

Annual Review of Research



University of Washington
College of Forest Resources Centers

Program

April 18, 2008

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

Presentation Schedule

College of Forest Resources Centers

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

Moderator

Robert Edmonds • Associate Dean for Research, College of Forest Resources

Morning Session

8:45 **Center for Sustainable Forestry at Pack Forest**
A Forest Management Plan for the Nisqually-Mashel State Park
Gregory Ettl • Associate Professor & Director

9:30 **Wind River Canopy Crane Research Facility**
Synthesis of Carbon Research at the Wind River Canopy Crane
Research
Ken Bible • Site Director

10:15 **UW Botanic Gardens**
Are cities harbingers of the future climate? A stomatal perspective of
urbanization and global climate change
Soo-Hyung Kim • Assistant Professor

11:00 **Center for International Trade in Forest Products**
Recent Trends in International Timber Markets: Strategic Implications
John Perez-Garcia • Professor

11:45 Lunch

Afternoon Session

1:00 **Stand Management Cooperative**
Non-destructive prediction of product stiffness in Douglas-fir trees and
logs: basic relationships and influence of growing conditions
David Briggs • Professor, Forest Products & Operations Research & Director

- Rural Technology Initiative**
 1:45 Optimizing timber harvest revenue with wildlife constraints for old-forest species using a spatially explicit wildlife model and open source GIS
 Hiroo Imaki • Geospatial Data Analyst, NOAA, Northwest Fisheries Science Center, Environmental Conservation Division
- Precision Forestry Cooperative**
 2:30 Beyond ground surface models: ecological applications of terrestrial and aerial LiDAR
 L. Monika Moskal • Assistant Professor, Remote Sensing & Biospatial Analysis
- The Water Center**
 3:15 Concentrations of polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) in water and fish in the Cedar River watershed, Washington
 Demetrius Fletcher • Master of Science Candidate
- Olympic Natural Resources Center**
 4:00 Application of the -3/2 Power Law to Young-Forest/Marginal Spotted Owl Habitat: Identifying Candidates and Prescriptions for More Complex Habitat
 Jason Cross • Research Coordinator
 Jeffrey Cornick • Research Scientist

Presenters

Bruce Bare	bare@u.washington.edu
Ken Bible	kbible@u.washington.edu
David Briggs	dbriggs@u.washington.edu
Jeff Cornick	jcornick@u.washington.edu
Jason Cross	crossco@u.washington.edu
Bob Edmonds	bobe@u.washington.edu
Greg Ettl	ettl@u.washington.edu
Demetrius Fletcher	df3@u.washington.edu
Hiroo Imaki	hiroo.imaki@noaa.gov
Soo-Hyung Kim	soohkim@u.washington.edu
L. Monika Moskal	lmoskal@u.washington.edu
John Perez-Garcia	perjohm@u.washington.edu

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/

Presentation Descriptions

Listed in alphabetical order by presentation title

Application of the $-3/2$ Power Law to Young-Forest/Marginal Spotted Owl Habitat: Identifying Candidates and Prescriptions for More Complex Habitat

The lands within the Olympic Experimental State Forest are currently meeting owners' management objectives or they are not; silviculture is the method by which stands are transformed from less-desirable conditions (i.e. meeting few or no management objectives) to more-desirable conditions (meeting primary or many management objectives). Success or failure in achieving management objectives depends on the definition of success; it may be difficult to measure success and failure across landscapes when definitions for identical management objectives differ by ownership. Further, structural definitions do not offer guidance as to the most appropriate silvicultural prescriptions to achieve success. This project explored an alternate methodology for achieving success in meeting the Washington State Department of Natural Resources' Habitat Conservation Plan mandate for spotted owl habitat: analyzing stands' risk, vigor, volume, and density relative to a defined target and prescribing treatments based on the combination(s) of these metrics.

Are cities harbingers of the future climate? A stomatal perspective of urbanization and global climate change

Evidences are emerging that urbanization is not only a leading cause of global change but also cities themselves may act as harbingers of the future climate because urban microclimate is already warmer and CO₂ enriched. Plants in many taxa exhibit an intriguing phenotypic plasticity by adjusting their stomatal numbers in response to CO₂ concentrations often in a fashion to increase water use efficiency. Here, I examine the stomatal numbers of several plant species that were grown in urban environments to 1) test if the stomatal development is affected by urban climate factors; 2) address the question if stomatal numbers will continue to be altered in the future climate; and 3) demonstrate the potential of utilizing urban environments as model system for climate change studies.

