



United States  
Department of  
Agriculture

Forest Service

Pacific Northwest  
Research Station



# Recent Publications of the Pacific Northwest Research Station, Third Quarter 2003



This list of recent publications and other products of the Pacific Northwest (PNW) Research Station is published four times a year.

The first section shows items published by the PNW Research Station. The second section shows publications available elsewhere. In each section, items are grouped alphabetically by author within categories.

### **Ordering from PNW Research Station Station Publications**

Station publications have a five-digit code number on the first line of the citation. The code numbers are printed again on the inside back cover.

To order a Station publication, circle its number on the inside back cover, cut out the order form, place in an envelope, and send it to the address indicated. Please do not remove the label containing your name and address. It is used to send your publications. If there is no label, please fill in your name and address.

Supplies of these publications are limited. We will not be able to fill your order after our current supply is exhausted. Copies may be purchased, however, from the U.S. Department of Commerce, National Technical Information Services, Springfield, VA 22161 ([www.ntis.gov](http://www.ntis.gov)).

### **Publications from Other Sources**

Many items listed here were not published by the PNW Research Station, although the work was supported by the Station. For these items, the Station laboratory where the work originated may have copies. To request a copy, use the order form for the laboratory indicated in parentheses at the end of the entry. If another organization has copies, its address will be given in parentheses at the end of the entry.

**NOTE:** If you are submitting more than one order form, you may put the forms in one envelope addressed to Diane Smith, P.O. Box 3890, Portland, OR 97208-3890. Be sure your complete address is on each form because they will be forwarded to the appropriate labs.

## **PNW Research Station Laboratories**

### **Anchorage**

Forestry Sciences Laboratory  
3301 C Street, Suite 200  
Anchorage, AK 99503-3954

### **Corvallis**

Forestry Sciences Laboratory  
3200 SW Jefferson Way  
Corvallis, OR 97331-4401

### **Fairbanks**

Forestry Sciences Laboratory  
University of Alaska Fairbanks  
P.O. Box 756780  
Fairbanks, AK 99775-6780

### **Juneau**

Forestry Sciences Laboratory  
2770 Sherwood Lane, Suite 2A  
Juneau, AK 99801-8545

### **La Grande**

Forestry and Range Sciences Laboratory  
1401 Gekeler Lane  
La Grande, OR 97850-3368

### **Olympia**

Forestry Sciences Laboratory  
3625-93<sup>rd</sup> Avenue SW  
Olympia, WA 98512-9193

### **Portland**

Forestry Sciences Laboratory  
620 SW Main, Suite 400  
P.O. Box 3890  
Portland, OR 97208-3890

### **Seattle**

Forestry Sciences Laboratory  
400 N 34<sup>th</sup> Street, Suite 201  
Seattle, WA 98103

### **Sitka**

Alaska Wood Utilization Research and  
Development Center  
204 Siginaka Way  
Sitka, AK 99835-7316

### **Wenatchee**

Forestry Sciences Laboratory  
1133 N Western Avenue  
Wenatchee, WA 98801-1229

## Ordering from Libraries

Libraries on our mailing list automatically receive copies of papers published by the Pacific Northwest Research Station but not reprints from journals or proceedings. Forestry libraries in the Northwest receive proceedings volumes and subscribe to the journals in which PNW authors publish. Those wanting to read articles listed here may visit the nearest research library or request the article from the library directly or through interlibrary loan; libraries charge a fee for copying and mailing these materials. Some forestry libraries in the Northwest are:

### Valley Library

Oregon State University  
Corvallis, OR 97331  
(Visit or request article from the Interlibrary Loan section)

### Interlibrary Borrowing Service

Suzzallo Library, FM 25  
University of Washington  
Seattle, WA 98195  
(To request article only)

### Forestry Resources Library, AQ15

60 Bloedel Hall  
University of Washington  
Seattle, WA 98195  
(To visit only)

### University of Alaska Library

3211 Providence Drive  
Anchorage, AK 99508  
(Visit or request article from the Interlibrary Loan section)

## Internet Access

Many of our publications are now available online in Portable Document Format (pdf). A free, downloadable Adobe Acrobat Reader is required to view these documents. For instructions about downloading the reader and to view the publications, navigate to: <http://www.fs.fed.us/pnw/publications/complete-list.shtml>.

Our most recent quarterly lists of publications also are available on our Web site. Some order forms include email addresses to direct your requests to the appropriate office.

<b>Web site</b>	<a href="http://www.fs.fed.us/pnw">http://www.fs.fed.us/pnw</a>
<b>Telephone</b>	(503) 808-2592
<b>Publication requests</b>	(503) 808-2138
<b>FAX</b>	(503) 808-2130
<b>Email</b>	<a href="mailto:pnw_pnwpubs@fs.fed.us">pnw_pnwpubs@fs.fed.us</a>
<b>Mailing address</b>	Publication Distribution PNW Research Station P.O. Box 3890 Portland, OR 97208-3890

## Pacific Northwest Research Station Publications

The following publications may be ordered by using the form on the inside back cover. Circle the code number for the publication. These publications are available to download at <http://www.fs.fed.us/pnw/publications/complete-list.shtml>.

### Bibliographies

#### 03-150

Pacific Northwest Research Station  
2003. Recent publications of the Pacific North-west Research Station, second quarter 2003. Portland, OR: U.S. Department of Agriculture, Forest Service. 20 p.

*Keywords: Bibliographies (forestry).*

### Economics

#### 01-211

Flora, D.F.  
2003. Forest economics research at the Pacific Northwest Research Station, to 2000. Gen. Tech. Rep. PNW-GTR-562. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 207 p.

Over 80 years of contributions by scientists of the Pacific Northwest Research Station to developments in economic theory, economic tools, policies, and economic issues are summarized. This is a story of progressive accomplishments set against a constantly changing background of economic and social events.

*Keywords: Forest economics, forest policy, forest management.*

#### 03-045

Nagubadi, R.V.; Fight, R.D.; Barbour, R.J.  
2003. Valuing a log: alternative approaches. Res. Note PNW-RN-541. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 15 p.

The gross value of products that can be manufactured from a tree is the starting point for a residual-value appraisal of a forest operation involving the harvest of trees suitable for making forest products. The amount of detail in a model of gross product value will affect the statistical properties of the estimate and the amount of ancillary information that is provided. Seven data sets from forest product recovery studies of western conifers were used in the evaluation of three models of gross product value. The evaluation of these models was based on the need for information and the statistical properties of the estimators. The most detailed method provided additional information, but at some loss in the precision and accuracy of the prediction of gross value of products from a log.

*Keywords: Residual-value appraisal, log value, alternative approaches.*



## **Ecosystem Structure and Function**

### **02-042**

Hann, W.J.; Wisdom, M.J.; Rowland, M.M.  
2003. Disturbance departure and fragmentation of natural systems in the interior Columbia basin. Res. Pap. PNW-RP-545. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 19 p.

We integrated landscape data from science assessments of the interior Columbia basin into one variable that functions as a robust index of departure from native conditions. This variable, referred to as the disturbance departure and fragmentation index, is a spatially explicit measure of landscape quality and resiliency. Primary causes of departure and fragmentation include fire suppression, timber harvest, mining, oil and gas development, livestock grazing, invasive species, road networks, and the interface of these activities with agricultural and urban development. We derived four classes of the disturbance departure and fragmentation index: very high, high, moderate, and low. Because the disturbance departure and fragmentation index represents the composite effects of management activities that do not mimic native or natural processes, the index appears useful as a planning tool for integrated restoration of wildland landscapes.

*Keywords: Disturbance departure, fragmentation, historical range of variability, interior Columbia basin, landscapes, land use planning, landscape ecology, resiliency, similarity index, wildlands, wildland landscapes.*

### **03-001**

Pacific Northwest Research Station  
2003. Promoting habitat complexity in second-growth forests [Brochure]. Portland, OR: U.S. Department of Agriculture, Forest Service. [Irregular pagination].

This brochure describes forest management tools that can help meet multiple values—environmental, economic, and aesthetic—when used collectively and according to a well-devised plan.

*Keywords: Species composition, forest structure, habitat.*

(This publication is available to download in pdf at [http://www.fs.fed.us/pnw/pubs/carey\\_habitat-complexity.pdf](http://www.fs.fed.us/pnw/pubs/carey_habitat-complexity.pdf). We have a very limited supply of paper copies of this brochure.)

## **Forest Management**

### **02-295**

Burchfield, J.A.; Miller, J.M.; Allen, S. [and others]  
2003. Social implications of alternatives to clearcutting on the Tongass National Forest: an exploratory study of residents' responses to alternative silvicultural treatments at Hanus Bay, AK. Gen. Tech. Rep. PNW-GTR-575. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 28 p.

After a series of eight harvest treatments were completed at Hanus Bay, Alaska, on the Tongass National Forest in 1998, 27 respondents representing 9 interest groups were interviewed to understand their reactions to the various harvest patterns in the 8 treatment areas. Harvest patterns included three stands with 25 percent retention of basal area; three stands with 75 percent retention of basal area;

a clearcut; and a full retention, or no-harvest, option. A special poster board that displayed estimates of consequences of the harvests in six areas (fish productivity, deer production, timber yield, appearance, biodiversity, and residual stand damage) was provided to assist respondents in articulating their evaluations. There were no significant differences in preferred treatments among the nine interest groups sampled, although responses identified specific preferences based on individual interests. Analysis of narrative responses identifies that the basis for acceptance follows three major elements of emerging social acceptability theory: (1) treatments achieve a balance of positive effects, (2) natural conditions are sustained, and (3) contextural attributes are thoroughly considered. Sustaining benefits to rural communities and subsistence lifestyles also emerge as important considerations in judging the acceptability of harvest treatments.

*Keywords: Clearcutting, subsistence, timber harvests, social acceptability.*

### **03-008**

Ralston, R.; Buongiorno, J.; Schulte, B.; Fried, J.

2003. WestPro: a computer program for simulating uneven-aged Douglas-fir stand growth and yield in the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-574. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 25 p.

This users manual and tutorial describes WestPro, a Microsoft Excel add-in program that simulates the growth of uneven-aged Douglas-fir stands in the Pacific Northwest region of the United States. Given an initial stand state, defined as the number of softwood and hardwood trees per acre by diameter class, WestPro predicts the future stand state for each year of

a predetermined time horizon. Management regimes are defined by a target stand distribution and a cutting cycle. Performance indicators include diversity of tree size and species groups, timber yield, and net present value of harvest cover over the given horizon. By working the examples in this manual, users can learn how to simulate the growth of a given initial stand and to predict how different management regimes may affect stand structure, yield, and diversity.

*Keywords: Douglas-fir, Pseudotsuga menziesii, uneven-aged, management, economics, ecology, WestPro, simulation, software, growth model, diversity.*

## **Mycorrhizae**

### **03-113**

Castellano, M.A.; Cázares, E.; Fondrick, B.; Dreisbach, T.

2003. Handbook to additional fungal species of special concern in the Northwest Forest Plan. Gen. Tech. Rep. PNW-GTR-572. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 144 p.

This is a companion handbook to the *Handbook to Strategy 1 Fungal Species in the Northwest Forest Plan* published in October 1999. This handbook includes all record-of-decision (ROD)-listed fungal species not contained in the first handbook, as well as updated site, field, and collecting forms; an expanded set of artificial keys to all fungal species from both handbooks; and an updated, partially illustrated glossary. The main purpose of this handbook is to help facilitate the survey, collection, and handling of potential ROD-listed fungal species by USDA Forest Service and USDI Bureau of Land Management employees. Each species is represented by a condensed description, a set of distinguishing features, and information on substrate, habitat, and seasonality. We also

present a list of known sites within the range of the northern spotted owl, a distribution map, and additional references to introduce the available literature on a particular species.

*Keywords: Mycology, mushrooms, sequestrate fungi, truffles, biodiversity, monitoring, rare fungi, forest ecology.*

(This publication is available to download in pdf at <http://www.fs.fed.us/pnw/pubs/gtr572>). Because of the cost involved in publishing this report, we have a very limited supply of paper copies. We have divided the electronic version into nine parts for easier downloading.)

## **Nontimber Forest Products**

### **03-140**

Alaska Boreal Forest Council, comps.

2003. Proceedings: hidden forest values: the first Alaska-wide nontimber forest products conference and tour; November 8-11, 2001. Gen. Tech. Rep. PNW-GTR-579. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 150 p.

