sponsored project because of its large scope, scale, duration, and number of cooperators. A series of workshops in 2001 identified the need for more information about the risk of airborne toxics in parks. Following these workshops, Dr. Dixon Landers, a U.S. Environmental Protection Agency (EPA) scientist, was selected to lead a team of researchers to conduct a large scale integrated study on airborne contaminants in western National Parks. Researchers from the U.S. Geological Survey, US Forest Service, University of Washington (UW), and Oregon State University (OSU) were subsequently selected to work with NPS and the EPA on vari-



Mission

The Pacific Northwest Cooperative Ecosystem Studies Unit (PNW CESU) is a partnership for research, technical assistance and education to enhance understanding and management of natural and cultural resources.



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PNW CESU PARTNERS

Federal:

US Bureau of Reclamation
US Forest Service
(PNW Research Station)
National Park Service
Bureau of Land Management
US Geological Survey
US Fish and Wildlife Service
Natural Resource
Conservation Service
Minerals Management Service

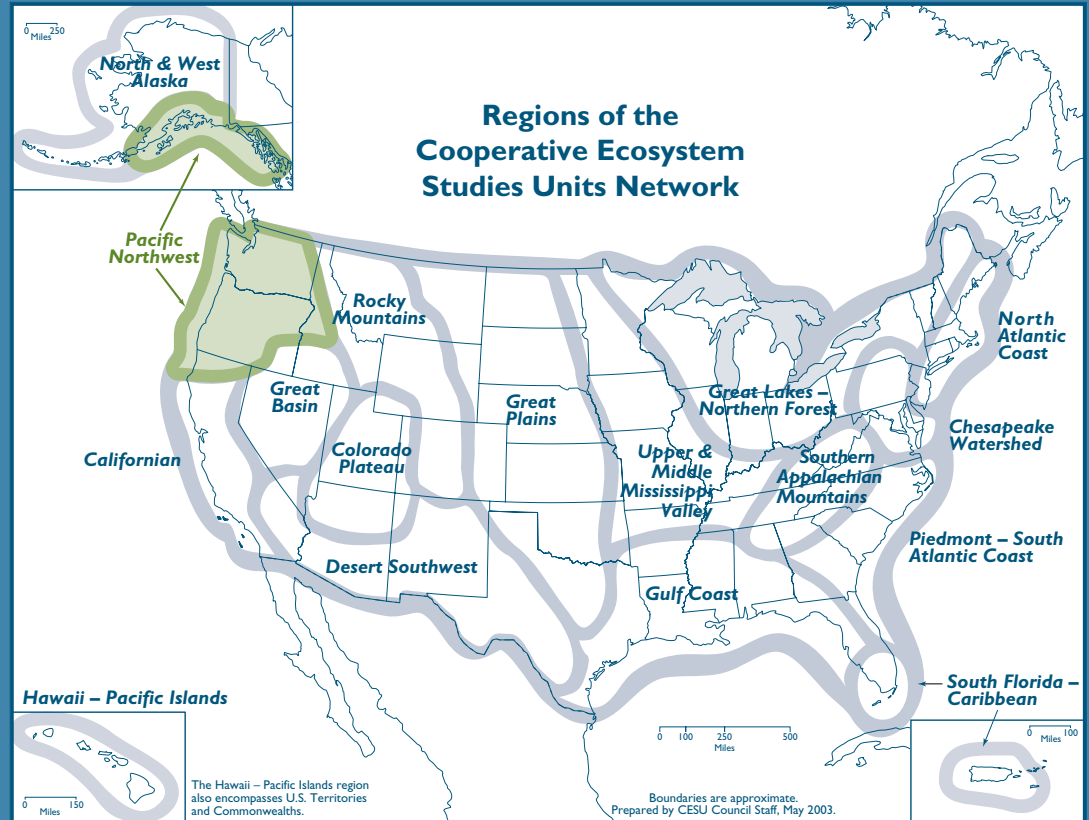
University:

