



A list of recent publications and other products, such as videos and software, of the Pacific Northwest (PNW) Research Station is published four times a year. This list announces completion and availability of scientific and technical publications and products supported by the PNW Research Station.

Publications are arranged in two sections. The first section lists items published by the PNW Research Station and available through our distribution system. The second section lists publications available elsewhere. Within each section, items are grouped by general subject categories and alphabetically by author within categories.

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Station publications have a five-digit code number at the beginning of the citation. These code numbers are printed again on the inside back cover of this list.

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### Journal, Proceedings, and Other Reprints

Many of the items listed here are not published by the PNW Research Station, although the work has been supported by the Station. For

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these items, the Station laboratory originating the publication 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.

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### Anchorage

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Anchorage, AK 99503-3954

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Forestry Sciences Laboratory  
3200 S.W. Jefferson Way  
Corvallis, OR 97331

### Juneau

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

### La Grande

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

### Olympia

Forestry Sciences Laboratory  
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Olympia, WA 98512-9193

### Portland

Forestry Sciences Laboratory  
P.O. Box 3890  
Portland, OR 97208-3890

### Seattle

Forestry Sciences Laboratory  
4043 Roosevelt Way, N.E.  
Seattle, WA 98105-6497

### Sitka

Wood Utilization Center  
204 Saginaka Way  
Sitka, AK 99835-7316

### Wenatchee

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Wenatchee, WA 98801

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## 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.

### Economics in Forest Management

**98-180**

Mauldin, Thomas E.; Plantinga, Andrew J.; Alig, Ralph J.

1999. Land use in the Lake States region: an analysis of future changes. Res. Pap. PNW-RP-519. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 24 p.

Land use changes can affect timber supplies, wildlife habitat, and other ecosystem goods and services. Since the 1950s, forest and farm land in the Lake States have been decreasing, while urban and other land uses have increased. Land rents and land quality variables were used in making projections of the distribution of Wisconsin's future land uses. The projections of land uses through 2050 are consistent with historic trends: areas of forest and agricultural lands will decline and urban and other land uses will increase. Timberland area is projected to be reduced by 13 percent in Wisconsin, 11 percent in Michigan, and 10 percent in Minnesota.

*Keywords: Land use change, urban development, land rents, timberland area projections.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

**98-001**

Plantinga, Andrew J.; Mauldin, Thomas; Alig, Ralph J.

1999. Land use in Maine: determinants of past trends and projections of future changes. Res. Pap. PNW-RP-511. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 20 p.

Since the 1950s, the area of forest land in Maine has increased by almost 400,000 acres, while the area of crop land and pasture land has declined by about 900,000 acres. Changes in land use have important consequences for the future availability of timber, wildlife habitat, and other benefits provided by forests. Land use patterns are determined by relative land rents and land quality. Projections indicate that private timberlands area will decline by almost 3 percent by 2050.

*Keywords: Land use, econometric model, RPA assessment.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

### Ecosystem Function

**97-320**

Carey, Andrew B.; Thysell, David R.; Brodie, Angus W.

1999. The forest ecosystem study: background, rationale, implementation, baseline conditions, and silvicultural assessment. Gen. Tech. Rep. PNW-GTR-457. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 129 p.

The forest ecosystem study (FES) came about as an early response to the need for experimental silvicultural methods to stimulate the development of late-successional attributes in managed stands. Beginning in 1991, extensive baseline data on wildlife and vegetation were accumulated. Since application of variable-density thinning in 1993, the FES has collected extensive data on the responses of arboreal rodents, small mammals, vegetation, and fungi to variable-density thinning. Background and rationale for

the study, as well as baseline conditions, selected preliminary responses, and a silvicultural assessment of variable-density thinning are presented.