The Hidden Forest Values Conference brought together a diverse assemblage of local, state, and federal agencies, tribal governments, traditional users, landholders, cottage enterprises, and other nontimber forest products-related businesses, scientists, and experts. The purpose of this forum was to exchange information, cooperate, and raise awareness of issues on sustainable, equitable, and environmentally and economically viable opportunities for nontimber forest products in Alaska. These proceedings include extended summaries of presentations by speakers and panelists at the conference.

*Keywords: Nontimber forest products, Alaska.*

## **Plant Ecology**

### **02-281**

Curtis, A.B.

2003. Horse Rock Ridge Research Natural Area: guidebook supplement 27. Gen. Tech. Rep. PNW-GTR-571. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 30 p.

Horse Rock Ridge Research Natural Area protects the best remaining example of a grassy "bald" on the western margin of the Cascade Range, and its associated botanical, wildlife, and scenic values. This bald, surrounded by old-growth *Pseudotsuga menziesii*/*Tsuga heterophylla* (Douglas-fir/western hemlock) forest, lies in the Coburg Hills on the eastern edge of the Willamette Valley, western Oregon. This site is recognized for its considerable diversity of plant species that includes both Willamette Valley plants and plants more often found in the montane zone of the Cascades. This guidebook describes the area, the environment, biota, disturbance history, research, and access.

*Keywords: Research, natural area, vegetation types, vascular plants, lichens, liverworts, mosses, birds, mammals, mollusks, amphibians, reptiles.*

### **02-141**

Johnson, C.G., Jr.

2003. Green fescue rangelands: changes over time in the Wallowa Mountains. Gen. Tech. Rep. PNW-GTR-569. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 41 p.

This publication continues the documentation of changes on green fescue rangelands in the Wallowa Mountains following overgrazing by domestic livestock at the beginning of the 20<sup>th</sup> century. Sites initially photographed and sampled by Arthur Sampson in 1907 and by Elbert H. "Burt" Reed in 1938 have been

rephotographed and resampled periodically. The comparative photography and data document the successional changes in the vegetation as a result of domestic grazing curtailment. Trends were static or upward on 70 percent of the sampled sites.

*Keywords: Green fescue, Wallowa Mountains, Arthur Sampson, Elbert Reed, Gerald Strickler.*

### 03-043

McClellan, M.H.; Brock, T.; Baichtal, J.F.  
2003. Calcareous fens in southeast Alaska. Res. Note PNW-RN-536. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 10 p.

Although calcareous fens have not been identified previously in southeastern Alaska, a survey identified several wetlands that appear to be calcareous fens. These sites were located in low-elevation discharge zones that are below recharge zones in carbonate highlands and talus footslopes. Two of six surveyed sites partly met the Minnesota Department of Natural Resources water chemistry criteria for calcareous fens, with pH values of 6.7 to 7.4 and calcium concentrations of 41.8 to 51.4 milligrams per liter but fall short with regard to specific conductivity (315 to 380 microsiemens per centimeter). Vegetation was predominantly herbaceous, with abundant Sitka sedge (*Carex aquatilis*) and scattered shrubs such as Barclay willow (*Salix barclayi*) and redosier dogwood (*Cornus sericea* ssp. *sericea*). The soils were Histosols composed of 0.6 to greater than 1 meter of sedge peat. We found no evidence of calcium carbonate precipitates (marl or tufa) in the soil.

*Keywords: Alaska (southeast), fens, calcareous fens, wetlands, peatlands, karst.*

## Regional Assessments

### 02-122

Haynes, R.W., tech. coord.

2003. An analysis of the timber situation in the United States: 1952 to 2050. Gen. Tech. Rep. PNW-GTR-560. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 254 p.

For more than a century, national assessments of supply and demand trends for timber have helped shape perceptions of future commodity consumption and resource trends. These perceptions have guided forest policy. Since 1952, U.S. timber harvest has risen by nearly 67 percent, accompanied by growing timber inventories on both public and private lands, but there has been a decline in the critical private timberland base. The current assessment envisions forest products consumption rising 42 percent by 2050 and marked shifts in the extent and location of domestic and imported supplies. Prospective shifts include a temporary near-term decline in U.S. roundwood harvest and an increase in the share of consumption from imports. In the longer term, U.S. timber harvest expands by 24 percent. As a result of steady improvement in growth and productivity on U.S. forest lands, this increased harvest is accommodated by continued expansion in inventory despite decreasing area in the private timberland base.

*Keywords: RPA, assessments, timber, projections, supply, demand, management alternatives, resource trends.*



## 02-376

Molina, R.; McKenzie, D.; Leshner, R.; Ford, J.; [and others]

2003. Strategic survey framework for the Northwest Forest Plan survey and manage program. Gen. Tech. Rep. PNW-GTR-573. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 34 p.

This document outlines an iterative process for assessing the information needs for all survey and manage species, designing and implementing strategic surveys (including field surveys and other information-gathering processes), and analyzing that information for use in the annual species review and adaptive management processes. The framework outlines a series of steps that provide guidance for development of (1) priority information needs, (2) evaluation and selection of information-gathering approaches, (3) implementation of annual work plans, and (4) information management and reporting and transfer of information to the annual species review process. Approaches include design-based statistical surveys, modeling, expert searches, and research that are anticipated to be used singly or in combination to address the priority survey and manage questions and information needs.

*Keywords: Survey, conservation, biodiversity, species persistence, late-seral old-growth forests.*

## Resource Inventory

### 03-088

Campbell, S.; Azuma, D.; Weyermann, D.  
2003. Forests of eastern Oregon: an overview. Gen. Tech. Rep. PNW-GTR-578. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 31 p.

This publication provides highlights of forest inventories and surveys from 1993 to 2001. About 35 percent of eastern Oregon is forested. The amount of forest land in eastern Oregon has increased by about 700,000 acres since the 1930s, with increases in juniper forest land

accounting for most of the change. Thirty-one tree species were tallied in forest inventories during the 1990s, with ponderosa pine the predominant species in all ecological provinces in eastern Oregon. The Forest Service, Bureau of Land Management, and other federal agencies manage about 71 percent of eastern Oregon forests; about 27 percent is privately owned; and the remaining 2 percent is managed by the Oregon Department of Forestry and other nonfederal public agencies. The volume of wood in eastern Oregon forests is about 25.7 billion cubic feet, of which about 312 million cubic feet per year were harvested between 1987 and 1999. In the same period, annual mortality and removals exceeded annual growth for all ownerships. Down wood is an important forest component and shows increases with forest age. Insect defoliators, bark beetles, root diseases, and dwarf mistletoes are present on over 72 percent of forest land in eastern Oregon. Year-to-year defoliation or mortality trends can be detected with aerial surveys. Introduced plant species are present on over 50 percent of private and other public forest land. Diversity of lichens (indicators of air pollution, climate, and forest age and structure) is greatest in the Blue Mountains Province and lowest in the Intermountain Province. No ozone injury has been detected on sensitive forest trees and plant species in eastern Oregon.

*Keywords: Eastern Oregon, forest land, timberland.*

### 03-111

Pacific Northwest Research Station  
2003. Forest inventory and analysis [Brochure]. Portland, OR: U.S. Department of Agriculture, Forest Service. [Irregular pagination].

This brochure describes the Forest Inventory and Analysis (FIA) program of the Pacific Northwest Research Station. The program conducts inventories in Alaska, California, Oregon, Washington, and the Pacific Islands. A wide variety of data are collected on FIA plots, from tree measurements to down woody

materials. The inventory and analysis crews use a 3-phase sampling design to collect information remotely as well as on the ground. The brochure provides contact information for staff and contains the FIA Web site addresses.

*Keywords: Forest inventory, forest analysis, resource inventory.*

## **Rural Communities**

### **03-006**

Donoghue, E.

2003. Delimiting communities in the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-570. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 51 p.

This paper presents an approach for delimiting communities in the Northwest Forest Plan (NWFP) region of the Pacific Northwest that responds to the need to assess impacts and issues associated with broad-scale ecosystem management. Census block groups are aggregated to provide an alternative to more commonly used geographic delimitations of communities, specifically census places. With the block group aggregation approach, census data can be applied to almost 1.5 million more people in the NWFP region than would be represented by using census places. The delimitation of community boundaries is intended to facilitate future research on understanding and characterizing conditions, structures, and change. Factors to consider in conducting social science research at the small scale are discussed. Ways in which communities have been defined for social assessments and monitoring are identified. The influence of data availability on determining the unit of analysis and research focus at the small scale is discussed.

*Keywords: Community, ecosystem management, Northwest Forest Plan, social assessment, socioeconomic monitoring.*

### **02-373**

Haynes, R.W.

2003. Assessing the viability and adaptability of forest-dependent communities in the United States. Gen. Tech. Rep. PNW-GTR-567. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 33 p.

The work responds to the need to assess progress toward sustainable forest management as established by the Montréal Process of Criteria and Indicators. The focus is on a single indicator (commonly referred to as Indicator 46) that addresses the “viability and adaptability to changing economic conditions, of forest-dependent communities, including indigenous communities.” From county-level data, a composite measure was developed that combined population density, lifestyle diversity, and economic resiliency. There are 837 counties assigned a low rating representing 36 percent of the area of the United States, but they contain less than 3 percent of the U.S. population. The rest of the population is roughly divided among the 2,063 counties assigned medium ratings and the 209 counties assigned high ratings. In terms of forest-dependent communities, there are 742 counties with a high proportion of forest land, but only 14 percent are classified as having low viability and adaptability.

*Keywords: Community resiliency, criteria and indicators, forest dependency, Montréal Process, socioeconomic well-being, sustainable forest management.*

## **Silviculture**

### **02-123**

Garman, S.L.; Cissel, J.H.; Mayo, J.H.

2003. Accelerating development of late-successional conditions in young managed Douglas-fir stands: a simulation study. Gen. Tech. Rep. PNW-GTR-557. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 57 p.

The goal of this simulation study was to provide information for defining thinning regimes for the Central Cascades Adaptive Management Area young-stand management framework. Specifically, this study evaluated the potential effects of an incremental range of thinning treatments starting with a young managed Douglas-fir stand on the development of stand attributes associated with late-successional forests and extracted merchantable volume. Both the specific and general information revealed in this study can be used to guide selection of thinning regimes that meet management goals as well as to design thinning regimes for further evaluation.

*Keywords: Silviculture, vegetation modeling, wildlife habitat, old growth, managed forests, plantations, young forests.*

## **Social Science**

### **02-125**

Kruger, L.E., tech. ed.

2003. Understanding community-forest relations. Gen. Tech. Rep. PNW-GTR-566. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 162 p.

Improved understanding of the relations between human communities and forests is necessary to understanding how alternative forest management policies and practices can affect different communities. This knowledge also enhances our ability to formulate plans that are responsive to the needs and concerns of local communities, thus reducing polarization and related social and economic costs. In December 1997, an interdisciplinary panel representing academic backgrounds in sociology, anthropology, geography, psychology, economics, and recreation gathered in Oregon to discuss relations between human communities and forests. This collection of papers is a product of that gathering.

*Keywords: Community, community research, integrated research, place-based community, community well-being, community attachment, natural disturbance.*

## Publications Available Elsewhere

The following publications are available through interlibrary loan, by writing to the locations indicated, or by using the form indicated. Many journal articles are available on our Web site at <http://www.fs.fed.us/pnw/publications/nonstation.shtml>.

### Aquatic and Riparian Systems

Everett, R.; Schellhaas, R.; Ohlson, P.  
[and others]

2002. Continuity in fire disturbance between riparian and adjacent sideslope Douglas-fir forests. *Forest Ecology and Management*. 175: 31-47.

Fire scar and stand cohort records were used to estimate the number and timing of fire disturbance events that impacted riparian and adjacent sideslope forests in the Douglas-fir series. Data were gathered from 49 stream segments on 25 separate streams on the east slope of the Washington Cascade Range. Upslope forests had more traceable disturbance events than riparian forests in each of the valley types. About 55 to 73 percent of the total traceable fire disturbance for a stream segment occurred on either sideslope and 24 to 27 percent in the riparian forest. Plant association groups in the riparian forest had fewer disturbance events than the same plant associations upslope. Fewer traceable disturbance events in riparian forest may indicate a reduced disturbance frequency or a more severe disturbance regime or both. Fire disturbance regimes of sideslope and riparian forests are quantitatively different but interconnected through shared fire disturbance events. As conservation of disturbance is a prerequisite for maintaining high-integrity ecosystems, we suggest that disturbance may need to be planned for in administratively defined riparian buffer strips to protect long-term ecological integrity of riparian and adjacent upslope forests.

*Keywords: Cohorts, ecosystem integrity, fire-free interval, historical disturbance regimes, riparian buffer zones, riparian-sideslope forests.*

(See Wenatchee order form.)