University of Washington (host)
Oregon State University
Southern Oregon University
University of Vermont
Tuskegee University
Heritage College
University of British Columbia
University of Alaska – SE
University of Alaska – Anchorage
Washington State University
University of Oregon
University of Idaho
Western Washington University
Portland State University
Oregon Institute of Technology
Saint Mary's University
Alaska Department of
Fish and Game

Contact information for all our
representatives can be found on
our Web site:

[www.cfr.washington.edu/
research.cesu/participants.asp](http://www.cfr.washington.edu/research.cesu/participants.asp)

The PNW CESU and the CESU National Network



The **Pacific Northwest Cooperative Ecosystem Studies Unit** encompasses a region extending across 5 states (Washington, Oregon, Northern California, Western Idaho and South East Alaska) and is hosted by the University of Washington. As a member of the National CESU Network, the PNW CESU is a working partnership among leading academic institutions, federal, state and non-governmental organizations.

The **CESU National Network** is organized around biogeographic regions across the United States. Each Region is served by a distinct CESU, with all CESUs linked together in the National Network. The goal of the Cooperative Ecosystem Studies Unit Network is to improve the scientific base for managing federal lands by providing resource managers with high quality scientific research, technical assistance and education through their working partnerships.

Visit our Web site at: www.cfr.washington.edu/research.cesu

- Browse our on-line project library
- Download the project summary form
- Find helpful materials for initiating a project through the PNW CESU.

The Western Airborne Contaminants Assessment Project

Continued from page 1

ous aspects of this project. The PNW Cooperative Ecosystem Studies Unit has been instrumental in facilitating the participation of world-class scientists in this project. Three separate PNW CESU task agreements have been written for this project; two for OSU and one for UW. At OSU, Dr. Staci Simonich has led the laboratory analysis effort to determine the presence and concentrations of toxic contaminants in air, water, sediment, snow, vegetation, fish, and moose. Many of the methodologies needed to guide these analyses had not yet been developed prior to this project, so Dr. Simonich and a large number of post-docs, grad students, undergraduates, and lab technicians pioneered and subsequently published new techniques to conduct the WACAP research. Dr. Carl Schreck, leader of the Oregon Cooperative Fish and Wildlife Research Unit and Dr. Michael Kent, director of the Center for Fish Disease Research at OSU; have been key partners in looking at physiological, hormonal, and chemical characteristics of fish in the WACAP study lakes. Dr. Daniel Jaffe, Professor of Atmospheric and Environmental Chemistry at UW, has been analyzing atmospheric transport patterns that carry airborne contaminants into western national parks. These university scientists, along with other partners from the federal agencies, have developed a unique integrative partnership with NPS through implementation of the project. For example, field data collection required over two thousand pounds of scientific equipment and supplies to be transported by helicopter, pack stock, and research staff into remote watersheds in each park before the two week process of sample collection in each park could begin. Investigators also collaborated on development of data analysis, results, and publications; resulting in products where the whole is really more than a sum of the “parks”.

Roadmap for Success

A few key elements have made this project successful: 1) World-class scientists were selected to provide their expertise in designing and implementing the project. The CESU process provided an avenue to select those researchers with proven track records in publishing their work, and experience in working as part of an interdisciplinary team; 2) A detailed written research plan and quality assurance and quality control plan, was developed with input from all involved scientists, and peer-reviewed by an external international panel of subject matter experts; 3) Leadership and accountability was ensured by setting up a “Science Project Leader” and an “NPS Project Manager” to keep the project moving forward, facilitate integration between disciplines, receive feedback from NPS “clients”, and provide a mechanism for decision making; 4. Avenues of communication such as a project web site, semi-annual investigators meetings, posters, and annual fact sheets helped keep everyone informed.

