



Director's Message John Calhoun, Director



UW ONRC commissioned a panel of natural resource professionals to review our research program, evaluate our past performance, and recommend research priorities for the next ten years. The panel members consisted of **Jamie Barbour**, *Program Manager*, USDA Forest Service Pacific Northwest Research Station; **Keith Blatner**, *Professor & Chair*, Department of Natural Resources, Washington State University; **Robert Heald**, *Director*, Center for Forestry, College of Natural Resources, University of California, Berkeley; and **Hamish Kimmins**, *Professor of Forest Ecology*, Canada Research Chair in Modeling Ecosystem Sustainability, University of British Columbia. The panel delivered us its findings on August 30, 2005.

This issue of the newsletter draws a focus on our core research activities. You will find examples of currently-funded, on-

going research projects as well as a feature article on a resident scientist and his research activities. The newsletter also provides insights into how our research projects are selected and funded.

My goal today, however, is to communicate our forward thinking management of the research program and emphasize how

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we are continuously improving on how we address the key issues of natural resource sustainability. Working on strategic research priorities adopted ten years ago will not serve the needs of our region for the next ten years. The report from our External Research Review Panel is our first step towards a renewed and exciting direction for UW ONRC research.

We are currently considering the recom-

mendations offered in the report and consulting widely with key natural resource research leaders and our stakeholders. The Policy Advisory Board plays a central role in sanctioning the changes in direction as they come about.

The UW ONRC mission remains unchanged. We conduct research and provide education on natural resources management practices that integrates

both ecological and economic values. We do this in a large part by stimulating interaction, communication, and partnerships with industry, government, tribes, communities, and other educational institutions.

Where should the focus of our efforts lie over the next ten years? Future newsletters will report our progress toward the answer to that question.

UW Graduate Student Studies Ravens on Olympic Peninsula

Bill Webb, Ph.D. Student

University of Washington College of Forest Resources

UW College of Forest Resources Professor John Marzluff conducted experiments at UW ONRC from 1996 through 2001. He used artificial nests containing eggs and artificial nestlings to identify the predators of the Marbled Murrelet. Approximately half of the nests were depredated by corvids, mostly by jays and crows. An unexpectedly low percentage of the nests were depredated by ravens. My research follows up on these results, as it pertains to ravens.

I am conducting an artificial nest experiment to examine the predatory behavior of ravens in more detail. My artificial nest experiment investigates the influence of habitat structure, location, and the presence of artificial resources on raven predatory behavior.

I am also surveying the abundance of ravens in different habitats on the Olympic Peninsula. I aim to combine this abundance data with the survival, movement, and predation behavior to build a spatially-explicit GIS model. This model will simulate raven abundance, population dynamics, and predatory behavior on the landscape. Land managers will be able to use the model to compare the potential impacts of future management alternatives.

In addition to its applied aspects, my project addresses a more fundamental aspect related to the speciation of ravens. Re-

cent genetic work shows that two apparently morphologically-uniform, but genetically-distinct mitochondrial deoxyribonucleic acid (DNA) clades are found within the Common Raven. The degree of divergence in the DNA between the Holarctic and California clades with the Common Raven is much greater than the difference between many well-established bird species.

Some Common Raven indi-



UW Researcher Bill Webb holding Common Raven

viduals with California clade mitochondrial DNA appear more closely related to another species, the Chihuahuan Raven (*Corvus cryptoleucus*). The Holarctic and California clades occur together over a huge area of the western United States and are represented in roughly equal numbers on the Olympic Peninsula. This is a rare example of paraphyly, where members of the same taxonomic group are more closely related to another taxon. One potential explanation for paraphyly in the Common Raven is the two clades formerly were two species and

now are in the process of re-merging. I am using the analysis of mitochondrial DNA combined with behavioral observations to further investigate this phenomenon.

Raven numbers on the Olympic Peninsula have increased steadily during the past 35 years (3% annual growth rate), while the abundance of forest nesting birds have declined (-5.4% annual rate) during the same period of

time. To gain a better understanding of these trends and the potential impacts, my research seeks to explain the spatial patterns of raven abundance, population dynamics, and predatory behavior.