Grady, J., Jr.

2001. Effects of buffer width on organic matter input to headwater streams in the western Cascade Mountains of Washington state. Seattle: University of Washington. 54 p. M.S. thesis.

Large-scale forest clearcutting is often no longer considered an acceptable forest management strategy, and more environmentally focused forestry practices are being developed and implemented. As alternative forest management techniques and strategies are developed and tested, it is essential that environmental studies are conducted at the same time to ensure that the alternative practices are in fact providing significant environmental protection. The primary emphasis of this study was to determine the effects of forest harvesting on litterfall delivery to the stream channel. Responses in streams of watersheds harvested at varying degrees of disturbance were compared to nearby undisturbed streams. From September 1999 to October 2000 litterfall was collected every 2 to 4 weeks when road access to sites was snow free. With the knowledge of forest characteristics, litterfall inputs between similar riparian forests were compared to assess the capability of buffers to simulate natural litterfall delivery to the stream channel. No clear statistical relationship could be found between litterfall amounts and buffer widths.

*Keywords: Stream buffer, organic matter, small watersheds.*

(Available only through library or interlibrary loan.)



Piccolo, J.J.; Wipfli, M.S.

2002. Does red alder (*Alnus rubra*) in upland riparian forests elevate macroinvertebrate and detritus export from headwater streams to downstream habitats in southeastern Alaska? *Canadian Journal of Fisheries and Aquatic Sciences*. 59(3): 503-513.

We assessed the effects of past timber management on macroinvertebrate and detritus export from headwater streams to downstream habitats in the Tongass National Forest, southeastern Alaska. Twenty-four fishless headwater streams were sampled across four riparian canopy types: old growth, clearcut (less than 5 years postcut), young growth (35 to 40 years postcut), and young-growth conifer. Young-growth alder sites exported over four times more macroinvertebrates than did young-growth conifer sites. No significant differences were observed between other canopy types. About 70 percent of the export consisted of aquatic macroinvertebrates; the remainder was terrestrial or unidentified. No significant differences in detritus export were found among canopy types. These results suggest that alder riparian canopies elevate macroinvertebrate export from headwater streams. Maintaining an alder component in upland forests following timber harvest should increase the productivity of headwater streams. We expect this to increase the productivity of downstream salmonid-bearing food webs that receive prey and detritus from these headwaters.

*Keywords: Red alder, Alnus rubra, riparian productivity, macroinvertebrates, Tongass National Forest.*

(See Wenatchee order form.)

Sheridan, C.D.

2002. Plant and amphibian assemblages in zero-order basins in the Oregon Coast Range. Corvallis, OR: Oregon State University. 207 p. M.S. thesis.

We have a poor understanding of the biotic communities in zero-order basins, drainages extending from ridgelines to the initiation of first-order streams. This study describes baseline plant and amphibian composition in unmanaged zero-order basins in the Oregon Coast Range. Specifically, the spatial distribution and diversity of species, including riparian associates, and the dominant environmental, spatial, and geomorphic gradients in species composition were studied. The results of this research have implications for riparian management in steep, forested landscapes of the Pacific Northwest.

*Keywords: Amphibians, headwater, plant communities, old-growth forests.*

(Available only through library or interlibrary loan.)

## **Atmosphere**

Smith, J.W.

2002. Mapping the thermal climate of the H.J. Andrews Experimental Forest, Oregon. Corvallis, OR: Oregon State University. 222 p. M.S. thesis.

The H.J. Andrews Experimental Forest (HJA) is an important environmental research area in the Pacific Northwest. The primary goal of this study was to provide the most accurate spatial representation of temperature regimes in the HJA given the data sets and tools currently available.

*Keywords: Climate, landscape dynamics.*

(Available only through library or interlibrary loan.)

## Botany

Cronn, R.C.; Small, R.L.; Haselkorn, T.; Wendel, J.F.

2002. Rapid diversification of the cotton genus (*Gossypium*: Malvaceae) revealed by analysis of sixteen nuclear and chloroplast genes. *American Journal of Botany*. 89(4): 707-725.

Previous molecular phylogenetic studies have failed to resolve the branching order among the major cotton (*Gossypium*) lineages, and it has been unclear whether this reflects actual history (rapid radiation) or sampling properties of the genes evaluated. In this paper, we reconsider the phylogenetic relationships of diploid cotton genome groups by using DNA sequences from 11 single-copy nuclear loci (10,293 bp [base pairs]), nuclear ribosomal DNA (695 bp), and four chloroplast loci (7,370 bp). Results from individual loci and combined nuclear and chloroplast DNA partitions reveal that the cotton genome groups radiated in rapid succession following the formation of the genus. Findings of this study highlight the necessity of using multiple, independent data sets for resolving phylogenetic relationships of rapidly diverged lineages.

*Keywords: Cotton, Gossypium, plant evolution, phylogenetics, incongruence.*

(See Corvallis order form 1.)

## Economics

Haynes, R.

2002. The development of economic policy models in support of broad scale land management strategies: an example from the United States. *Revista Forestal Centroamericana*. 37: 12-18. [In Spanish].

The United States has a century of experience with the development of forest policies for broad-scale forest management. For the last three decades, these policies have benefited from or been influenced by economic policy

models. These models have been used to provide the basis for forecasting future resource and market trends to shape public perceptions of emerging resource issues and to explore the effects of different policy options. Lessons from the experience in the United States are generalized as guides for other countries interested in increasing the rigor of forest policy debates.

*Keywords: Economic models, policy analysis, forest policies.*

(See Portland order form. This publication is available only in Spanish.)

## Ecosystem Structure and Function

Gierasimiuk, J.; Rózycki, H.; Strzelczyk, E.; Li, C.Y.

2001. Studies on the fast- and slow-growing bacteria occurring in the root-free soil, rhizosphere and mycorrhizosphere of nursery seedlings and 70-year-old trees of Scots pine (*Pinus sylvestris* L.). Enumeration and identification. *Polish Journal of Soil Science*. 34(2): 77-87.

The numbers of bacteria were higher in the mycorrhizosphere of both the seedlings and old trees than in other sources of isolation. The numbers of bacteria forming fast- and slow-growing colonies were different depending on their origin. In the same sources of isolation, the same groups and taxa for old trees and nursery seedlings dominated.

*Keywords: Scots pine, Pinus sylvestris, rhizosphere ecology, mycorrhizosphere.*

(See Corvallis order form 1.)

Perkins, D.L.

2002. An ecologist's view of whitebark pine. *Sage Notes*. 24(2): 2-5

This article outlines the ecology of whitebark pine and the threats to its persistence, as well as directing readers to further reading. An exotic fungus from Europe, fire suppression, and mountain pine beetles are reducing populations throughout the Pacific Northwest. Restoration efforts are just beginning in the region.

Keywords: *Whitebark pine*, *Pinus albicaulis*.

(See La Grande order form.)

## Fire

Heyerdahl, E.K.; McKay, S.J.

2001. Condition of live fire-scarred ponderosa pine trees six years after removing partial cross sections. *Tree-Ring Research*. 57(2): 131-139.

Our objective was to quantify the effect of fire-history sampling on mortality of mature ponderosa pine trees. We examined 138 trees sampled in the previous 5 to 6 years, and 386 similarly sized, unsampled neighbors, from 78 plots distributed over about 5000 hectares in Oregon. Mortality was low for both groups, although it was significantly higher for the sampled trees than for their neighbors (8 percent versus 1 percent). Removing a fire-scarred section did not make the sampled trees substantially more susceptible to factors such as insects or wind. Most sampled trees (79 percent) had evidence of insect activity in 1994-95, whereas only 5 percent had such evidence in 2000. The few sampled boles that broke did so well above sampling height. The mortality rate among sampled trees in this study was low probably because we removed relatively small samples, averaging 8 percent of the tree's cross-sectional area, from a species with effective, resin-based defenses against insects and microorganisms. Although sampling live

ponderosa pine trees did not often lead to their death in the early years after sampling, fire-scarred trees that are already dead should remain an important source of information on historical fire regimes.

Keywords: *Ponderosa pine*, *fire history*, *Oregon*, *impacts of sampling*, *partial cross sections*, *fire scars*.

(See Corvallis order form 1.)

Wimberly, M.C.

2002. Spatial simulation of historical landscape patterns in coastal forests of the Pacific Northwest. *Canadian Journal of Forest Research*. 32: 1316-1328.

Current concerns about the fragmentation of Pacific Northwest forests are grounded in the assumption that these landscapes historically contained large, contiguous areas of old growth. This supposition, however, appears to conflict with disturbance history research that shows large wildfires were a ubiquitous element of presettlement forest ecosystems. To better quantify historical forest patterns, a spatial simulation model of wildfire patterns and forest succession was used to simulate presettlement landscape dynamics in the Oregon Coast Range.

Keywords: *Fire*, *succession*, *landscape dynamics*, *landscape pattern*.

(See Corvallis order form 2.)

## Fish

Chaloner, D.T.; Wipfli, M.S.; Caouette, J.P.

2002. Mass loss and macroinvertebrate colonisation of Pacific salmon carcasses in south-eastern Alaskan streams. *Freshwater Biology*. 47: 263-273.

We examined the spatial and temporal dynamics of pink salmon (*Oncorhynchus gorbuscha*) carcass decomposition (mass loss and macroinvertebrate colonization) in southeastern Alaska streams. Dry mass and macroinvertebrate fauna of carcasses placed in streams were measured every 2 weeks over 2 months in six artificial streams, and once after 6 weeks in

four natural streams. We also surveyed the macroinvertebrate fauna and wet mass of naturally occurring salmon carcasses. Carcass mass loss in artificial streams was initially rapid and then declined over time, and no significant differences were found among natural streams. Several macroinvertebrate taxa colonized carcasses, but chironomid midge (Diptera: Chironomidae) and *Zapada* (Plecoptera: Nemouridae) larvae were found consistently and were the most abundant. Chironomid and *Zapada* larvae are likely to be important in mediating nutrient and energy transfer between salmon carcasses and other components of the freshwater-riparian food web in southeastern Alaska streams.

*Keywords:* Pacific salmon, decomposition, carcass, chironomid midge, Chironomidae, southeastern Alaska, stream.

(See Wenatchee order form.)

Marston, B.H.; Willson, M.F.; Gende, S.M.  
2002. Predator aggregations during eulachon *Thaleichthys pacificus* spawning runs. Marine Ecology Progress Series. 231: 229-236.

Predators (gulls, bald eagles, sea lions, harbor seals) congregated in large numbers at the spring spawning run of eulachon (*Thaleichthys pacificus*) in Berners Bay, southeast Alaska. Because eulachon are unusually high in lipid content and many of the prodigious spawning runs in Alaska and British Columbia occur in the spring, eulachon are an important prey for many wildlife species when energy demands are high. We suggest that spring spawning runs of eulachon and other forage fishes are an ecological cornerstone for regional coastal ecosystems.

*Keywords:* Eulachon, Thaleichthyes pacificus, Osmeridae, southeast Alaska, Stellar sea lion, harbor seal, Laridae.

(See Juneau order form.)

Wipfli, M.S.; Gregovich, D.P.

2002. Export of invertebrates and detritus from fishless headwater streams in southeastern Alaska: implications for downstream salmonid production. Freshwater Biology. 47: 957-969.

We examined invertebrate (terrestrial and aquatic) and coarse detritus transport from forested headwaters to downstream aquatic habitats in the coastal mountains of southeastern Alaska. We sampled fishless reaches of 52 small streams, in most cases upstream of salmonid-bearing habitats. Invertebrate and detritus transport from headwaters to downstream reaches occurred throughout the year, was generally highest during spring and autumn, and was highly variable among streams within geographic locations, among geographic locations, and among seasons. Aquatic taxa were more abundant than terrestrial taxa. The many small streams draining these forested uplands may function as energy conduits that subsidize downstream food webs, linking upland ecosystems with habitats lower in the catchments. Because timber harvests may lead to altered riparian forest canopies in these high-gradient forests, which affect allochthonous and solar inputs and may cause shifts in headwater stream function and productivity, we predict that timber harvesting will influence energy flow and trophic links among upland forests, headwater streams, and downstream food webs.

*Keywords:* Upland forests, headwater streams, terrestrial invertebrates, aquatic invertebrates, detritus, energy flow, salmonids, riparian management.

(See Wenatchee order form.)



## Forest Management

Deal, R.L.