*Keywords: Variable-density thinning, Pacific Northwest, Douglas-fir, biodiversity, northern flying squirrel, truffle, forest ecosystem study, experimental silviculture.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

### 98-099

Hessburg, Paul F.; Smith, Bradley G.; Salter, R. Brion

1999. Using estimates of natural variation to detect ecologically important change in forest spatial patterns: a case study, Cascade Range, eastern Washington. Res. Pap. PNW-RP-514. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 65 p.

By using hierarchical clustering techniques, subwatersheds on the eastern slope of the Cascade Range in Washington were grouped into ecological subregions by similarity of area in potential vegetation and climate attributes. Spatially continuous historical and current vegetation maps were then built for 48 randomly selected subwatersheds from interpretations of 1938-49 and 1985-93 aerial photos, respectively, and attributed cover types, structural classes, and potential vegetation types to individual patches by modeling procedures. A natural range of variation (NRV) in spatial patterns of patch types by subwatersheds and five forested ecological subregions was estimated. The authors illustrate how NRV information can be used to characterize the direction and magnitude of vegetation change occurring as a consequence of management.

*Keywords: Natural range of variation, forest health, space-for-time substitution, ecosystem restoration, ecological monitoring, landscape patterns, spatial pattern analysis.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

### 97-183

Schoettle, Anna W.; Tonnessen, Kathy; Turk, John [and others]

1999. An assessment of the effects of human-caused air pollution on resources within the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-447. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 66 p. (Quigley, Thomas M., ed.; Interior Columbia Ecosystem Management Project: scientific assessment).

An assessment of existing and potential impacts to vegetation, aquatics, and visibility within the Columbia River basin due to air pollution was conducted as part of the Interior Columbia Basin Ecosystem Management Project. This assessment examined the current situation and potential trends due to pollutants such as ammonium, nitrogen oxides, sulfur oxides, particulates, carbon, and ozone. Ecosystems and resources at risk are identified, including certain forests, lichens, cryptogamic crusts, high-elevation lakes and streams, arid lands, and class I areas. Current monitoring data are summarized and air pollution sources identified. The assessment also includes a summary of data gaps and suggestions for future research and monitoring related to air pollution and its effects on resources in the interior Columbia River basin.

*Keywords: Atmospheric deposition, acid rain, air pollution, aquatic effects, class I areas, terrestrial effects, sensitive species, visibility.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

## Fish and Wildlife

### 98-027

Villa, Lisa J.; Carey, Andrew B.; Wilson, Todd M.; Glos, Karma E.

1999. Maturation and reproduction of northern flying squirrels in Pacific Northwest forests. Gen. Tech. Rep. PNW-GTR-444. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 59 p.

Northern flying squirrels are the primary prey of northern spotted owls and important dispersers of fungal spores in Pacific Northwest forests. Despite their importance in forest ecosystems, information is lacking on life history and on methods for determining age and reproductive condition. In the laboratory, epiphyseal notch, femur length, rostrum length, least interorbital breadth, rump pelage length and color, and tail width of dead squirrels were measured. Weight, pelage color, and reproduction were analyzed for field-collected data from live squirrels. Reproduction of northern flying squirrels can be reliably determined in live-trapping studies. Regional variations suggest accurate assessment of age and reproduction is a prerequisite for understanding flying squirrel ecology.

*Keywords: Northern flying squirrel, maturation, reproductive biology, Oregon, Washington, live-trapping, necropsy.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

## General

### 98-189

DeForest, Christopher E.

1999. Watershed restoration, jobs-in-the-woods, and community assistance: Redwood National Park and the Northwest Forest Plan. Gen. Tech. Rep. PNW-GTR-449. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 31 p.

Many parallels exist between the 1978 legislation to expand Redwood National Park and the Northwest Forest Plan, which together with the Northwest economic adjustment initiative formed

the 1993 Pacific Northwest initiative. In both situations, the Federal Government sought to promote retraining for displaced workers, to undertake watershed assessment and restoration work, and to assist communities with economic planning, grants, and transitions. Both efforts point out the inherent conflicts between the economic and ecological objectives of watershed restoration. No one wants to have to choose between reducing sediment and reducing employment in coastal forests.

