

Annual Update of Research



University of Washington
College of Forest Resources Centers

Program

May 17, 2007

Anderson Hall • Forest Club Room • Room 207
University of Washington • Seattle, Washington

Presentation Schedule

College of Forest Resources Centers

8:30 **Introductory Remarks**
Bruce Bare • Dean, College of Forest Resources

Moderator
John Calhoun • Director, Olympic Natural Resources Center

Section I: ONRC-Sponsored Research

8:45 **Olympic Natural Resources Center**
GIS for Estuarine Restoration Project Ranking in Willapa Bay
Teresa Zena Alcock • GIS Coordinator/Analyst
Keven Bennett • GIS Analyst

9:30 **Olympic Natural Resources Center**
Using GPS and the ONRC Willapa Bay LiDAR Elevation Model for Mapping Invasive Burrowing Shrimp in Willapa Bay
Teresa Zena Alcock • GIS Coordinator/Analyst
Keven Bennett • GIS Analyst

10:15 **Rural Technology Initiative**
Management Templates for Biodiversity and Economics on the Olympic Experimental State Forest
Kevin Zobrist • Research Scientist
Bruce Lippke • Professor & Director, Rural Technology Initiative & President, Consortium for Research on Renewable Industrial Materials

11:00 **Center for International Trade in Forest Products**
Creating Value from Trust Lands
John Perez-Garcia • Professor, Forest Economics

11:45 Lunch

Section II: Other Research

12:30 **Rural Technology Initiative**
Eastside Climate, Bugs, and Fire Impact on Carbon and Cost
Elaine Oneil • Research Silviculturist

- Rural Technology Initiative**
 1:15 Forest Land Conversion in Washington State
 Ara Erickson • Forestry Research Consultant
- Precision Forestry Cooperative**
 2:00 Using Acoustics to Estimate Wood Quality and Value along the Tree-to-product Chain
 David Briggs • Professor & Director, Precision Forestry & Stand Management Cooperatives
- Stand Management Cooperative**
 2:45 Application of New Technology and Methods for Pacific Northwest Forest Nutrition Research
 Robert Harrison • Professor & Nutrition Project Head
- Center for International Trade in Forest Products**
 3:30 Economic Contribution of the Forestry and Forest Products Industries to the State of Washington
 Ivan Eastin • Professor & Director, Center for International Trade in Forest Products
- Center for Sustainable Forestry at Pack Forest**
 4:15 Comparison of the Effects of SFI and FSC Forest Certification Systems on the Management of Pack Forest
 Gregory Ettl • Associate Professor & Director, Center for Sustainable Forestry at Pack Forest

Presenters

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College of Forest Resources Centers & Cooperative Programs

The College administers five interdisciplinary centers, two of them jointly with other UW academic units. Centers at the UW generally focus on research and outreach. Although centers do not administer academic programs, they are an important resource for graduate and undergraduate student learning and research. Other special programs, like the Stand Management Cooperative, are organized as research cooperatives, with members from private industry and government agencies paying an annual fee. Still others are loosely organized as consortia or networks, drawing on the expertise and interests of faculty, students, and staff from the College and throughout the UW.

Center for International Trade in Forest Products	www.cintrafor.org
Center for Quantitative Science in Forestry, Fisheries, and Wildlife	http://depts.washington.edu/cqs/
Center for Sustainable Forestry at Pack Forest	www.packforest.org
Landscape Management	http://lms.cfr.washington.edu/
Northwest Environmental Forum	www.nwenvironmentalforum.org
Olympic Natural Resources Center	www.onrc.washington.edu
Precision Forestry Cooperative	www.cfr.washington.edu/research.pfc
Rare Plant Care and Conservation	http://courses.washington.edu/rarecare/
Restoration Ecology Network	http://depts.washington.edu/uwren/
Rural Technology Initiative	www.ruraltech.org
Stand Management Cooperative	www.cfr.washington.edu/research.smc
Urban Ecology IGERT	www.cfr.washington.edu/research.urbaneco
UW Botanic Gardens	http://depts.washington.edu/urbhort/
The Water Center	http://depts.washington.edu/cwws/

Project Descriptions

Listed in order of presentation

GIS for Estuarine Restoration Project Ranking in Willapa Bay

ONRC provided GIS support for a WRIA 24 project to evaluate and rank the relative importance of estuarine areas of Willapa Bay as habitat for salmon and steelhead or to devise specific projects directed at restoring key estuarine habitat. ONRC compiled and updated all the datasets relevant to analysis of estuarine conditions in Willapa Bay. Key themes used in the analysis of restoration opportunities included anadromous fish status, culvert inventories, oyster habitat, wetlands change, eelgrass and spartina distributions, and tideland morphology and sediments. ONRC produced a final report for the WRIA that represents an amalgamation of the analysis and recommendations of other team members on the project, the GIS analysis and products provided by UW ONRC GIS, and the observations, comments, and corrections contributed by numerous stakeholders, scientists and managers. An overview of the GIS work will be presented.

Using GPS and the ONRC Willapa Bay LiDAR Elevation Model for Mapping Invasive Burrowing Shrimp in Willapa Bay

ONRC is part of a new scientific team in Willapa Bay in a project aimed at increasing understanding of the population distributions of burrowing shrimp, especially as they relate to oyster aquaculture. Known for our work on modeling invasive *Spartina* and modeling the tides in Willapa Bay, ONRC GIS has shared with the entire team a rich array of datasets and GIS themes that describe biological and physical features of Willapa Bay. Recently, we integrated new GPS tideland-elevation-survey information to enhance the LiDAR-derived bathymetry data for the first systematic empirical effort to map the distribution of burrowing shrimp in Willapa Bay. Accurate and comprehensive bathymetry is of interest because both eelgrass and burrowing shrimp may be significantly affected by elevation and marine and estuarine tidal levels. This dataset will allow the team to analyze the interaction of burrowing shrimp populations and oyster aquaculture.