2002. Forestry from a researcher's perspective. *Western Forester*. 47(4): 4.

Research foresters work on a wide range of forestry-related research topics. Their research may include investigation of basic ecological processes or applied forestry research, and their professional backgrounds may vary from economics and social science to specialized fields of forest genetics, wood products, or landscape ecology. One of their primary duties is the communication of research results. Researchers serve the scientific community and publish in peer-reviewed scientific journals. They also provide information for land managers in a variety of professional forestry outlets. Communication is often more than just publication. Researchers communicate through workshops, symposia, and field visits. I work as a research forester for the USDA Forest Service, Pacific Northwest Research Station in Portland, Oregon. Our basic mission is to generate and communicate scientific knowledge that helps people understand and make informed choices about people, natural resources, and the environment.

*Keywords: Forestry career, research forester, Pacific Northwest Research Station, forestry professionals.*

(See Portland order form.)

Harrington, C.

2002. Oak forest ecosystems: ecology and management for wildlife [Book review]. *Forest Science*. 48(4): 792-793.

This review discusses *Oak Forest Ecosystems: Ecology and Management for Wildlife*, a book edited by William J. McShea and William M. Healey. The book contains useful information on

managing oak forests for wildlife, and most of the information is presented clearly with an obvious attempt to tie it specifically to management needs.

*Keywords: Oaks, Quercus spp., temperate forest ecosystems.*

(See Olympia order form.)

## Genetics

Zúñiga, G.; Cisneros, R.; Hayes, J.L.; Macias-Samano, J.

2002. Karyology, geographic distribution, and origin of the genus *Dendroctonus* Erichson (Coleoptera: Scolytidae). *Annals of the Entomological Society of America*. 95(3): 267-275.

Several revisions of the taxonomy and phylogenetic hierarchies of the Scolytid genus *Dendroctonus* have been reported during the last century. These hierarchies have been based on external morphology and biology of adults, internal morphology of immatures, karyology, and most recently, molecular genetics. By means of karyological data—chromosomal number and mechanism of sex determination—from 119 *Dendroctonus* populations representing 16 of the 19 species currently recognized, we determined rate of chromosomal evolution and evolutionary phases of this genus. Our results indicated a high rate of chromosomal diversity and suggest that the evolutionary phase of the genus is in regression. This suggests that the *Dendroctonus* genus should be composed of specialist species with relatively low chromosomal numbers. These conclusions differ from those of previous studies, and we propose two hypotheses to explain the differences and discuss the evidence for each.

*Keywords: Dendroctonus, karyology, geographic origin, evolution.*

(See La Grande order form.)

## Geomorphology and Hydrology

Buffington, J.M.; Woodsmith, R.D.; Booth, D.B.; Montgomery, D.R.

2003. Fluvial processes in Puget Sound rivers and the Pacific Northwest. In: Montgomery, D.R.; Bolton, S.; Booth, D.B.; Wall, L., eds. Restoration of Puget Sound rivers. Seattle, WA: University of Washington Press: 46-78. Chapter 3.

The variability of topography, geology, climate, vegetation, and land use in the Pacific Northwest creates considerable spatial and temporal variability of fluvial processes. Channel characteristics are mutually adjusted to imposed conditions of valley slope, channel confinement, hydraulic discharge, sediment supply, and riparian vegetation. These interrelated channel characteristics manifest common reach-scale channel morphologies termed channel types. Each channel type in turn imposes characteristic physical processes and boundary conditions that are important to consider when assessing channel condition and designing restoration projects. Moreover, river networks integrate geomorphic processes within a watershed and translate disturbances through the landscape. Consequently, effective restoration design may require a holistic approach that considers spatial links of processes and the potential for distal disturbances to propagate through areas designated for restoration. Local restoration efforts that do not address larger scale watershed processes and disturbances are likely to be ineffective or costly to maintain. Here we identify process domains of typical Pacific Northwest watersheds and examine local physiographic and geologic controls on channel processes and response potential in the Puget Sound region.

*Keywords: Fluvial processes, river and stream restoration, Puget Sound rivers, channel classification.*

(Available from bookstores and libraries.)

Johnson, A.C.; Wilcock, P.

2002. Association between cedar decline and hillslope stability in mountainous regions of southeast Alaska. *Geomorphology*. 46: 129-142.

Old-growth forests experiencing widespread decline of yellow-cedar (*Chamaecyparis nootkatensis*) have a 3.8-fold increase in the frequency of landslides. We report here on an investigation of the cause of this increased slope instability. Forest health was assessed by using surveys of dying trees around landslide sites. Root decay on dead trees was used to estimate the decline in the apparent soil strength provided by roots. Changes in soil hydrology were measured with 120 piezometers located in areas of healthy cedar, healthy spruce and hemlock, and sites with cedar decline. The relative influence on slope stability of changes in soil moisture and root strength is evaluated by using a simple stability model. At most sites, soil depth is less than 0.7 meter and the loss of root strength has an important and possibly dominant influence on slope instability. In soils deeper than 1 meter, changes in pore pressure have a proportionately larger influence on slope stability. Landslides appear most likely when cedar decline reaches class IV (about 50 years after tree death), when most of the cedar root strength is lost and root strength from secondary growth has yet to develop.

*Keywords: Landslides, yellow-cedar decline, Chamaecyparis nootkatensis, root deterioration, piezometers, soil saturation, pore pressure, infinite slope stability model, blowdown.*

(See Juneau order form.)

Jones, J.A.; Swanson, F.J.

2001. Hydrologic inferences from comparisons among small basin experiments. *Hydrological Processes*. 15: 2363-2366.

Hydrologic research has a long history of work in small, experimental watersheds to examine effects of management. Comparative analysis among study sites, new tools, and data sharing are leading to important advances in hydrology.

*Keywords: Hydrology, streamflow, experimental watersheds, intersite studies.*

(See Corvallis order form 1.)

Swanson, F.J.; Jones, J.A.

2002. Geomorphology and hydrology of the H.J. Andrews Experimental Forest, Blue River, Oregon. In: Moore, G.W., ed. *Field guide to geologic processes in Cascadia: field trips to accompany the 98<sup>th</sup> annual meeting of the Cordilleran section of the Geological Society of America*. Spec. paper 36. [Place of publication unknown]: Oregon Department of Geology and Mineral Industries: 289-314.

This field trip guide presents short reports on findings from research activities in and near the H.J. Andrews Experimental Forest in the Oregon Cascade Range. Topics include climate, hydrology, geomorphology, small watershed nutrient yield, effects of roads on sediment routing, and flood effects.

*Keywords: Geomorphology, hydrology, climate, nutrient cycling.*

(See Corvallis order form 2.)

## **Invasive Plants and Animals**

Carey, A.B.

2002. Globalization of flora: inviting worldwide ecosystem disaster. *Renewable Resources Journal*. 20(1): 13-17.

Meeting the needs of expanding human populations has changed land use worldwide and presented a biodiversity crisis. Emerging related concerns are threats to native species from homogenization of world flora and the spread of

exotic species by human activities. The benefits to people of domestication and spread of food and fiber plants such as wheat, corn, potatoes, and cotton are well known. Catastrophes caused by introduced diseases such as chestnut blight and Dutch elm disease are also well known. Less catastrophic introductions of other organisms that can spread rapidly, from the west Nile virus to kudzu to aquatic plants and animals have provoked local headlines and costly control efforts. Less recognized are the less spectacular effects of introduced species such as cheatgrass, which has changed fire ecology and degraded the quality of rangelands in much of the West, and starlings, which have become not only an urban and agricultural pest, but also a threat to some indigenous birds.

*Keywords: Invasive species, biodiversity, exotic species.*

(See Olympia order form.)

## **Invertebrates**

Ross, D.W.; Daterman, G.E.; Gibson, K.E.

2002. Elution rate and spacing of anti-aggregation pheromone dispensers for protecting live trees from *Dendroctonus pseudotsugae* (Coleoptera: Scolytidae). *Journal of Economic Entomology*. 95(4): 778-781.

The antiaggregation pheromone, 3-methylcyclohex-2-en-1-one (MCH), is highly effective in preventing the infestation of high-risk trees by Douglas-fir beetles. A large portion of the cost of an MCH treatment is related to the time applicators spend walking through an area dispersing the formulated pheromone. Application of fewer MCH dispensers eluting at a higher rate than those currently registered for operational use could potentially reduce treatment costs. Two higher elution rates of 5 and 18 milligrams per day per dispenser were compared to the current standard of 2 milligrams per day per dispenser and to an untreated control on 1-hectare circular plots. Dispensers were spaced 5, 15, and 44 meters apart around the plot perimeters, and

eluting 2, 6, and 18 milligrams per day, respectively. The nominal dose of MCH was 144 milligrams per hectare per day on all treated plots. Percentages of attacked trees were significantly lower on plots treated with dispensers eluting 2 and 6 milligrams per day and spaced 5 and 15 meters apart, respectively, as compared with the untreated control. The infestation rate on plots treated with 18-milligram-per-day dispensers and spaced 44 meters apart was not significantly different than the control. The results indicate that MCH dispensers eluting at 6 milligrams per day (three times the registered rate) and spaced 15 meters apart can effectively prevent Douglas-fir beetle infestations.

*Keywords: Douglas-fir beetle, Dendroctonus pseudotsugae, 3-methylcyclohex-2-en-1-one, MCH, antiaggregation pheromone.*

(See Corvallis order form 2.)

## Land Use

Ahn, S.; Plantinga, A.J.; Alig, R.J.

2002. Determinants and projections of land use in the South Central United States. *Southern Journal of Applied Forestry*. 26(2): 78-84.

This paper presents historical trends and future projections of forest, agricultural, urban, and other land uses for the South-Central region of the United States. An econometric land use model is used to investigate the relation between the areas of land in alternative uses and economic and demographic factors influencing land use decisions. Determinants of land use included in the model are the net returns from different land uses, land quality, and demographic variables such as population density. Given projections of stumpage prices and population, the fitted econometric models are used to generate projections of future land use to the year 2050. Under a scenario in which population changes in the future but stumpage prices remain constant, urban/other land increases by 2.2 million acres from 1992 to 2050. More private timberland (1.8 million acres) than

agricultural land (0.4 million acres) is converted to urban/other land to accommodate the population increase. Under a scenario of population growth and 0.5-percent annual increases in stumpage prices, private timberland increases from 101.7 million acres to 107.2 million acres by 2050, and the urban/other land increases by 1.3 million acres. Agricultural land declines by almost 7 million acres, mirroring the increases in the urban/other land and private timberland.

*Keywords: Land use, land rents, projections of forest area.*

(See Corvallis order form 1.)

Kline, J.D.; Butler, B.J.; Alig, R.J.

2001. Tree planting in the South: What does the future hold? Summary. In: Zhang, D.; Mehmood, S.R., eds. *Forest law and economics: Proceedings of the 31<sup>st</sup> annual Southern forest economics workshop*. [Auburn, AL]: Auburn University, School of Forestry and Wildlife Sciences: 38-40.

We develop empirical models of historical tree planting in the Southern United States as a function of economic variables and federal cost sharing. We use the models to make 50-year projections of future tree planting in support of the Renewable Resources Planning Act (RPA) assessment and to test the relative impacts of harvest rates, planting costs, and cost sharing on future tree planting. Results suggest that industrial tree planting will increase over the next several years owing primarily to projected increases in harvest rates, whereas nonindustrial tree planting is projected to decline owing largely to assumptions regarding increasing tree planting costs and continuation of relatively low levels of federal cost-share assistance.

*Keywords: Nonindustrial private forest owners, forest industry, cost-share programs, carbon sequestration.*

(See Corvallis order form 1.)



Pennington, D.D.

2002. Structural and functional comparison of human-impacted and natural forest landscapes in the western Cascades of Oregon. Corvallis, OR: Oregon State University. 263 p. Ph.D. dissertation.

This study compared effects of human and natural wildfire disturbance on age class distribution and associated ecosystem properties of forests in a 15 670-square-kilometer area on the west side of the Cascade Range of Oregon. The specific objectives were to simulate wildfire disturbance and the range of landscape patterns likely to have occurred in the past few millennia; to derive a representation of the current landscape from remotely sensed imagery; to construct hypothetical managed landscape patterns under different management scenarios; to compare coarse-scale forest patterns from the wildfire, current, and hypothetical managed landscapes; and to investigate divergent patterns on selected ecosystem properties.

*Keywords: Landscape change, landscape dynamics, land-use patterns, fire regimes, landscape modeling, disturbance.*

(Available only through library or interlibrary loan.)

## Monitoring

Evans Mack, D.; Raphael, M.G.; Laake, J.L.