Results

Scientists involved with WACAP have now completed the collection of all WACAP samples and are focusing on completing the remaining laboratory analyses. With the final WACAP report and final data base due to be completed in September 2007, there is lots of work yet to be done in this interdisciplinary project. Very interesting results are beginning to emerge from the work. A long list of current and historic use contaminants in all parks but generally at concentrations below levels of concern raised by various government and scientific sources, with the exception of mercury. Current use pesticides are the most abundant compounds we have found in three years of annual snow sampling and these appear to be strongly related to regional agricultural activities within proximity to the parks. Historic use chemicals such as PCBs (banned

Please see Western Airborne Contaminants on page 4



Photo courtesy NPS

Hauling field equipment, Olympic National Park



Photo courtesy NPS

Lichen sampling in Denali National Park and Preserve

The Western Airborne Contaminants Assessment Project

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in the USA) show similar, low levels in fish from all of the WACAP primary parks. However, there is evidence in some parks that fish are demonstrating a physiological response to chemical stressors. In Sequoia and Denali presence of microscopic changes in the kidney, liver, and spleen indicate a stress response commonly associated with contaminants and poor nutrition. Mercury flux to the watersheds in the western national parks is dominated by mercury derived from human activities such as coal burning and metal smelting, as is the global background for this element. The mercury flux to the Alaska Parks is up to 10 times less than for the parks in the lower 48, yet the mean fish concentrations in some Alaskan lakes are significantly higher. This appears to be due to watershed, lake and food web characteristics in the Alaska systems that efficiently bioaccumulate mercury in the top aquatic predators - fish. The WACAP final report will fully document these and other findings to inform future management decisions relating to the protection of the natural resources in our national parks. Several WACAP related articles have already been published in the peer-reviewed literature, and more are expected in 2007 and 2008.

What Can Be Done About Toxics in National Parks?

The information gathered as a part of this multi-agency partnership project will be of great value to the National Park Service because of the diversity of sensitive ecosystems that they manage. Specific uses or management actions for the results depend on what we find where:

- Current-use compounds vs. those banned in the US?
- Local influences vs. global transport?
- Presence of contaminants vs. potential effect?

One of the best values of the WACAP project is to inform the public about the presence and potential effects of toxic compounds in national parks. To that end, the interest in the project by the national and local media has been keen, and numerous articles have already been published in online and print newspapers across the country. A “WACAP Final Report To Parks” session is planned for the George Wright Society meeting in St. Paul Minnesota in April 2007 www.georgewright.org/2007.html; at this session additional discussion will take place between NPS and project researchers to discuss results and potential actions. The NPS hopes that if problems with toxic compounds are identified in parks, the data from this project can be used to help develop solutions through collaboration with regulatory agencies and stakeholders (domestically) and/or in international diplomatic arenas. [cv](#)



Photo courtesy NPS

Processing fish samples at OSU lab



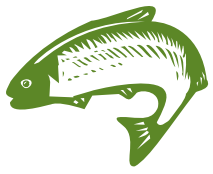
Photo courtesy NPS

Lake sediment sampling in Alaska



Photo courtesy NPS

Presenting WACAP results



Pacific Northwest CESU Update

News from the Host University

Fiscal year 2006 was a year of growth and expansion for the PNW CESU. Since we have formally reported to you in “Cooperative Ventures” the ranks of the PNW CESU partners has swelled, and more new partners are on the horizon.

Six federal agencies initiated 41 new projects through 13 different university partners. Projects funded through the PNW CESU grew to a record \$4.165 million in fiscal year 2006. This represents nearly 25% growth over fiscal year 2005. See “PNW CESU Project Activity” on page 9 for a graphical summary of fiscal year 2006 activity. Please visit our website and project library to view detailed information about all the PNW CESU projects.