*Keywords: Watershed restoration, community assistance, Redwood National Park.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

### 97-344

Hof, John; Flather, Curtis; Baltic, Tony; Davies, Stephen

1999. National projections of forest and rangeland condition indicators: a supporting technical document for the 1999 RPA assessment. Gen. Tech. Rep. PNW-GTR-442. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 57 p.

The 1999 forest and rangeland condition indicator model is a set of independent econometric production functions for environmental outputs (measured with condition indicators) at the national scale. This report documents the development of the database and the statistical estimation required by this particular production structure with emphasis on two special characteristics of environmental output production processes: (1) the independence of ecological systems from human control and (2) the broad-scale spatial nature of these processes. Resolution of data deficiencies also is examined. Finally, the model projections are presented and discussed by using national-scale maps.

*Keywords: Resource interactions, land management planning, econometric production, functions, modeling, environmental outputs.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)



**98-368**

Julin, Kent R.; Shaw, Charles G., III  
1999. Science matters: information for managing the Tongass National Forest. Misc. Publ. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 28 p.

A team of research scientists were assembled to help Federal land use planners prepare a plan to guide management of the Tongass National Forest for the next 10 to 15 years. These scientists produced a series of resource and conservation assessments, led expert judgment panels to assess the risks that different management options posed for various resources, and provided advice on approaches to mitigate potentially adverse management effects on specific resources. Without making any management recommendations or decisions, the scientists also evaluated how the available scientific information was applied and risks to resources were acknowledged in the final plan. This paper highlights the engagement of these research scientists in the planning process and their contributions to maintaining healthy wildlife and fish populations, understanding landscape dynamics, and defining socioeconomic conditions related to management of the Tongass National Forest.

*Keywords: National Forest planning, Alaska, Tongass National Forest, expert panels, risk assessment, old growth, natural disturbance, wildlife, fish, socioeconomics.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

**98-369**

Shaw, Charles G., III  
1999. Use of risk assessment panels during revision of the Tongass Land and Resource Management Plan. Gen. Tech. Rep. PNW-GTR-460. Portland, OR: U.S. Department of

Agriculture, Forest Service, Pacific Northwest Research Station. 43 p. (Shaw, Charles G., III, tech. coord.; Conservation and resource assessments for the Tongass land management plan revision).

This paper describes the process used to conduct the 16 risk assessment panels and a subsistence working group held during revision of the Tongass land management plan. It provides an overview of how results from the panels were used by forest managers in plan-related decisionmaking, discusses some reactions to the effort, and identifies some opportunities to improve the process. The panel results provided estimates of the relative risk that implementation of a range of alternative approaches to management of the Tongass National Forest would pose to the continued persistence across the landscape of an array of species or resources and estimates of potential socioeconomic effects on communities. As anticipated, results from these risk assessment panels became an integral component of the effects analysis section of the environmental impact statement that provided the context for successfully completing the Tongass Land and Resource Management Plan.

*Keywords: Forest planning, effects analysis, National Forest Management Act, old-growth forest, forest policy, Tongass National Forest, socioeconomic issues, southeast Alaska, subsistence, wildlife population viability, fisheries sustainability, well-distributed populations.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

**97-268**

Zheng, Daolan; Alig, Ralph J.  
1999. Changes in the non-Federal land base involving forestry in western Oregon, 1961-94. Res. Pap. PNW-RP-518. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 22 p.

Temporal and spatial analyses of land use changes on non-Federal lands in western Oregon between 1961 and 1994 were conducted. Two distinct changes in the region were a loss of

forest lands and an increase in urban areas. Neither the rates of change over time nor the spatial distribution of land converted to urban use was evenly distributed in the region. The influence of socioeconomic factors, such as ownership, population growth, and personal income, as well as physical factors of land such as slope and location, on land use changes also was examined.