2002. Probability of detecting marbled murrelets at sea: effects of single versus paired observers. *Journal of Wildlife Management*. 66(3): 865-873.

Density estimates for marbled murrelets are obtained from at-sea surveys, but survey methods differ among regions. We compared the performance of a single observer to that of an observer operating in a two-observer team in detecting marbled murrelets during marine surveys in the San Juan Islands, Washington. Performance was measured against an independent observer (IO) who selected a sample of birds; we used this sample to determine the

proportion detected by the observer(s). To represent probability of success, we used a function that was the product of a half-normal detection function modified to incorporate scale covariates and a logistic function to represent detection probability on the line,  $g(0)$ . Single observers detected 80 percent of 247 targets, and paired observers detected 84 percent of 343 targets selected by the IO. Detection probability was affected by observer, murrelet behavior, and group size; wave height influenced the effect of distance on detection probability. Estimates of detection probability on the line  $g(0)$  ranged from 0.78 to 0.95 with a single observer; estimates from paired observers were similarly biased but less variable. Because adding a second observer did not substantially increase  $g(0)$ , we suggest that surveys may need to be conducted with two or more observers (using one as an independent observer) or with a different two-person configuration.

*Keywords: At-sea surveys, Brachyramphus marmoratus, covariates, line transect, marbled murrelet, observer variability, Washington.*

(See Olympia order form.)

## Mycology

Gould, L.E.

2002. Ecology of truffles in three habitat types of eastern Cascade forests.

Ellensburg, WA: Central Washington University. 33 p. M.S. thesis.

Mycorrhizal fungi are critical elements of forest food webs and play important roles in nutrient cycling. Truffle fruiting bodies are important food for arboreal rodents, especially the northern flying squirrel. Truffles were systematically sampled in soils of 12 dry forest stands that represent 3 dry forest cover types on the east side of the Washington Cascade Range: dry, open ponderosa pine forest, and mesic young and mature mixed-species forests. Twenty-two species were collected. *Rhizopogon*, *Hysterangium*, *Gautieria*, *Geopora*, and *Leucogaster*

species were most abundant. Total truffle biomass and richness were lower in open pine than in other forest types but did not differ between young and mature mixed-forest types. Percentage of mineral soil was negatively correlated with truffle biomass and richness. Soil sampling yielded a species list that differed slightly from one obtained by examining fecal pellets of flying squirrels. Sampling period and harvesting efficiency of squirrels explained differences.

*Keywords: Truffles, flying squirrels, ponderosa pine, Douglas-fir.*

(Available only through library or interlibrary loan.)

Koo, C.; Molina, R.; Miller, S.L.; Trappe, J.M. 2001. Effect of water stress on ectomycorrhizal development and growth of *Alnus rubra* seedlings. The Journal of Korean Society of Soil Science and Fertilizer. 34(4): 301-309.

The effects of water stress on the development of *Alpova diplophloeus* ectomycorrhizas and on the growth of nodulated *Alnus rubra* Bong. seedlings were investigated. Five-day cyclic water stress significantly decreased the ectomycorrhizal development and the seedling growth. *Alpova diplophloeus* inoculated seedlings did not, however, significantly differ from the noninoculated seedlings in the growth and physiological activities under both well-watered and water-stressed conditions. N<sub>2</sub> fixation was less sensitive than CO<sub>2</sub> fixation to water stress. We conclude that under water stress conditions, *A. diplophloeus* mycorrhizas do not contribute to the fitness of red alder seedlings.

*Keywords: Mycorrhiza, drought stress, Alnus rubra, red alder.*

(See Corvallis order form 1.)

Stockdale, C.

2000. Green-tree retention and ectomycorrhiza legacies: the spatial influences of retention trees on mycorrhizal community structure and function. Corvallis, OR: Oregon State University. 75 p. M.S. thesis.

Retention trees serve as important refugia for ectomycorrhizal fungi. This biological legacy from the predisturbance stand may be important for the recolonization of ectomycorrhizal fungi onto new seedlings being established. For those fungi that are lost from these treatment units, recolonization of some hypogeous fruiting species and those adapted to conditions in a mature forest may occur from neighboring forest stands, provided the distance to the center of the harvested area is not too great for effective spore dispersal.

*Keywords: Legacy, alternative silviculture.*

(Available only through library or interlibrary loan.)

Trappe, M.J.

2001. Ecology of *Craterellus tubaeformis* in western Oregon. Corvallis, OR: Oregon State University. 55 p. M.S. thesis.

*Craterellus tubaeformis* is a small to medium-sized forest mushroom that is fairly common in the Douglas-fir/western hemlock forests of the Pacific Northwestern United States. It is most often associated with decayed coarse woody debris. In this study, the mycorrhiza of *C. tubaeformis* in western Oregon is identified by DNA analysis by using polymerase chain reaction amplification and restriction fragment length polymorphism typing, and the mantle morphology is described. The likelihood of *C. tubaeformis* occurrence in a stand was highly correlated to the presence of western hemlock.

*Keywords: Fungi, mushrooms, habitat modeling.*

(Available only through library or interlibrary loan.)

Vandegriff, V.E.

2002. Fungal diversity within decomposing woody conifer roots in Oregon. Corvallis, OR: Oregon State University. 103 p. M.S. thesis.

Molecular techniques were employed to generate Internal Transcribed Spacer-Restriction Fragment Length Polymorphism (ITS-RFLP) patterns to examine saprotrophic fungi in roots of these tree species and to see if differences in the fungal communities might explain observed differences in decomposition rates. Owing to a large number of ITS-RFLP patterns recovered and low levels of similarity in ITS-RFLP patterns across samples, I was unable to explain root decomposition based on the fungal community information. Consequently, the analysis focused on comparing levels of ITS-RFLP similarity at each sampling level, determining the extent to which the sampling methods captured the total fungal biodiversity, and examining samples with microscopy and gene sequencing techniques to identify fungi.

*Keywords: Biodiversity, mycology, wood decay, decomposition.*

(Available only through library or interlibrary loan.)

## **Natural Resources Policy**

Mills, T.J.; Quigley, T.M.; Everest, F.J.

2001. Science-based natural resource management decisions: What are they? *Renewable Resources Journal*. 19(2): 10-15.

Although many people propose science-based decisions, it is not always clear what they mean by "science-based." We define science-based decisions as those decisions that result from the full and complete consideration of relevant science information. We offer five guidelines to focus scientists' contributions to science-based decisionmaking. We describe the experience of using science in the development of natural resource management decisions for the

Tongass National Forest and for the federal lands in the interior Columbia River basin as examples to illustrate our guidelines.

*Keywords: Decisionmaking, natural resource policy, forest management.*

(See Headquarters order form.)

Shaw, C.G., III; Everest, F.H.; Swanston, D.N. [and others]

1999. Independent scientific review in natural resource management: a recent example from the Tongass Land Management Plan. *Northwest Science*. 73(1): 58-62.

There are several goals to be addressed when conducting science reviews of land management planning documents. In this paper, the nature and application of such goals are discussed in the context of our scientific review of the Tongass Land Management Plan and academic opinions recently put forth on the subject in the *Journal of Conservation Biology*. Certain aspects of the academic approach detailed in the journal are found wanting, including the likely objectivity of the authors and their lack of reference to other pertinent information. For example, we assert that to maintain neutrality and credibility in such reviews, scientists should not impose their personal values into the process by making management recommendations. The personal values of scientists coupled with scientific information do not equal science. In this regard, four authors of the article in *Journal of Conservation Biology* would have been compromised as scientific reviewers of the Tongass Land Management Plan as they had signed a letter to the President of the United States advocating a particular management outcome on the Tongass National Forest. The nature and desirability of peer review of such review documents are also discussed.

*Keywords: Science policy, peer review, advocacy, risk.*

(See Juneau order form.)

## Plant Ecology

Kelsey, R.G.

2001. Chemical indicators of stress in trees: their ecological significance and implication for forestry in eastern Oregon and Washington. *Northwest Science*. 75 (Special issue): 70-76.

Acute and chronic stresses in forest ecosystems can reduce growth or vigor of trees and cause changes in their physiology or chemical contents. Ethanol, acetaldehyde, ethylene, and ethane are volatile compounds often produced in stressed, dying, or recently dead trees. Ethanol accumulation is ecologically important because it attracts insects that attack and damage trees or spread disease. In addition, there are other chemicals conferring resistance to insects and disease, but they decrease in concentration under stress. Monitoring these compounds can assist in timing the lifting of nursery seedlings, detecting harmful effects from air pollution, confirming the presence of root disease, or identifying trees at risk to insect attack. Chemical indicators of stress have potential to be used in monitoring forest health across various scales, but not enough is yet known about options and techniques.

*Keywords: Chemical stress indicators, forest health and productivity, disturbance processes, forest management.*

(See Corvallis order form 1.)

## Plant Pathology

Anderson, R.C.; Gardner, D.E.; Daehler, C.C.; Meinzer, F.C.

2002. Dieback of *Acacia koa* in Hawaii: ecological and pathological characteristics of affected stands. *Forest Ecology and Management*. 162: 273-286.

The purpose of this study was to characterize the stand structure, soil conditions, and physiological condition of dieback-affected *Acacia koa* (koa) trees and to assess the possible role of *Fusarium oxysporum* f. sp. *koae* in the current dieback stands. This fungus was isolated

from branches of symptomatic koa in dieback-affected stands. Possible differences in the pathogenicity and virulence of fungal isolates obtained from the roots of healthy koa in unaffected stands and those from branches of dieback-affected koa were determined by greenhouse inoculations of koa seedlings. Both branch and root isolates were pathogenic, with the mortality of inoculated seedlings ranging from 30 to 60 percent for all isolates. Wilt symptoms were not observed in field inoculations of koa saplings after 8 months. Investigation of the dieback stand structure showed that the larger size classes (d.b.h. greater than 3 centimeters) were all affected equally, with the smallest size class (0 to 3 centimeters d.b.h.) having the lowest percentage of dieback at each site. Phyllodes on dieback trees had reduced stomatal conductance and higher (less negative) leaf water potential. Results from the greenhouse inoculations demonstrated that the fungal isolate was pathogenic to koa, but its activity in the field may be influenced by predisposing factors such as temperature, water availability, soil type, and interactions with other soil organisms.

*Keywords: Disease ecology, forest dieback, fungal pathogens, Fusarium oxysporum.*

(See Corvallis order form 1.)

Mathiasen, R.; Parks, C.; Beatty, J.; Sesnie, S. First report on *Psittacanthus angustifolius* on pines in Mexico and Guatemala. *Plant Disease*. 84(7): 808.

The mistletoe *Psittacanthus angustifolius* Kuijt (Loranthaceae) is a common parasite of pines in Honduras. In March 2000 we observed this mistletoe parasitizing *Pinus tecunumannii* Equiluz & J.P. Perry (The Chiapan populations of this pine are *Pinus oocarpa* var. *ochoterenai* Martinez according to J.P. Perry) about 4 kilometers (km) south of Jitotol, Chiapas, Mexico. We also observed *P. angustifolius* on *Pinus oocarpa* Schiede 4 km north of Jitotol. In addition, we found this mistletoe parasitizing *Pinus maximinoi* H.E. Moore about 15 km west of Ocosingo, Chiapas. In Guatemala, we observed *P. angustifolius* on *Pinus oocarpa* at



several locations north and south of La Cumbre, Department Baja Verapaz. However, this mistletoe definitely appears to be less common in Chiapas and Guatemala than it is in Honduras. This is the first report of *P. angustifolius* in both Mexico and Guatemala and the first report of this mistletoe on *Pinus tecunumannii*. Specimens of *P. angustifolius* from the above pine hosts have been deposited in the Deaver Herbarium, Northern Arizona University, Flagstaff, Arizona.

*Keywords:* Mistletoe, *Psittacanthus angustifolius*.

(See La Grande order form.)

## Plant Physiology

Heckman, C.W.; Deventer, B.

2000. Phylogenetic variability in the pigment complement of aquatic tracheophytes. *Limnologia*. 30: 121-130.

The pigment complements of five emergent aquatic tracheophyte species were analyzed by using high-performance liquid chromatography. The species were chosen to represent major taxa and included *Equisetum palustre* L., a pteridophyte; *Glyceria fluitans* (L.) Robert Brown, a monocot; and three dicots, *Callitriche* sp., *Veronica beccabunga* L., and *Ranunculus sceleratus* L. The samples had been taken from the same site on the same date and time of day. Cluster analysis of the results for each sample revealed that several of the species are distinct from the others in the quantitative composition of their pigment complements. These distinctions, however, do not reflect phylogenetic differences among the major taxa. It is concluded that differences in the chloroplast genomes that have been used to trace the phylogenetic development of the plants are not reflected in the phenotypic characteristics of the pigment complement.