The 2005-2010 PNW CESU Master Cooperative and Joint Venture Agreement was formally signed in the late fall of 2005 and distributed to all PNW CESU partners. [cv](#)

New Partner News

Minerals Management Service (MMS) anticipates their first PNW CESU task agreement in 2007. MMS is the Department of the Interior bureau with responsibility for managing the Nation’s oil, natural gas, other mineral resources, and alternate energy related uses on the Federal Outer Continental Shelf (OCS). MMS also works with the mineral revenues from OCS, Federal, and Indian lands. Look for more information about MMS at their website www.mms.gov.

Oregon Institute of Technology (OIT) is located in Klamath Falls, Oregon, in close proximity to Crater Lake National Park and Lava Beds National Monument. With the advent of the Crater Lake Science and Learning Center a collaborative relationship between OIT and Crater Lake National Park may emerge. Look for more information about OIT at their website www.oit.edu.

Saint Mary’s University (SMU) programs of Environmental Science, Resource Analysis, and Geospatial Services Programs are of strong interest to the United States Fish and Wildlife Service (USFWS) and NPS. USFWS plans to sustain a relationship with SMU to map wetlands through the National Wetlands Inventory. The first PNW CESU task agreement between the NPS and St. Mary’s is under development. Look for more information about SMU at their website www.smumn.edu/.

Eastern Washington University (EWU) has the distinction of soon being the PNW CESU’s newest partner- though it is unlikely that they can boast this for long! NPS and USGS scientists see potential for long-term collaboration with EWU, especially with respect to the Elwha Dam removal project occurring at Olympic National Park. The agreement modification bringing EWU into the PNW CESU will be distributed to all partners for signature soon. Look for more information about EWU at their website www.ewu.edu. [cv](#)

Thanks to all partners for their support and cooperation during these numerous administrative tasks over the past year.

The PNW CESU is pleased to announce these exciting new projects through the US Fish and Wildlife Service and US Bureau of Reclamation.

US FISH AND WILDLIFE SERVICE

Project title: Northern Spotted Owl Disturbance Study

Funding: \$39,999

Collaborators: University of Washington, Department of Biology
United States Fish and Wildlife Service, Red Bluff Fish and Wildlife Office.

For more information contact:

Ron Clementsen

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Or

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BUREAU OF RECLAMATION

Project title: Ecology of Upper Klamath Lake Shortnose and Lost River Suckers

Funding: \$319,194

Collaborators: Oregon State University and U.S. Bureau of Reclamation.

For more information contact:

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Or

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PNW CESU Student Project Profile

Ecology and Restoration of Prairies at San Juan National Historic Park



Photo courtesy Julie Combs

Amy Lambert conducting field work in the coastland habitat at SAJH.

During the initial planning stages for the National Park Service's North Coast and Cascades Network (NCCN) Inventory and Monitoring Program, prairies were identified as a resource that merited long term monitoring at San Juan Island National Historical Park (SAJH) and Ebey's Landing National Historical Reserve (EBLA). With the need for long-term monitoring at EBLA and SAJH, and the potential for future restoration work in mind, a collaborative effort supported by a PNW CESU agreement began in 2002. This task agreement involved North Cascades National Park Service (NOCA) Science Advisor Dr. Regina Rochefort and University of Washington, College of Forest Resources, faculty member Dr. Kern Ewing. The goal of this project was to describe the current status of the prairies in SAJH and to identify potential areas and methods for restoration to native prairies.

Dr. Ewing recruited Amy Lambert as the project graduate research assistant. Amy had recently worked for Golden Gate National Recreation Area on a project monitoring the Mission Blue Butterfly. In spring of 2006, Amy completed her M.S. thesis titled "Prairie Restoration in American Camp, SAJH: Fire and Herbicide Effects on Community Composition and Growth and Survival of Planted Native Species." Her research, focusing on site-preparation and revegetation methods, demonstrated that fire and herbicide treatments combined were more effective in reducing dominant introduced species than either herbicide or fire treatments alone in the study area.