*Keywords: Land use change, forestry, urban development, periodic surveys, temporal and spatial analyses.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

## **General, Nontechnical**

### **99-135**

Pacific Northwest Research Station

1999. Recent publications of the Pacific Northwest Research Station, second quarter 1999. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 20 p.

*Keywords: Bibliographies (forestry).*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

### **99-260**

Pacific Northwest Research Station

1999. Recent publications of the Pacific Northwest Research Station, third quarter 1999. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 18 p.

*Keywords: Bibliographies (forestry).*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

## **Resource Inventory and Monitoring**

### **97-332**

Gaines, William L.; Harrod, Richy J.; Lehmkuhl, John F.

1999. Monitoring biodiversity: quantification and interpretation. Gen. Tech. Rep. PNW-GTR-443. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 27 p.

An approach is presented to monitor biological diversity at different levels of ecological organization: landscape, community or ecosystem, population or species, and genetic. The approach involves identifying monitoring questions derived from regional, provincial, or watershed assessments; identifying monitoring methods; and analyzing and interpreting data to integrate into management strategies. Examples of monitoring methods, data analysis, and interpretation are provided for each level of ecological organization, beginning with the most inclusive level, the landscape. An approach and examples are provided to help land managers develop biodiversity monitoring strategies.

*Keywords: Biodiversity, monitoring, genetic diversity, landscape diversity, species diversity, ecosystem diversity.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

### **97-084**

van Hees, Willem W.S.

1999. Vegetation resources inventory of southwest Alaska: development and application of an innovative, extensive sampling design. Res. Pap. PNW-RP-507. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 51 p.

An assessment of the vegetation resources of southwest Alaska was made by using an inventory design developed by the Pacific Northwest Research Station. Satellite imagery (LANDSAT MSS), high-altitude aerial photography, and ground sampling were the major components of the design. Estimates of area for all land cover classes in the southwest region were produced. Additionally, more intensive sampling



provided data for estimating timber resources in the forest land component. Field data collection was conducted from 1991 to 1994, and data compilation progressed through 1995.

*Keywords: Vegetation surveys, forest surveys, timber resources, statistics (forest), Alaska (southwest).*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

## **Soil, Site, Geology**

### **99-065**

Meurisse, Robert T.; Ypsilantis, William G.; Seybold, Cathy, tech. eds.

1999. Proceedings, Pacific Northwest forest and rangeland soil organism symposium; 1998 March 17-19; Corvallis, OR. Gen. Tech. Rep. PNW-GTR-461. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 215 p.

To provide a review of the state-of-the-science about soil organisms for management, a symposium was convened to address soil organism functions and processes and management effects on soil organisms and processes, and to describe some roles of soil organisms in restoration and applications for land management. The focus of the symposium was on Pacific Northwest forest and rangeland ecosystems.

*Keywords: Soil organisms, soil quality, nutrient cycling, nitrogen transformation, foodwebs, ecosystem, bacteria, fungi, anthropods, root diseases.*

## **Supply and Demand**

### **98-158**

Calkin, David

1999. Historic resource production from USDA Forest Service Northern and Intermountain Region lands. Res. Note PNW-RN-540. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 29 p.

This paper presents long-term resource production from National Forests in the Northern and Intermountain Regions, Regions 1 and 4, respectively. A historic data series of timber harvest and

grazing levels on National Forests and lumber production and prices for these regions is developed. Significant trends within the data set are examined. A simple model based on derived demand concepts is tested to identify periods of possible structural change within the stumpage markets for the Region 1 data. This information provides a baseline data set of interest to policymakers and researchers involved in the analysis of the long-term resource production for Regions 1 and 4.

*Keywords: Stumpage prices, harvest volumes.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

## **Timber Management**

### **97-129**

Cochran, P.H.; Seidel, K.W.