*Keywords:* High-performance liquid chromatography (HPLC), chloroplasts, chlorophyll, photosynthetic pigments.

(See Olympia order form.)

Meinzer, F.C.

2002. Co-ordination of vapour and liquid phase water transport properties in plants. *Plant, Cell and Environment*. 25: 265-274.

This review and synthesis article discusses the most recent evidence concerning how stomata balance transpiration with the efficiency of water supply to the leaves, avoiding leaf desiccation at one extreme, and unnecessary restriction of carbon dioxide uptake at the other. Recent studies have shown that stomata are exquisitely sensitive to short-term, dynamic perturbations in the efficiency of liquid water transport. Several components that contribute to dynamic variation in apparent hydraulic resistance in intact plants are discussed. Results of studies conducted with multiple species point to considerable convergence with regard to coordination of stomatal and plant hydraulic properties. Because stomata apparently sense and respond to an integrated and dynamic soil-to-leaf water transport efficiency, studies involving intact plants under both natural and controlled conditions are most likely to yield the most useful new insights concerning stomatal coordination of transpiration with soil and plant hydraulic properties.

*Keywords:* Hydraulic conductance, stomata, transpiration.

(See Corvallis order form 2.)

## Regional Assessments

Tingey, D.T.; Laurence, J.A.; Weber, J.A. [and others]

2001. Elevated CO<sub>2</sub> and temperature alter the response of *Pinus ponderosa* to ozone: a simulation analysis. *Ecological Applications*. 11(5): 1412-1424.

We investigated the potential impact of projected temperature and CO<sub>2</sub> concentrations in combination with tropospheric O<sub>3</sub> on the annual biomass increment of *Pinus ponderosa* Doug. ex Laws. TREGRO, a process-based whole-tree growth model in which trees experience a seasonal drought, was used to study the interactions of CO<sub>2</sub>, temperature, and O<sub>3</sub> on tree growth along a latitudinal gradient in California,

Washington, and Oregon. The annual biomass increment increased in proportion to CO<sub>2</sub> concentrations, although the magnitude varied among sites. Increasing air temperature (+1.3 °C) increased growth at most sites. Elevated CO<sub>2</sub> increased the temperature optimum for growth at four sites and decreased it at two sites. The annual biomass increment decreased with increasing O<sub>3</sub> exposure. The differences in O<sub>3</sub> effects among sites were primarily controlled by differences in precipitation. Although increasing CO<sub>2</sub> can reduce the O<sub>3</sub> impact, it does not eliminate the impact of O<sub>3</sub>. Elevated CO<sub>2</sub> would enhance tree growth more if O<sub>3</sub> exposures were reduced, especially in more polluted sites. The greatest benefit for tree growth would come from reducing O<sub>3</sub> exposures in the most polluted sites, but we must also consider locations that have high inherent O<sub>3</sub> sensitivity because of their mesic conditions. Limiting the increase of O<sub>3</sub> levels in those areas also will increase tree growth.

*Keywords: Ponderosa pine, Pinus ponderosa, drought stress, elevated CO<sub>2</sub>, ozone, troposphere, temperature, TREGRO.*

(See Corvallis order form 2.)

## Remote Sensing

Woodcock, C.E.; Macomber, S.A.;  
Pax-Lenney, M.; Cohen, W.B.

2001. Monitoring large areas for forest change using Landsat: generalization across space, time, and Landsat sensors. *Remote Sensing of Environment*. 78: 194-203.

Landsat 7 EMT+ provides an opportunity to extend the area and frequency with which we are able to monitor the Earth's surface with fine spatial resolution data. To take advantage of this opportunity, it is necessary to move beyond the traditional image-by-image approach to data analysis. A new approach to monitoring large

areas is to extend the application of a trained image classifier to data beyond its original temporal, spatial, and sensor domains.

*Keywords: Change detection, remote sensing.*

(See Corvallis order form 2.)

## Resource Inventory

Barrett, T.M.; Schurr, F.G.; O'Hara, K.L.  
2002. Classifying stand structure: a comparison of SVS images with plot visits and FVS-generated metrics. In: Crookston, N.L.; Havis, R.N., comps. *Second Forest Vegetation Simulator Conference; 2002 February 12-14; Fort Collins, CO. Proc. RMRS-P-25*. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 31-37.

The forest vegetation simulator (FVS) is frequently linked with the stand visualization system (SVS) to provide computer-generated images of future forest structure for inclusion in research articles, forest planning documents, and public presentations. A small pilot study in the Sierra Nevada focused on whether survey responses for classification attributes (stand size, age, and canopy density) differed between SVS images and site visits. The survey, conducted in fall 2002, used groups of forest visitors who toured seven 0.10-acre plots within a variety of stand structures. Results showed these visitors interpreted tree size, age, and canopy density differently during the field visit to plots than while viewing SVS images. Responses from both field visits and image viewing also differed from commonly used metric output in the FVS program. Altering plot size for the images and adding snags substantially affected responses.

*Keywords: Forest structure, forest classification, landscape visualization.*

(See Portland order form. To order a copy of the complete RMRS-P-25, send an email to Richard Schneider at [rschneider@fs.fed.us](mailto:rschneider@fs.fed.us); contact him at Rocky Mountain Research Station, 240 West Prospect, Fort Collins, CO 80526; or call him at (970) 498-1392.)

## Silviculture

DeBell, D.S.; Harrington, C.A.

2002. Density and rectangularity of planting influence 20-year growth and development of red alder. *Canadian Journal of Forest Research*. 32: 1244-1253.

Red alder (*Alnus rubra* Bong.) seedlings were planted in northwestern Oregon at five initial spacings: 0.6 by 1.2 meters (m), 1.2 by 1.2 m, 1.2 by 1.8 m, 1.8 m by 1.8 m, and 2.5 by 2.5 m. Up to about age 10, tree and stand characteristics were correlated primarily with initial planting density in the expected manner; beyond that age, tree growth and stand development in plots planted at rectangular spacings were substantially more rapid than in the two closest square spacings. At age 20 years, cumulative mortality ranged from an average of 42 percent in the two widest spacings to 87 percent in the 0.6 by 1.2 m spacing. Mean stand diameter ranged from 19.2 centimeters (cm) in the widest spacing to 14.0 cm in the closest square (1.2 by 1.2 m) spacing; mean tree height decreased from nearly 24 m in the widest (2.5 by 2.5 m) spacing to about 18 m in the closest square spacing. Growth and yield in the widest spacing were better than estimated by normal yield tables for fully stocked natural stands on sites of similar quality. We hypothesize that rectangular planting enhances stand differentiation, accelerates competition-related mortality, and thus leads to improved growth of surviving trees.

*Keywords: Spacing, pattern, Alnus rubra, red alder, stand development, growth, rectangularity.*

(See Olympia order form.)

## Soil

Dolan, E.

2002. Soil and site variability in the northeast Wenatchee Mountains, Washington. Seattle, WA: University of Washington. 102 p. M.S. thesis.

Soils were described for a 25-square-kilometer forested area in the Swauk Sandstone formation on the east side of the Washington Cascade Range. Of the 48 sites, 44 were described by

using five soil types. Stages of development among the five soil types varied widely from young, thin soils lacking an A horizon to mature, deep soils with multiple Bt horizons. Aspect and percentage of tree, grass cover, and erosion were associated with O-horizon thickness. Herb and grass cover were associated with A-horizon thickness. Horizon thickness models were tested with field data. Maps and scatter plots showed that predicted O-horizon thickness was more accurate than for the A horizon.

*Keywords: Fuel management, soils, ponderosa pine, Douglas-fir.*

(Available only through library or interlibrary loan.)

Sirvent, T.M.; Walker, L.; Vance, N.; Gibson, D.M.

2002. Variation in hypericins from wild populations of *Hypericum perforatum* L. in the Pacific Northwest of the U.S.A. *Economic Botany*. 56(1): 41-48.

Representatives from eight wild populations of *Hypericum perforatum* L. were collected from Montana and northern California at flowering and subsequently analyzed for hypericin and pseudohypericin by using high-performance liquid chromatography analysis. Total individual plant concentrations in these wild populations were from 0.0003 to 0.1250 percent dry weight (DW) hypericin and 0.0019 to 0.8458 percent DW pseudohypericin. In general, hypericin concentrations were highest in the plant's reproductive (flower and bud) tissues, followed by leaf and stem tissues, respectively. Hypericin and pseudohypericin concentrations were positively correlated in all samples, although the relative ratio of hypericin to pseudohypericin varied with site locations.

*Keywords: St. John's wort, Hypericum perforatum, hypericin, pseudohypericin, composition, plant defense.*

(See Corvallis order form 2.)

Vance, N.C.

2002. Ecological considerations in sustainable use of wild plants. In: Jones, E.T.; McLain, R.J.; Weigand, J., eds. *Nontimber forest products in the United States*. Lawrence, KS: University Press of Kansas: 151-162.

The conservation and sustainable management of hundreds of commercially important native plant and fungal species depends on implementing effective strategies not only for sustainable harvest, but also for species, habitat, and ecosystem protection. Although inventories and monitoring, as well as acquiring and applying ecological information, will not guarantee that plant species, communities, and habitats will be sustained, they are at greater risk without these actions. If long-term sustainable harvest of wild plant parts for a variety of human benefits is coupled with protecting forest flora and habitats and avoiding risk to the environment, it will save costs to society as well. The challenge will be to the biological and ecological requirements of these species and habitats as social and economic demands on resources continue to intensify.

*Keywords: Plant conservation, medicinal plants, special forest products, nontimber forest products.*

(Available in bookstores and libraries.)

Walker, L.; Sirvent, T.; Gibson, D.; Vance, N. 2001. Regional differences in hypericin and pseudohypericin concentrations and five morphological traits among *Hypericum perforatum* plants in the Northwestern United States. *Canadian Journal of Botany*. 79(10): 1248-1255.

Geographic differences among *Hypericum perforatum* L. plants in concentration of two hypericins and five morphological characteristics were analyzed in plants collected from four sites each in northern California and western Montana and two sites in Oregon. Differences among the regional collections of *H. perforatum*

were assessed based on analysis of hypericin and pseudohypericin concentrations in floral, leaf, and stem tissue; light and dark leaf gland density; leaf area; leaf length/width ratio; and stem height. Significant differences in morphological and biochemical traits were detected primarily between samples collected from California and Montana. California samples had higher concentrations of hypericins, greater leaf gland density, larger leaves, and taller stems than those from Montana. Overall, Oregon samples did not consistently differentiate from those of Montana or California. Seasonal differences in hypericins were analyzed in Oregon plants only. Mean floral concentrations of pseudohypericin (0.29 percent) and hypericin (0.06 percent) were highest during anthesis coinciding with July and August sampling dates, whereas mean leaf concentrations (0.19 and 0.04 percent, respectively) were highest in August.

*Keywords: St. John's wort, Hypericum perforatum, hypericin, leaf glands, noxious weed, medicinal plant.*

(See Corvallis order form 2.)

## **Threatened, Endangered, and Sensitive Species**

Drew, R.E.; Hallett, J.G.; Aubry, K.B. [and others]

2003. Conservation genetics of the fisher (*Martes pennanti*) based on mitochondrial DNA sequencing. *Molecular Biology*. 12: 51-62.

Translocations of animals have been used to re-establish extirpated populations and to augment declining populations. We evaluate the consequences of past and future translocations on a small carnivore, the fisher, by examining population variation in mitochondrial control-region sequences. We sampled populations throughout the fisher's range in North America including seven undisturbed by translocations and two western populations that received translocations from sources more than 600 kilometers away.



The twelve haplotypes detected were characterized by very little sequence divergence. Parsimony analysis indicated little phylogenetic structure or geographical pattern, which was unsurprising considering the relatively recent origin (about 30,000 years BP) of the fisher. Analysis of molecular variance and neighbor-joining analyses of haplotype distributions and frequencies revealed significant patterns of population subdivision similar to subspecies earlier described. This subdivision supports designation of these populations as “distinct population segments” as defined under the Endangered Species Act. Greater caution in translocating fisher into California is suggested because of reduced genetic variation in these populations.

*Keywords:* Fisher, *Martes pennanti*, conservation genetics, subspecies, reintroductions.

(See Olympia order form.)