Concurrent with her work on fire and herbicide at SAJH, Amy started monitoring the island marble (*Euchloe ausonides insulanus*) and laying the foundation for what would evolve into a Ph.D. project. In the spring of 2005, a PNW CESU task agreement was approved to monitor the island marble with funding provided by the NCCN Research Learning Network; additional funding was provided by the NCCN I&M program. In 2006, U.S. Fish and Wildlife Service, Division of Listing and Recovery allocated funding to support the butterfly monitoring efforts with an interagency agreement with NPS and the funds subsequently added to the PNW CESU task agreement budget supporting Amy's work.

Amy's research involve specific species characteristics of the island marble in the attempt to provide a framework from which to answer management driven research questions such as: 1) If restoration efforts included restoring native mustard species in areas adjacent to existing non-native mustard, what are the possibilities that the island marble would use native mustards as host plants? 2) Will the island marble switch back to its presumed original native host plants if they are present? 3) Is there a possibility of managing the island marble solely in areas of native habitat?

This research is a prime example of the win-win partnerships that often develop in PNW CESU projects. Stay tuned as Amy Lambert's results begin to not only elucidate the condition of the island marble at SAJH but also to inform resource managers of the complex interactions between attempts to restore the native prairie and the welfare of this very rare species. [cv](#)

PROJECT SUMMARY

Project title: Ecology and Restoration of Prairies in San Juan Island National Historic Park

Funding: \$68,088

Collaborators: University of Washington, College of Forest Resources, Center for Urban Horticulture, National Park Service, North Cascades National Park and San Juan Island National Historic Park

For more information contact:

Regina Rochefort

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Or

Kern Ewing

kern@u.washington.edu

The Island Marble Butterfly

Amy Lambert, Ph.D. Student, University of Washington

Due to small population size and potentially threatened status, the island marble (*Euchloe ausonides insulanus*) has been proposed for listing as an endangered species. The island marble is a subspecies of the large marble (*Euchloe ausonides*). The large marble commonly occurs from Alaska, south to California and east to Ontario. However, the island marble is extremely rare, and is known to occur only on two islands located in the northern Puget Sound. The island marble is primarily white and yellow with a greenish marbled texture under the hind wing. It has a wingspan of approximately 45 mm (see photos). The island marble was presumed extinct until 1998, when a small population was discovered in San Juan Island National Historical Park (SAJH) on the southern end of San Juan Island. Since 1998 several surveys have been conducted, yet relatively few individuals have been observed.

Field notes on existing museum specimens (collected before 1998) indicate that the island marble inhabited prairie grasslands and lower south facing slopes with open habitat. Also, the earliest record of the island marble from the 1860's was from Vancouver Island found in open habitat similar to the small amounts of remnant prairie remaining at SAJH.

Alterations to and reductions in prairie habitat likely caused the decline in numbers of the island marble. Both the island marble and its close relative the large marble are dependent on plants from the mustard family as a host plant and a food source for their larvae. The large marble butterfly is known to utilize species of rockcresses (*Arabis spp.*) and mustard-like-crucifers (e.g. *Sisymbrium altissimum*). The island marble is currently using two exotic species and one native species as host plants on San Juan Island. Both of the exotic host plant species, field mustard (*Bassica campestris*) and tumble mustard (*Sisymbrium altissimum*) occur in upland prairie habitat on San Juan Island and support the majority of the island marble population. Introduced plants from the mustard family seem to have effectively replaced the functions formerly served by native species in prairie habitat on San Juan Island. Locality labels on museum specimens suggest that rockcress (*Arabis spp.*) may have been the historical native host plant species of the island marble. Rockcress occurs in open grassland habitat on Vancouver Island and in some areas through the Puget Trough and Willamette Valley. However, research suggests that rockcress has been extirpated from the grasslands on the southern end of San Juan Island. It is likely that field mustard and tumble mustard that were planted with other agricultural crops on southern San Juan Island in the early 1850's enabled the island marble butterfly to persist by switching host plants as its native host plant(s) became increasingly limited in the prairie grasslands.