1999. Growth and yield of western larch under controlled levels of stocking in the Blue Mountains of Oregon. Res. Pap. PNW-RP-517. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 35 p.

After 30 years, largest trees but lowest cubic-volume yield were produced in the lightest thinning level, while highest board-foot yields were found in intermediate thinning levels. Partial defoliation by larch casebearer occurred. Ice damage caused the most mortality. Mortality caused by other agents was low. The stand density index-bole area relation appears to be curvilinear.

*Keywords: Bole area, stand density index, stocking levels, larch casebearer, ice damage, future stands.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

## 98-373

Cochran, P.H.; Barrett, James W.

1999. Thirty-five-year growth of ponderosa pine saplings in response to thinning and understory removal. Res. Pap. PNW-RP-512. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 28 p.

Long-suppressed ponderosa pine saplings responded to overstory removal, thinning, and competing vegetation. Trees on plots without competing vegetation had greater growth for 20 years but soil quality decreased. Height and diameter growth of individual trees increased as spacing increased. Cubic volume growth decreased as spacing increased, but Scribner board-foot yields 35 years after treatment increased curvilinearly as spacing increased.

*Keywords: Thinning, understory vegetation, growth, ponderosa pine, Pinus ponderosa, saplings.*

(This publication is available to download in pdf format at [www.fs.fed.us/pnw/pubs.htm](http://www.fs.fed.us/pnw/pubs.htm).)

**June** 1999. Spies, Thomas A.; Cohen, Warren. Pixel by pixel: the evolving landscapes of remote sensing.

**July** 1999. Carey, Andrew B. Wisdom from the little folk: the forest tales of birds, squirrels, and fungi.

**August** 1999. McIver, Jim. Home on the range: might the cattle peacefully graze?

**September** 1999. Swanson, Fred; Cissel, John. Messy world: managing dynamic landscapes.

**October** 1999. McClellan, Michael H. Alternatives to clearcutting of old growth in southeast Alaska.

**November** 1999. Bull, Evelyn; Torgersen, Torolf; Parks, Catherine. Dead and dying trees: essential for life in the forest.

## Science Findings

In 1998 PNW Research Station began publishing a series that presents science findings for people who make and influence decisions about managing lands. The 1999 issues may be ordered by using the order form on the last page of this publication.

**February** 1999. Bormann, Bernard T. Confronting illusions of knowledge: how should we learn?

**March** 1999. Liegel, Leon; Pilz, David. Mushrooms in the mist: stalking the wild chanterelle.

**April** 1999. Wilson, Mary. The fish-based food web: when predator and prey connect.

**May** 1999. Neilson, Ronald P. More rain, more drought: Will the forests thrive or die?

## Publications Available Elsewhere

The following publications are available through interlibrary loan, by writing to the locations indicated, or by using the form indicated.

### Economics in Forest Management

Alig, Ralph J.; Adams, Darius M.; McCarl, Bruce A.

1998. Ecological and economic impacts of forest policies: interactions across forestry and agriculture. *Ecological economics*. 27: 63-78.

A linked model of the U.S. forest and agriculture sectors was used to examine economic and ecological impacts of two forest policies: a minimum harvest age limitation and a reduced public harvest policy. Simulated private responses to both policies indicate that landowners could undertake a range of adjustments to minimize welfare impacts, but imposition of constraints on the management of existing timber stocks have particularly potent effects. Projected environmental changes include impacts on biodiversity trends and wildlife habitat conditions and effects on sequestered carbon in all parts of the forest system.

*Keywords: Land use allocation, intertemporal optimization, forest investment.*

(See Corvallis order form B.)

### Ecosystem Function

Bormann, Bernard T.; Wang, Deane; Bormann, F. Herbert.