Because of their extreme mobility, ravens may utilize even isolated anthropogenic resources, thus increasing the ecological footprint of anthropogenic subsidies. Ravens can range over hundreds of

kilometers to capitalize on human subsidies, thus potentially reducing the habitat quality of large tracts of intact native habitat to sensitive species.

To document the survival and movements of ravens, I capture them and attach a small radio transmitter to each bird. The transmitters weigh a small fraction of the bird's total mass and last approximately two years. Adult ravens and their fledglings are captured and radio-tagged in order to compare their survival

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and movements. Many of the ravens are sedentary while others move great distances. Some of the radio-tagged ravens have been found as far away as 100 kilometers from the initial capture location.

During my last three years of dissertation research on the Olympic Peninsula, UW ONRC has been an invaluable resource. UW ONRC provided a significant amount of my research funds and provides affordable and convenient lodging for my research technicians and myself. In addition to work space, equipment storage, and networking access, the staff goes out their way to be helpful to my technicians and me.

Bill Webb is a Ph.D. Student in the UW College of Forest Resources, studying the ecology and behavior of ravens on Washington's Olympic Peninsula. He recently completed his third season of full-time field research.



The **Common Raven** (*Corvus corax*) is a member of the crow family (*Corvidae*), and is also the largest songbird (Order *Passeriformes*). The Common Raven has one of the widest distributions of any vertebrate, occurring throughout the northern hemisphere, and can be found anywhere from hot deserts to the icy Arctic. Their intelligence and adaptable behavior are thought to explain the ability of ravens to live successfully in such a wide array of habitats. Their intelligence and flexible behavior has enabled them to

exploit a wide array of resources, including those inadvertently provided by humans. Ravens take advantage of anthropogenic resources such as refuse, road kill, water from landscaping and artificial nesting substrates. Researchers in Washington and elsewhere have found that ravens living near people have higher survival rates and produce more offspring than ravens living further away from humans. Surveys have shown long-term, dramatic increases in the abundance of ravens throughout western North America. The increasing abundance of ravens is a significant conservation concern because in addition to scavenging on anthropogenic resources, ravens also hunt and are known predators of several sensitive species. In western Washington, populations of the Marbled Murrelet (*Brachyramphus marmoratus*) and other forest-nesting birds are vulnerable to increased incidence of raven predation, fueled in part by human influences.

How Research Projects are Selected and Funded

Forestry research supported by UW ONRC is guided by priorities identified by the ONRC Policy Advisory Board and consistent with the Washington State Legislative intent. Within this over-arching framework, we use selection criteria that reflect values in our Strategic Plan.

The staff at UW ONRC, led by the Director, identifies pressing issues within the framework and formulates research questions that can address these issues. Next we seek funding to support research projects. No permanent research funding comes from the State Legislature. We frequently rely on funds that can come to UW ONRC as a result of "earmarks" on federal or state appropriation bills. Once the funding is secure, we distribute Request for Proposals widely within the academic and governmental research

community to conduct the research that will address the issue. We judge the proposals according to pre-determined criteria and make the awards. Finally, we administer the research budget and distribute the findings.

Successful proposals must meet several criteria to be successful in the competition for funds. First, they must demonstrate a high standard of scientific and technical merit. Next, they must be consistent with research priorities and evaluation criteria in the UW ONRC Strategic Plan.

Criteria for winning proposals include the following points:

- Applied research is favored over basic research
- Research that builds on existing research, particularly that done

on the Olympic Peninsula, is favored

- Information gained from the research must be able to be applied by regional resource managers, and
- The research must address issues or interests that are underserved by other organizations and be of a scale to make a noticeable difference.

Finally, research funded by UW ONRC must be submitted for peer review. Results must be either published in peer reviewed journals or other publications. This ensures quality and gives confidence to UW ONRC staff as we use the findings to suggest solutions to natural resource problems, seeking the integration of ecological values into commercial management of forest resources.