If the US Fish and Wildlife Service lists the island marble as endangered, associated habitat will also be protected complicating the jobs of North Cascades National Park natural resource managers who are interested in restoring native prairie vegetation to SAJH. Restoration activities in the vicinity of introduced mustards will have to be carefully considered. The two species of mustards the island marble is currently using as host plants, field mustard and tumble mustard, are colonizers of disturbed habitat and have been documented to increase in abundance in areas of restoration activity. Concerns associated with restoration include disturbance effects of initial site treatments (i.e. herbicide, fire) resulting in colonization of non-native mustard species. Non-native mustard species also currently serve important host plant functions in habitat no longer served by native species. [cv](#)



Island marble caterpillar

Photo courtesy Amy Lambert



Island marble butterfly

Photo courtesy Amy Lambert

Author's Note

References were omitted from this article. If you are interested in the references please contact author Amy Lambert (lambea@u.washington.edu) or PNW CESU Program Coordinator Joel Siderius (pnwcesu@u.washington.edu).



PNW CESU Partner Book Announcement

2006 Book Release: *Keeping it Living: Traditions of Plant Use and Cultivation on the Northwest Coast of North America*

Douglas Deur (deur@u.washington.edu)
Research Coordinator, Protected Area Social Research Unit,
College of Forest Resources, University of Washington, and
Nancy Turner (nturner@uvic.ca)
Distinguished professor in the School of Environmental Studies and Geography,
University of Victoria

From the authors:

On the damp northwestern edge of North America, the coastal landscape seems verdant and bountiful. Early explorers were awed by salmon-filled rivers, imposing forests, and the rich meadows and marshes of the coastal margin. Certainly, in such an Edenic setting, one might assume that Native Americans had little need to cultivate plants - in fact, this view is asserted in popular and academic accounts alike. However, in the course of our past research on both traditional Native American plant use and the historical ecology of the Northwest Coast, many reasons were found to question this pervasive view: accounts of fields containing edible plants, kept clear through the regular use of fire; plots of root vegetables, transplanted there for later use; groups of trees termed "orchards" in early accounts, maintained through pruning and weeding. Taken together, these accounts suggested a region-wide tradition of plant community management that defied conventional wisdom.

A symposium, calling together scholars from diverse backgrounds on the topic, indicated many had encountered similar evidence. Based on this, it became clear a book project was in order. We approached potential contributors, including some of the region's most prominent specialists on Northwest Coast cultures, and initiated an extended dialogue on the topic. In the course of these exchanges, it became apparent that the Native American imprint on the Northwestern landscape, while subtle, was pervasive. Our recently released book, *Keeping it Living*, brings together much of this information in a single volume.

Keeping it Living provides a comprehensive and revisionary view of how Northwest Coast Native Americans managed the landscape and cared for the plant communities on which they depended. With case studies ranging from the coast of Oregon to southeast Alaska, *Keeping it Living* explores tobacco gardens among the Haida and Tlingit, managed camas plots among the Coast Salish of Puget Sound and the Strait of Georgia, estuarine root gardens along the central coast of British Columbia, wapato maintenance on the Columbia and Fraser Rivers, and tended berry plots up and down the entire coast. We also explore the reasons why this information was overlooked by earlier generations and discuss how the presumed absence of plant husbandry was used to undermine tribal land claims in the 19th and early 20th centuries. We also point toward implications of these practices in understanding local and regional ecological patterns and in reassessing the environmental "baseline condition" of Northwestern landscapes - a topic that is increasingly addressed by CESU projects in the region. Written for diverse audiences, the tone is scholarly, but most chapters of *Keeping it Living* will appeal to general readers with interests in the Northwest's indigenous cultures, native plants, and environmental history. This volume will inspire future research on the topic and provide readers with a tantalizing glimpse of lifeways that sustained vibrant Native American communities for generations while leaving only subtle traces on the land. **cv**



University of Washington Press and
University of British Columbia Press.
Deur and Turner.
Hardcover edition released 2005;
paper edition released 2006.
More information at:
[www.washington.edu/uwpress/
search/books/DEUKEC.html](http://www.washington.edu/uwpress/search/books/DEUKEC.html)

Photo courtesy Doug Duer



First Nations residents and students at Kingcome River, B.C. assisting in the construction and analysis of sample plots of edible roots.