Beyond ground surface models: ecological applications of terrestrial and aerial LiDAR

In less than a decade, LiDAR (Light Detection and Ranging) has revolutionized hyperspatial remote sensing, especially in the field of forestry. Precision Forestry Cooperative continues to be a leader in developing methodologies for forest inventory characterization and beyond. New research direction include applications of aerial and terrestrial LiDAR in stand characterization, species identification, sensor fusion, above ground biomass estimation, extraction of forest canopy variables for fire modeling, as well as application of LiDAR to issues concerning forest health such as susceptibility to mountain pine beetle.

Concentrations of polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) in water and fish in the Cedar River watershed, Washington

Presentation will focus on the possible delivery of polybrominated diphenyl ethers (PBDEs) and polychlorinated biphenyls (PCBs) by chinook and coho salmon to the Cedar River watershed and how it may influence decisions affecting salmon populations and watershed management above the Landsburg Diversion Dam.

A Forest Management Plan for the Nisqually-Mashel State Park

The 1200 ac Nisqually-Mashel State Park was recently established from the purchase of former forest plantations near the confluence of the Nisqually and Mashel Rivers in Pierce County, WA. The Center for Sustainable Forestry at Pack Forest was contracted to examine forest health and the potential of transitioning plantations to more diverse species compositions and open forest structures. A field survey was used to inventory stand conditions, and the forest modeling program Landscape Management System (LMS) was applied to field data to create virtual silvicultural prescriptions that allowed a comparison of various treatments. A mixture of treatment

recommendations will be discussed, demonstrating the process of developing a management plan for a forest with diverse stakeholder objectives.

Non-destructive prediction of product stiffness in Douglas-fir trees and logs: basic relationships and influence of growing conditions

Commercial nondestructive testing (NDT) of lumber and veneer for stiffness and other mechanical properties began in 1963 and 1977 respectively. Direct estimates of the properties of lumber and veneer permitted more accurate, precise, and flexible sorting and allowed manufacturers of products such as glulam beams, trusses, laminated veneer lumber, I-beams & joists, etc. to improve and customize the design of these products to customer needs. The success of NDT and growth of these engineered wood products (EWP's) led to demand for NDT methods for assessing logs that would predict the properties of lumber or veneer they would yield. Commercial technology for NDT of logs appeared several years ago and provides a method for rating and sorting logs according to order files for lumber or veneer for EWP's. The success of the log NDT technology spurred recent development of NDT technology to assess properties in standing trees. The Stand Management and Precision Forestry Cooperatives received a grant to develop prediction relationships to (1) estimate stiffness along the tree to product value chain for Douglas-fir, (2) to determine if stiffness found in Douglas-fir trees can be estimated from tree, stand and site variables, and (3) in collaboration with the Pacific Northwest Tree Improvement Research Cooperative at Oregon State University, to assess the utility of the tree and log NDT technology in genetic improvement of stiffness in Douglas-fir.

Optimizing timber harvest revenue with wildlife constraints for old-forest species using a spatially explicit wildlife model and open source GIS

The current study presents a spatial forest planning framework that combines a stand level management simulation and a landscape level harvest scheduling. This spatial forest planning framework includes conflicting management goals such as a net present value of timber harvesting (/NPV/) and threshold levels of wildlife habitat capacity. An optimization algorithm, simulated annealing, was adopted to search for efficient relationships between two conflicting objectives.

Recent Trends in International Timber Markets: Strategic Implications

The weak US dollar should improve the competitiveness of US wood products in foreign markets, especially in relation to European and Canadian suppliers. Exports allow chance to diversify market risk since economies tend to be countercyclical relative to each other. The slowing US housing market should further encourage exports. Russian log export tariffs should provide good export opportunities for US logs and lumber, particularly in China, Japan, Korea, Taiwan, Finland and Sweden. Public procurement policies in Europe and Japan should help stimulate demand for certified wood, especially in China, Vietnam, Japan and the EU. Finally, emerging markets will provide new export opportunities.

Synthesis of Carbon Research at the Wind River Canopy Crane Research

Carbon has been the focus of many research projects conducted at the Wind River Canopy Crane Research Facility. This presentation is a synopsis of various methods employed to study carbon in an old-growth Douglas-fir forest.