TABLE 1. CURRENTLY FUNDED RESEARCH PROJECTS

<p>Title <i>River Food Web Response to Riparian Zone Management</i></p> <p>PI / Affiliation Dr. Timothy Wootton University of Chicago Division of Biological Sciences Department of Ecology & Evolution</p> <p>Award \$43,301</p> <p>Project Focus Using a unique series of replicated riparian manipulations along the South Fork Pysht River, this project will investigate multiple effects of riparian conversion management schemes on the food web components of rivers. It will look at how these affect juvenile salmonids rearing in rivers, paying particular attention to how the management changes affect the energy base of these food webs. Specific activities in this phase of the project will focus on documenting changes in biotic and abiotic components of the river in response to manipulation of riparian habitat, investigating how the scale of manipulation affects the responses, and exploring the correspondence between the scale of movement of juvenile salmon to the scale of management manipulations. This work will provide insight into the effectiveness of current riparian conversion projects and may suggest an alternative approach of introducing limited productivity hotspots in the larger scale context of conserved riparian corridors.</p>
<p>Title <i>Application of Density Management Principles to Reduce Type II Errors in Classifying Young-Forest/Marginal (Northern Spotted) Owl Habitat Within the Olympic Experimental State Forest</i></p> <p>PI / Affiliation Jason Cross / University of Washington Olympic Natural Resources Center</p> <p>Award \$40,188</p> <p>Project Focus The purpose of this project is to apply the principles of density management to Washington Administrative Code (WAC) 222-16-085 and identify a volume density range that may be a substitute definition for young-forest/marginal owl habitat on the Olympic Experimental State Forest (OESF). The focus of the planning and management on the OESF is to provide habitat for the northern spotted owl. Previous studies demonstrated that volume and density can guarantee the number of species, canopy layers, trees greater than 30 inches in diameter, and the amount of canopy closure required in the definition of old-forest owl habitat listed in WAC 222-16-085. Managing for two structural elements (i.e., volume and density) is more efficient than managing for four structural elements, as required by the WAC regulations. Volume and density may also identify habitat not implicated by the WAC; the results is a more effective definition of owl habitat.</p>
<p>Title <i>Snider Ridge Landscape Analysis</i></p> <p>PI / Affiliation John Calhoun / University of Washington Olympic Natural Resources Center</p> <p>Award \$47,278</p> <p>Project Focus The intent of this project is to explore a range of management alternatives for the Snider Ridge area that address the general forest health issue of off-site planting and dieback and the specific issue of the most efficient silvicultural method to provide habitat for the northern spotted owl. Snider Ridge lies within the Olympic National Forest Pacific Ranger District and the Sol Duc Adaptive Management Area.</p>
<p>Title <i>Multipliers for Jobs, Revenues, and Taxes Resulting from DNR Timber Sales</i></p> <p>PI / Affiliation Bruce Lippke / University of Washington College of Forest Resources Rural Technology Initiative</p> <p>Award \$49,962</p> <p>Project Focus This project will create a user-friendly, flexible, scientifically-credible habitat analysis model to use with forest landscapes. The model will work in conjunction with the Landscape Management System (LMS) to provide multiple-species stand and landscape-level assessments of current and potential future wildlife habitat quality and quantity. Forest growth and treatments simulated in LMS will provide quick and easy integration of habitat attributes with other forestry values of interest for many forest management alternatives. Linking outputs to Geographic Information Systems will allow forest planners to examine the results in spatial and temporal contexts. The complexity of managing the OESF to balance both conservation and production increases when habitat for multiple species to maintain a diversity of fauna as required by the Washington State Department of Natural Resources' Habitat Conservation Plan is added into the mix. Forest managers need robust planning and analysis tools to assess the impacts of forest management alternatives on many species simultaneously.</p>
<p>Title <i>The Contribution of Low-Income Workers to Forest Management and Production</i></p> <p>PI / Affiliation Dr. Robert Lee / University of Washington College of Forest Resources</p> <p>Award \$21,999</p> <p>Project Focus This study will provide a baseline understanding of what local knowledge exists in this community of low-income manual forest laborers and how that information is shared. Migrant workers are an increasing percentage of the low-income manual forest laborers in the Pacific Northwest. They have important ecological knowledge learned through years of experience in the harvest of floral greens and mushrooms and pre-harvest thinning, all of which directly affect the health and productivity of the forest. Their work can be incorporated into monitoring efforts, integrating their knowledge into a plan for sustaining the forest.</p>