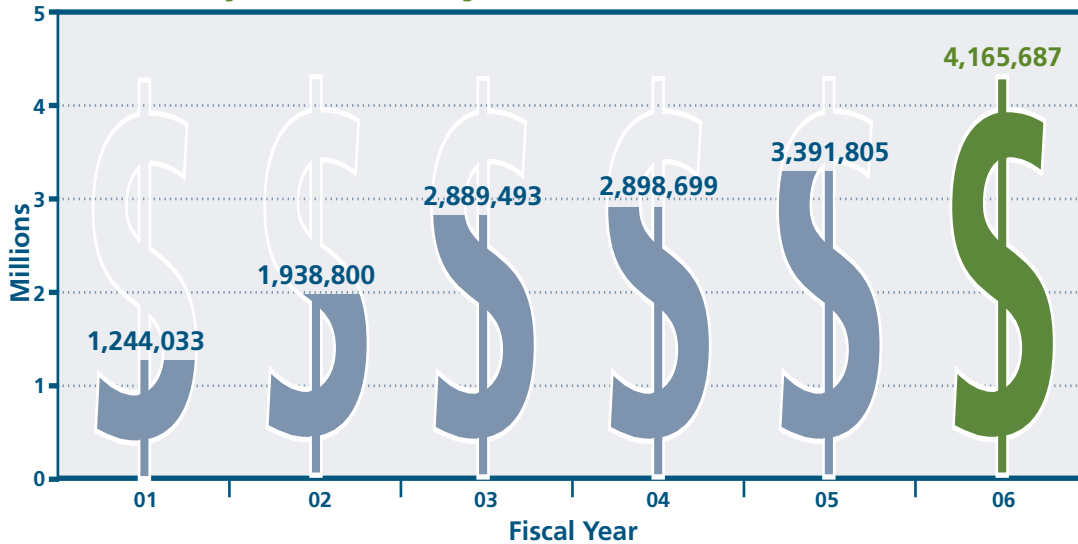
PNW CESU Project Activity

Natural Resource Conservation Service (NRCS) enjoyed significant growth in the PNW CESU for FY06. In FY06 NRCS accounted for 22% of project funds in the PNW CESU.

PNW CESU grew by nearly 25% over fiscal year 2005, with projects totaling a record \$4.165 million in fiscal year 2006. [cv](#)

If you would like to initiate a NRCS project through the PNW CESU please contact the NRCS federal representative Sheryl Kunickis (Sheryl.Kunickis@usda.gov) or the PNW CESU office (pnwcesu@u.washington.edu).

Total Project funds by FY



NATURAL RESOURCE CONSERVATION SERVICE PROJECT PROFILE

Project title: Advancing the Soil Map Analysis Program (Soil-MAP) for Soil Survey.

Funding: \$165,485

Collaborators: Oregon State University and NRCS

Abstract: This project seeks to work as part of a multidisciplinary, multi-institutional team addressing one of the largest unmapped areas in the USA – Malheur County, southeastern Oregon. In cooperation with the USDA-NRCS and DOI-BLM, there will be development of geoinformation in formats that assist and further extend the customary methods of an active soil survey, and train the soil survey members in these methods.