Management Templates for Biodiversity and Economics on the Olympic Experimental State Forest

On the Olympic Experimental State Forest (OESF), the Department of Natural Resources (DNR) is charged with finding management techniques that provide for older forest habitat, especially habitat suitable for the Northern spotted owl (NSO) (*Strix occidentalis cuarina*), while also generating revenue for trust beneficiaries. Identifying management approaches that balance environmental and economic objectives and minimize trade-offs can be challenging. DNR managers can benefit from tools and methods that identify such management approaches in a way that is systematic and transparent to stakeholders. A process has been proposed for developing base management plans, or “templates,” that integrate environmental and economic objectives. This process utilizes a structure-based non-parametric targeting and assessment procedure in combination with economic performance thresholds to identify a spectrum of alternatives that provide varying levels of output relative to both objectives.

Creating Value from Trust Lands

Using existing mill survey data, existing economic data for markets in competition with timber suppliers and manufacturers on the Peninsula and timber sales data, the presentation examines those factors that affect timber revenue on the Olympic Peninsula to determine what actions are needed that can increase timber values.

Eastside Climate, Bugs, and Fire Impact on Carbon and Cost

Since 2000 eastern Washington has been experiencing warmer summer temperatures than at any time in the last 100 years, and these temperature trends are correlated with enhanced insect outbreaks and fire spread during that period. Developing an adaptation strategy that builds resilience into our forests requires that we integrate climate change into our understanding of disturbance and its impacts. Research into climate change impacts is necessary to develop management approaches that are based on future conditions rather than the past. Life cycle analysis of forest management activities and the forest products they can produce demonstrates that forest growth coupled with carbon storage in long-lived forest products and the use of residuals as renewable energy sources generates a substantial carbon benefit.

Forest Land Conversion in Washington State

As part of the Future of Washington’s Forests and Forestry Industries project, this study assessed the trends and dynamics of forest land conversion to non-forestry uses in Washington state. An overview of the factors that contribute to forest land converting to residential and commercial development, possible incentives and disincentives that influence forest land owners’ decision to maintain their lands in forestry uses, and general estimates of rates of forest land conversion will be presented.

Using Acoustics to Estimate Wood Quality and Value along the Tree-to-product Chain

This project became important, hence funded, because of the intersection of several trends; the shift toward smaller trees, the shift toward shorter rotations, replacement of traditional solid wood products by engineered wood products, and the development of new technologies that are replacing visual assessment of “quality” by direct measurement. With all of these changes, the central question is “How can we better match the quality developing in the resource with the needs of products?” Improved methods can benefit manufacturers and landowners and provide better understanding of the effects of silvicultural practices and genetics on quality. This study is developing information on the application of acoustics to assess wood stiffness, a key property for many products, along the tree-to-product chain for Douglas-fir.

Application of New Technology and Methods for Pacific Northwest Forest Nutrition Research

Forest nutrition research, including studies on the effects of application of growth-limiting nutrients such as N to forests as fertilizers, has been ongoing in the PNW for about 50 years. High variability and uncertainty of site-specific fertilizer response across the region, as well as environmental constraints, are the major current limitations to wider use of fertilizers. High costs of conventional research methods have prevented large-scale studies of fertilizer response of modern forest plantations for the last 20 years. We are currently developing methods that initially characterize stands using LIDAR and other technologies, “pair” treatments to plots of similar stand and site characteristics with GIS, and control application treatments by GIS/GPS-controlled helicopter. With these methods it may be possible to install a modern large-scale study for significantly less cost and in a much smaller time period than using previous fertilization research methods.

Economic Contribution of the Forestry and Forest Products Industries to the State of Washington

Since 1990 the forest sector in Washington has undergone major restructuring as a consequence of changing policies affecting federal forest management, the transition to harvesting second growth on private lands, changing regulatory pressures to protect habitat on public and private lands, changing international competition including the impact of a major recession in Asia that resulted in a substantial restructuring of markets that previously provided price premiums for Washington wood products, and a substantial loss of productive timberland to non-forest uses. In spite of this substantial restructuring within the forest products sector over the past 15 years, the gross business contribution of the sector has begun to grow again; contributing over \$16 billion to the State’s economy in 2005 while remaining an important employer in many rural communities. The threat to forest health and fire risk posed to Eastside forests from mountain pine beetle and bark beetle infestations makes it incumbent upon the state to consider options to reduce this risk. An analytical framework to assess strategic options to improve forest health could weigh the total avoided costs of fire suppression activities against the cost of incentives to encourage the establishment of wood processing facilities.

Comparison of the Effects of SFI and FSC Forest Certification Systems on the Management of Pack Forest

The application of two third-party forest certification systems, the Sustainable Forestry Initiative and the Forest Stewardship Council, were compared for the College of Forest Resources’ 4300 acre Pack Forest. The forest’s stands were divided into two halves, and differing harvest rules applied to each half. Landscape Management System software was used to simulate stands 50 years into the future and wildlife habitat, wood volume and revenue over the 50 years were compared. Revenue targets were more readily achieved under the Sustainable Forestry Initiative’s standard. The Forest Stewardship Council certification half showed a steady increase in Johnson and O’Neil “large tree” habitat types starting 25 years after implementation, while the Sustainable Forestry Initiative half maintained a more consistent balance of habitat types over the 50 years.