## Wildlife

Bowyer, R.T.; Stewart, K.M.; Wolfe, S.A. [and others]

2002. Assessing sexual segregation in deer. *Journal of Wildlife Management*. 66(2): 536-544.

In this simulation study, sexual segregation (defined as the differential use of space at specified spatial and temporal scales by males and females outside of the breeding season) was detected when males and females exhibited differences in habitat preference, but was not detected when such differential preferences did not occur. Population density of deer and sampling scale significantly affected our ability to detect sexual segregation, but landscape grain did not.

*Keywords:* Deer, sexual segregation, landscape ecology, landscape grain, sampling scale.

(See La Grande order form.)

Carey, A.B.

2002. Response of northern flying squirrels to supplementary dens. *Wildlife Society Bulletin*. 30(2): 547-556.

The northern flying squirrel (*Glaucomys sabrinus*) is a keystone species in Pacific Northwest coniferous forests, consuming and disseminating spores of ectomycorrhizal fungi essential to Pinaceae and preyed upon by various vertebrate predators. The flying squirrel hypothetically is limited in abundance in second growth by (1) abundance of den sites, (2) quality, quantity, and diversity of food, (3) predation, and (4) biocomplexity that expands niche space, reduces competition, and mediates predation. In 1992 we added nest boxes and tree cavities to 8 of 16 stands of various management histories in the Puget Trough of Washington. Use of boxes increased over years, predominantly by pregnant and nursing females. Proportions of adult females breeding and population sizes, however, failed to increase. Predation by long-tailed weasels (*Mustela frenata*) removed 32 percent or less of the populations. Predation, however, does not explain why flying squirrels may be two to three times more abundant in old growth (where spotted owls, *Strix occidentalis*, also prey on them) than in nearby second growth. Spatial heterogeneity, vegetation, and structural complexity may contribute to high populations of northern flying squirrels in old growth.

*Keywords:* Cavities, dens, forest management, *Glaucomys sabrinus*, limiting factors, nest boxes, northern flying squirrels, predation, wildlife management.

(See Olympia order form.)

Hudson, R.E.; Aukema, J.E.; Rispe, C.; Roze, D.

2002. Altruism, cheating, and anticheater adaptations in cellular slime molds. *The American Naturalist*. 160(1): 31-43.

Cellular slime molds (CSMs) possess a remarkable life cycle that encompasses an extreme act of altruism. The cells live as individual amoebae until starved, then aggregate and ultimately



transform themselves into a multicellular fruiting body. This fruiting body consists of stalk cells (altruists that eventually die) and spores (the beneficiaries of this sacrifice). Altruistic systems such as this are vulnerable to cheaters, which are individuals unrelated to the altruists that obtain the benefits provided by them without reciprocating. Here, we investigate two forces that can maintain CSM altruism despite cheating: kin selection and anticheater adaptations. First we present new kinship-based models based on CSM developmental biology to evaluate the efficacy of kin selection. These models show that stalk-making genotypes can still be maintained when aggregations are initiated by multiple "founder" spores, provided that spores of stalkless fruiting bodies have low rates of dispersal and dispersal success is a concave function of stalk height. Second, we review proposals that several features of CSM development, such as the chemical suppression of the redifferentiation of prestalk cells into prespores, act as anticheater adaptations.

*Keywords:* Altruism, cellular slime molds, cheater, Dictyostelium, kin selection, multicellularity.

(See Olympia order form.)

Jenks, J.A.; Smith, W.P.; DePerno, C.S.  
2002. Maximum sustained yield harvest versus trophy management. *Journal of Wildlife Management*. 66(2): 528-535.

We examined hypotheses regarding compatibility of managing white-tailed deer (*Odocoileus virginianus*) populations for trophy males and maximum sustained yield (MSY) harvests. Harvest of white-tail deer on Oak Ridge Reservation, Tennessee, began in 1985 following 45 years of protection. Assuming the population had attained equilibrium during this period and hunter bias toward males was constant across years, we examined several harvest characteristics including age and sex composition, and antler and body size of male deer. We assumed

that absence of predators and other sources of natural mortality would suggest that deer-vehicle collisions prior to hunting were the primary factor maintaining the population below carrying capacity. Several demographic parameters indicated the population was intensively harvested. Proportion of trophy males harvested declined from 36 percent to 15 percent throughout the study period. Following the initial harvest, the high proportion of yearling males harvested suggests the age distribution of males became truncated. Results from our empirical example support the hypothesis that sustained production of trophy males is a consequence of MSY of either-sex harvests when males are considered trophy with at least eight points, when annual recruitment at MSY consistently approaches unity, and when hunters show no selectivity bias. These constraints are unlikely under current management prescriptions.

*Keywords:* Either-sex harvest, maximum sustained yield, *Odocoileus virginianus*, Ridge and Valley Province, Tennessee, trophy management, vehicle mortality, Western mesophytic forest, white-tailed deer.

(See Juneau order form.)

Raphael, M.G.; Wisdom, M.J.; Wales, B.C.  
2002. Status and trends in diversity of alpine vertebrates in the Northwestern United States. In: Körner, Ch.; Spehn, E.M., eds. *Mountain biodiversity: a global assessment*. Boca Raton, LA: The Parthenon Publishing Group: 191-197.

We examined the distribution of vertebrate species along an elevational gradient from the Columbia River to the surrounding Cascade and northern Rocky Mountains in a 58-million-hectare area of the Northwestern United States. The area supports diverse terrestrial communities and associated plant and animal species. Previous research identified 487 species of resident or migratory terrestrial vertebrates that occur in this area. Alpine habitats, which cover

less than 1 percent of the area, support nearly 10 percent of the total vertebrate species. At least four of these species are endemic to alpine habitats; alpine areas support a distinctive set of species and thus make a strong contribution to overall vertebrate diversity in the study area. Although habitats for many terrestrial vertebrates in the area have declined since settlement by Europeans, the extent of alpine habitat has not declined. Potential effects of global warming, however, could substantially reduce the future extent of alpine habitat. Other threats to the amount and quality of alpine habitat, and hence vertebrate diversity, include recreational activity, ozone depletion, mining, and invasions of exotic species.

*Keywords: Amphibians, biodiversity, birds, mammals, reptiles, species richness.*

(Available in bookstores and libraries.)

Scott, J.M.; Heglund, P.J.; Morrison, M.L. [and others]

2002. Introduction. In: Scott, J.M.; Heglund, P.J.; Morrison, M.L. [and others], eds. Predicting species occurrences: issues of accuracy and scale. Washington, DC: Island Press: 1-5.

The complexity and inherent variation in species and their responses to physical and biological factors at multiple scales, as well as the dynamic nature of environments and species ranges, make predicting species occurrence, abundance, or viability with high levels of precision and accuracy difficult. The papers in this volume present advances in efforts to model species distributions. Our goal was to examine the theoretical basis for model development, assess the degree to which assumptions are met, discuss the current applications of modeling techniques, and focus on the future of modeling for natural resource conservation and management.

*Keywords: Wildlife habitat relationships, models, geographic information systems, population dynamics, demographics, population ecology.*

(Available in bookstores and libraries.)

Smith, W.P.; Hunt, H.E.; Townley, W.K.

2001. A comparison of breeding bird communities and habitat features between old-growth and second-growth bottomland hardwood forest. In: Hamel, P.B.; Foti, T.L., tech. eds. Bottomland hardwoods of the Mississippi alluvial valley: characteristics and management of natural function, structure, and composition. Gen. Tech. Rep. SRS-42. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station: 65-82.

During 1991 and 1992, spot-mapping and strip-count censuses were conducted in old-growth and adjacent second-growth tracts in Moro Bottoms, Arkansas, to characterize bird species composition, relative abundance, and habitat affinities. More species were recorded on the old-growth site compared to the second-growth grid. Similarly, the old-growth grid had a larger Shannon-Weaver diversity index than the second-growth site. Territories of several species coincided with specific habitat features: white-eyed vireo (*Vireo griseus*), Carolina wren (*Thryothorus ludovicianus*), Kentucky warbler (*Oporornis formosus*), and prothonotary warbler (*Protonotaria citrea*) were associated with tree-fall canopy gaps; Acadian flycatcher (*Empidonax vireescens*) and prothonotary warbler were affiliated with standing water; and the American redstart (*Setophaga ruticilla*) showed a strong affinity for swamp chestnut oak (*Quercus michauxii*). Small forest openings, making up 22 percent or less of the total area of old-growth bottomland forest, do not appear to adversely affect and may enhance breeding bird diversity.

*Keywords: Breeding communities, bird abundance, bird diversity, bottomland hardwood forest, habitat relations, old growth, second growth.*

(See Juneau order form. The entire proceedings is available online at <http://www.srs.fs.usda.gov/pubs.>)

Smith, W.P.; Zollner, P.A.

2001. Seasonal habitat distribution of swamp rabbits, white-tailed deer, and small mammals in old growth and managed bottomland hardwood forests. In: Hamel, P.B.; Foti, T.L., tech. eds. *Bottomland hardwoods of the Mississippi alluvial valley: characteristics and management of natural function, structure, and composition*. Gen. Tech. Rep. SRS-42. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station: 83-98.

We studied swamp rabbits, white-tailed deer, and small mammals in an old-growth and adjacent second-growth and young-growth bottomland hardwood forest stands in southern Arkansas from August 1991 through February 1993. With 29,436 trap nights of total effort during winter, spring, and summer seasons, we captured 939 small mammals that were distributed among 14 species. There were more individuals of more species in old-growth forest than in other habitats, and more new animals were captured during spring. The cotton mouse, *Peromyscus gossypinus* was clearly the most abundant species in all habitats during all seasons, but it was always more abundant in old growth than in other habitats. The golden mouse, *Ochrotomys nuttalli*, was the only species that was notably more abundant in habitat other than old growth.

*Keywords: Bottomland hardwood forest, community composition, habitat distribution, managed forest, old growth, relative abundance, second growth, small mammals, swamp rabbit, white-tailed deer.*

(See Juneau order form. The entire proceedings is available online at <http://www.srs.fs.usda.gov/pubs/>.)

Wisdom, M.J.; Wales, B.C.; Holthausen, R.S. [and others]

2002. A habitat network for terrestrial wildlife in the interior Columbia basin. *Northwest Science*. 76(1): 1-14.

Habitat managers need information about broad-scale environmental conditions in relation to the composite requirements of species that deserve attention in conservation planning. Consequently, we characterized and mapped a broad-scale network of habitats for five groups of terrestrial vertebrates in the interior Columbia basin composed of 44 species whose habitats have declined strongly from historical (circa 1850 to 1890) to current periods in the basin. The families consist of species that depend on old forests, on early-seral forests, or open-canopy sagebrush and grasslands. For each family, we characterized current habitat conditions at the scale of the watershed. All five families had the highest percentage of watersheds in condition 3 (low abundance or low quality) (59 to 80 percent), and four of the five families had the lowest percentage in condition 2 (high abundance but moderate quality) (5 to 25 percent). Connectivity among watersheds for all families appeared low in many parts of the basin owing to spatial gaps associated with areas of habitat extirpation, a component of condition 3. Our condition maps constitute a broad-scale network of habitats that currently exists for a large set of terrestrial vertebrates of conservation focus; this network could be useful for developing multispecies research hypotheses and management strategies in the basin.

*Keywords: Habitat, habitat management, conservation, network, habitat network, species conservation, conservation planning.*

(See La Grande order form.)

## Corvallis Lab Order Form 1

To order copies of these publications, check the reference, and mail the form to the  
Corvallis Forestry Sciences Lab

The Corvallis Forestry Sciences Laboratory is able to accept email requests for these publications. Send requests to  
ibutler@fs.fed.us.