For more information contact:

Dr. Jay Noller

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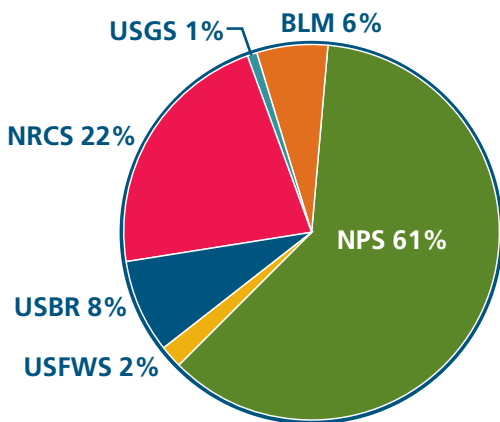
Or

Jonathan Hempel

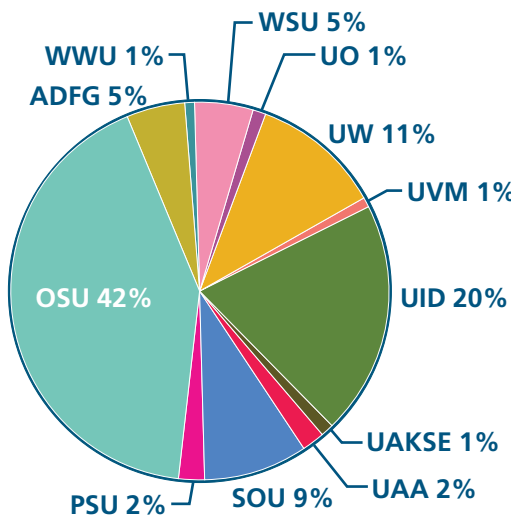
Jon.hempel@ww.usda.gov

FY 06 total \$4.165 million

Funds by Agency



Funds by University Cooperator



The Grand Opening of Crater Lake Science and Learning Center occurred August 25, 2006. Crater Lake has joined a growing network of other National Park Service research learning centers across the country that now numbers 13. These facilities are working together to facilitate research and provide educational opportunities for everyone. The new facility at Crater Lake National Park welcomes scientists, teachers, students and artists who can use the Crater Lake Learning Center to lend their talent, share their discoveries, and teach the lessons that will inspire the next generation to explore and enrich us all.

The Crater Lake Science and Learning Center is now housed at two renovated park historic structures, the original superintendent's residence and the chief naturalist's residence. These buildings provide office and residential facilities for Center patrons. In addition, visiting scientists, teachers, artists and students will have access to conference facilities, workspace, laboratories, library facilities and museum collections in the park to support their work.

More information about National Park Service Science and Learning Centers can be found at www.nature.nps.gov/learningcenters/

Conferences

February 1-2, 2007, Washington, D.C.

7th National Conference on Science, Policy, and the Environment: Integrating Environment and Human Health

www.ncseonline.org/2007conference/

April 9-12, 2007, Atlanta, Georgia.

Emerging Issues along the Urban/Rural Interface

www.sfws.auburn.edu/urbanruralinterfaces/

April 16-20, 2007, St. Paul, Minnesota.

2007 George Wright Society Meeting: Rethinking Protected Areas in a Changing World

www.georgewright.org/

June 17-21, 2007, Park City, UT

13th International Symposium on Society and Resource Management (ISSRM)

www.issrm2007.org/

Workshops

1/18/2007, Vancouver, Washington

Ecosystem Services: Market incentives for land stewardship

www.westernforestry.org/ cv



UPCOMING EVENT AT UW! Book Launch Event

Invasive Species in the Pacific Northwest

Edited by P. D. Boersma, S. H. Reichard, and A. N. Van Buren. Join the authors as they discuss their new book, November 20th from 5:30–7:30pm at University of Washington Center for Urban Horticulture, Miller Hall Commons.

See Center for Urban Horticulture Miller Library for more info
<http://depts.washington.edu/hortlib>



...Have any news from your institution or agency to share with the PNW CESU? Send announcements to Joel Siderius (pnwcesu@u.washington.edu) for inclusion in Cooperative Ventures the official publication of the Pacific Northwest Ecosystem Studies Unit.