- \_\_\_\_\_ S. Ahn, A.J. Plantinga, and R.J. Alig  
Determinants and projections of land use in the South Central United States
- \_\_\_\_\_ R.C. Anderson, D.E. Gardner, C.C. Daehler, and F.C. Meinzer  
Dieback of *Acacia koa* in Hawaii: ecological and pathological characteristics of affected stands
- \_\_\_\_\_ R.C. Cronn, R.L. Small, T. Haselkorn, and J.F. Wendel  
Rapid diversification of the cotton genus (*Gossypium*: Malvaceae) revealed by analysis of sixteen nuclear and chloroplast genes
- \_\_\_\_\_ J. Gierasimiuk, H. Rózycki, E. Strzelczyk, and C.Y. Li  
Studies on the fast- and slow-growing bacteria occurring in the root-free soil, rhizosphere and mycorrhizosphere of nursery seedlings and 70-year-old trees of Scots pine (*Pinus sylvestris* L.). Enumeration and identification
- \_\_\_\_\_ E.K. Heyerdahl and S.J. McKay,  
Condition of live fire-scarred ponderosa pine trees six years after removing partial cross sections
- \_\_\_\_\_ J.A. Jones and F.J. Swanson  
Hydrologic inferences from comparisons among small basin experiments
- \_\_\_\_\_ R.G. Kelsey  
Chemical indicators of stress in trees: their ecological significance and implication for forestry in eastern Oregon and Washington
- \_\_\_\_\_ J.D. Kline, B.J. Butler, and R.J. Alig  
Tree planting in the South: What does the future hold? Summary
- \_\_\_\_\_ C. Koo, R. Molina, S.L. Miller, and J.M. Trappe  
Effect of water stress on ectomycorrhizal development and growth of *Alnus rubra* seedlings

Third Quarter 2003

**Please print. This may be  
used as a mailing label:**

_____
Name
_____
Address
_____
Address
_____
City, ST zip

Cut here

From:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Place  
Postage  
Stamp  
Here

Publication Requests  
Corvallis Forestry Sciences Laboratory  
3200 SW Jefferson Way  
Corvallis, OR 97331-4401



## Corvallis Lab Order Form 2

To order copies of these publications, check the reference, and mail the form to the  
Corvallis Forestry Sciences Lab

The Corvallis Forestry Sciences Laboratory is able to accept email requests for these publications. Send requests to  
ibutler@fs.fed.us.

- \_\_\_\_\_ F.C. Meinzer  
Co-ordination of vapour and liquid phase water transport properties in plants
- \_\_\_\_\_ D.W. Ross; G.E. Daterman, and K.E. Gibson  
Elution rate and spacing of antiaggregation pheromone dispensers for protecting live trees  
from *Dendroctonus pseudotsugae* (Coleoptera: Scolytidae)
- \_\_\_\_\_ T.M. Sirvent, L. Walker, N. Vance, and D.M. Gibson  
Variation in hypericins from wild populations of *Hypericum perforatum* L. in the Pacific  
Northwest of the U.S.A.
- \_\_\_\_\_ F.J. Swanson and J.A. Jones  
Geomorphology and hydrology of the H.J. Andrews Experimental Forest, Blue River, Oregon
- \_\_\_\_\_ D.T. Tingey, J.A. Laurence, J.A. Weber, and others  
Elevated CO<sub>2</sub> and temperature alter the response of *Pinus ponderosa* to ozone: a simulation  
analysis
- \_\_\_\_\_ L. Walker, T. Sirvent, D. Gibson, and N. Vance  
Regional differences in hypericin and pseudohypericin concentrations and five morphological  
traits among *Hypericum perforatum* plants in the Northwestern United States
- \_\_\_\_\_ M.C. Wimberly  
Spatial simulation of historical landscape patterns in coastal forests of the Pacific Northwest
- \_\_\_\_\_ C.E. Woodcock, S.A. Macomber, M. Pax-Lenney, and W.B. Cohen  
Monitoring large areas for forest change using Landsat: generalization across space, time,  
and Landsat sensors

Third Quarter 2003

**Please print. This may be  
used as a mailing label:**

_____
Name
_____
Address
_____
Address
_____
City, ST zip

Cut here

From:

---

---

---

---

Place  
Postage  
Stamp  
Here

Publication Requests  
Corvallis Forestry Sciences Laboratory  
3200 SW Jefferson Way  
Corvallis, OR 97331-4401

## Headquarters Order Form

To order a copy of this publication, check the reference, and mail the form to the  
PNW Research Station Headquarters

The headquarters office is able to accept email requests for this publication. Send request to [pnw\\_pnwpubs@fs.fed.us](mailto:pnw_pnwpubs@fs.fed.us).

—— T.J. Mills, T.M. Quigley, and F.J. Everest  
Science-based natural resource management decisions: What are they?

Third Quarter 2003

**Please print. This may be  
used as a mailing label:**

_____
Name
_____
Address
_____
Address
_____
City, ST zip

Cut here

From:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Place  
Postage  
Stamp  
Here

Publication Requests  
PNW Research Station Headquarters  
P.O. Box 3890  
Portland, OR 97208

## Juneau Lab Order Form

To order copies of these publications, check the reference, and mail the form to the  
Juneau Forestry Sciences Laboratory

The Juneau Laboratory is able to accept email requests for this publication. Send requests to [tmeachem@fs.fed.us](mailto:tmeachem@fs.fed.us).

- \_\_\_\_\_ J.A. Jenks, W.P. Smith, and C.S. DePerno  
Maximum sustained yield harvest versus trophy management
  
- \_\_\_\_\_ A.C. Johnson and P. Wilcock  
Association between cedar decline and hillslope stability in mountainous regions of  
southeast Alaska
  
- \_\_\_\_\_ B.H. Marston, M.F. Willson, and S.M. Gende  
Predator aggregations during eulachon *Thaleichthys pacificus* spawning runs
  
- \_\_\_\_\_ C.G. Shaw, III, F.H. Everest, D.N. Swanston, and others  
Independent scientific review in natural resource management: a recent example from the  
Tongass Land Management Plan
  
- \_\_\_\_\_ W.P. Smith, H.E. Hunt, and W.K. Townley  
A comparison of breeding bird communities and habitat features between old-growth and  
second-growth bottomland hardwood forest
  
- \_\_\_\_\_ W.P. Smith and P.A. Zollner  
Seasonal habitat distribution of swamp rabbits, white-tailed deer, and small mammals in old  
growth and managed bottomland hardwood forests

Third Quarter 2003

**Please print. This may be  
used as a mailing label:**

_____
Name
_____
Address
_____
Address
_____
City, ST zip



Cut here

From:

---

---

---

---

Place  
Postage  
Stamp  
Here

Juneau Forestry Sciences Laboratory  
2770 Sherwood Lane, Suite 2A  
Juneau, AK 99801-8545

## La Grande Lab Order Form

To order copies of these publications, check the reference, and mail the form to the  
La Grande Forestry and Range Sciences Laboratory

- \_\_\_\_\_ R.T. Bowyer, K.M. Stewart, S.A. Wolfe, and others  
Assessing sexual segregation in deer
  
- \_\_\_\_\_ R. Mathiasen, C. Parks, J. Beatty, and S. Sesnie  
First report of *Psittacanthus angustifolius* on pines in Mexico and Guatemala
  
- \_\_\_\_\_ D.L. Perkins  
An ecologist's view of whitebark pine
  
- \_\_\_\_\_ M.J. Wisdom, B.C. Wales, R.S. Holthausen, and others  
A habitat network for terrestrial wildlife in the interior Columbia basin
  
- \_\_\_\_\_ G. Zúñiga, R. Cisneros, J.L. Hayes, and J. Macias-Samano  
Karyology, geographic distribution, and origin of the genus *Dendroctonus* Erichson  
(Coleoptera: Scolytidae)

Third Quarter 2003

**Please print. This may be  
used as a mailing label:**

_____
Name
_____
Address
_____
Address
_____
City, ST zip

Cut here

From:

---

---

---

---

Place  
Postage  
Stamp  
Here

Attn: Publication Requests  
La Grande Forestry and Range Sciences  
Laboratory  
1401 Gekeler Lane  
La Grande, OR 97850-3368

## Olympia Lab Order Form

To order copies of these publications, check the reference, and mail the form to the  
Olympia Forestry Sciences Laboratory

The Olympia Forestry Sciences Laboratory is able to accept email requests for these publications. Send requests to  
kkimball@fs.fed.us.

- \_\_\_\_\_ A.B. Carey  
Globalization of flora: inviting worldwide ecosystem disaster
- \_\_\_\_\_ A.B. Carey  
Response of northern flying squirrels to supplementary dens
- \_\_\_\_\_ D.S. DeBell and C.A. Harrington  
Density and rectangularity of planting influence 20-year growth and development of red  
alder
- \_\_\_\_\_ R.E. Drew, J.G. Hallett, K.B. Aubry, and others  
Conservation genetics of the fisher (*Martes pennanti*) based on mitochondrial DNA  
sequencing
- \_\_\_\_\_ D. Evans Mack, M.G. Raphael, and J.L. Laake  
Probability of detecting marbled murrelets at sea: effects of single versus paired observers
- \_\_\_\_\_ C. Harrington  
Oak forest ecosystems: ecology and management for wildlife [Book review]
- \_\_\_\_\_ C.W. Heckman and B. Deventer  
Phylogenetic variability in the pigment complement of aquatic tracheophytes
- \_\_\_\_\_ R.E. Hudson, J.E. Aukema, C. Rispe, and D. Roze  
Altruism, cheating, and anticheater adaptations in cellular slime molds

Third Quarter 2003

**Please print. This may be  
used as a mailing label:**

_____
Name
_____
Address
_____
Address
_____
City, ST zip

Cut here

From:

---

---

---

---

Place  
Postage  
Stamp  
Here

Olympia Forestry Sciences Laboratory  
3625 93rd Avenue, SW  
Olympia, WA 98512-9193



## Portland Lab Order Form

To order copies of these publications, check the reference, and mail the form to the  
Portland Forestry Sciences Laboratory.

- \_\_\_\_\_ T.M. Barrett, F.G. Schurr, and K.L. O'Hara  
Classifying stand structure: a comparison of SVS images with plot visits and FVS-  
generated metrics
  
- \_\_\_\_\_ R.L. Deal  
Forestry from a researcher's perspective
  
- \_\_\_\_\_ R. Haynes  
The development of economic policy models in support of broad scale land management  
strategies: an example from the United States (Available only in Spanish)

Third Quarter 2003

**Please print. This may be  
used as a mailing label:**

_____
Name
_____
Address
_____
Address
_____
City, ST zip

Cut Here

From:

---

---

---

---

Place  
Postage  
Stamp  
Here

Attn: Publication Requests  
Portland Forestry Sciences Laboratory  
P.O. Box 3890  
Portland, OR 97208-3890

## Wenatchee Lab Order Form

To order copies of these publications, check the reference, and mail the form to the  
Wenatchee Forestry Sciences Laboratory

The Wenatchee Forestry Sciences Laboratory is able to accept email requests for these publications. Send requests to  
ljblack@fs.fed.us.

- \_\_\_\_\_ D.T. Chaloner, M.S. Wipfli, and J.P. Caouette  
Mass loss and macroinvertebrate colonisation of Pacific salmon carcasses in south-eastern Alaskan streams
  
- \_\_\_\_\_ R. Everett, R. Schellhaas, P. Ohlson, and others  
Continuity in fire disturbance between riparian and adjacent sideslope Douglas-fir forests
  
- \_\_\_\_\_ J.J. Piccolo and M.S. Wipfli  
Does red alder (*Alnus rubra*) in upland riparian forests elevate macroinvertebrate and detritus export from headwater streams to downstream habitats in southeastern Alaska?
  
- \_\_\_\_\_ M.S. Wipfli and D.P. Gregovich  
Export of invertebrates and detritus from fishless headwater streams in southeastern Alaska: implications for downstream salmonid production

Third Quarter 2003

**Please print. This may be used as a mailing label:**

_____
Name
_____
Address
_____
Address
_____
City, ST zip

Cut Here

From:

---

---

---

---

Place  
Postage  
Stamp  
Here

Attn: Publication Requests  
Wenatchee Forestry Sciences Laboratory  
1133 N Western Avenue  
Wenatchee, WA 98801

To receive a publication from this list, circle the appropriate number, cut out this order card, place it in an envelope, and mail to:

**PNW Publications**  
**Portland Habilitation Center, Inc.**

5312 NE 148th  
Portland, OR 97230-3438

*Please leave label attached.*

<b>01-211</b>	<b>02-295</b>	<b>03-045</b>
<b>02-042</b>	<b>02-373</b>	<b>03-088</b>
<b>02-122</b>	<b>02-376</b>	<b>03-111</b>
<b>02-123</b>	<b>03-001</b>	<b>03-113</b>
<b>02-125</b>	<b>03-006</b>	<b>03-140</b>
<b>02-141</b>	<b>03-008</b>	<b>03-150</b>
<b>02-281</b>	<b>03-043</b>	

The **Forest Service** of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives—as directed by Congress—to provide increasingly greater service to a growing Nation.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

Pacific Northwest Research Station, 333 S.W. First Avenue, P.O. Box 3890, Portland, Oregon 97208-3890.

U.S. Department of Agriculture  
Pacific Northwest Research Station  
333 SW First Avenue  
P.O. Box 3890  
Portland, Oregon 97208-3890

---

Official Business  
Penalty for Private Use, \$300

PRSRT STD  
**US POSTAGE**  
PAID  
PORTLAND OR  
PERMIT NO. G-40

do NOT detach label