1998. Rapid, plant-induced weathering in an aggraded experimental ecosystem. *Biogeochemistry*. 43: 129-155.

Weathering rates for experimental ecosystems with and without vegetation were examined to better understand the effect of plants on the rate of weathering and soil and ecosystem development. To evaluate whether rates of weathering of primary minerals are underestimated in watershed mass-balance studies that fail to include products of weathering accumulating in plants and in developing soil, changes in the calcium

and magnesium content of vegetation and soil fractions were measured in large, monitored lysimeters (sandbox ecosystems) at Hubbard Brook Experimental Forest, New Hampshire.

*Keywords: Cations, denudation, ecosystems, nutrient availability, sustainability, weathering.*

(See Corvallis order form A.)

Hann, Wendel J.; Jones, Jeffrey L.; Keane, Robert E. [and others]

1998. Landscape dynamics. *Journal of Forestry*. October: 10-15.

The landscape assessment characterized the landscape dynamics (included by both natural and human changes) of the ecosystems within the interior Columbia River basin. The situation is described where few relations occur among land use, ecosystem health, and species diversity that are in balance with inherent disturbance processes and biophysical capabilities. Both traditional commodity and reserve system management strategies were found to cause short-term fragmentation leading to long-term simplification of landscape patterns.

*Keywords: Landscape dynamics, interior Columbia basin, natural disturbance, human-caused disturbance, land management.*

(See Wenatchee order form.)

Harrington, Constance A.

1999. Forests planted for ecosystem restoration or conservation. *New Forests*. 17: 175-190.

Restoration and related concepts are discussed in terms of ecosystem structure (species and complexity) and ecosystem function (biomass and nutrient content). The importance of specific

objectives in planning conservation or restoration projects is stressed, and examples of practices that might be used are provided.

*Keywords: Restoration, conservation, planting.*

(See Olympia order form.)

Holthausen, Richard S.; Raphael, Martin G.; Samson, Fred B. [and others]  
1999. Population viability in ecosystem management. In: Johnson, N.C.; Malk, A.J.; Sexton, W.T.; Szaro, R., eds. Ecological stewardship: a common reference for ecosystem management. Oxford, England: Elsevier Science Ltd.: 135-136.

Regulations implementing the National Forest Management Act (NFMA) of 1976 provided the first formal requirement for land managers to consider the concept of species viability. Over time, implementation of the viability provision of the NFMA has raised many difficult technical and policy questions. An overview of the management context for population viability analysis, a description of alternative approaches that have been used, and a series of case studies are presented. Key questions identified and explored include (1) how species of concern are selected, (2) what techniques are available to determine population status, (3) how risk factors can be identified and quantified, (4) how the relation of population dynamics to habitat dynamics can be determined, and (5) how suitable habitat and project trends in the future can be defined.

*Keywords: Endangered species, genetics, habitat dynamics, demographics, regulations.*

(See Olympia order form.)

Zenner, Eric K.  
1998. A new index for describing the structural complexity of forests. Corvallis, OR: Oregon State University. 177 p. Ph.D. dissertation.

A new index, the structural complexity index (SCI), was developed to characterize and compare the structural complexity of different forests. The SCI was strongly related to tree size variation, tree density, density of emergent

canopy trees, and species mixture in multiple-aged stands. Based on the observed or effective structure and the potential structure, the "maximum structure hypothesis for natural mixed conifer forests" was proposed, stating that in the absence of large-scale, stand-replacing disturbances and in the presence of small-scale disturbances associated with mortality and replacement of individual trees, the effective structure is near the potential structure. There was strong evidence in young and mature stands in favor of the maximum structure hypothesis, but stands resembling old-growth structures had effective structures less than their potential.

*Keywords: Forest structure, structural complexity index.*

(Available only through library or interlibrary loan.)

## Fire

Ottmar, Roger D.; Vihnanek, Robert E.  
1999. Stereo photo series for quantifying natural fuels. Volume II: black spruce and white spruce types in Alaska. PMS 831. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 65 p.

Two series of stereo photographs display a range of natural conditions and fuel loadings in black spruce and white spruce ecosystem types in Alaska. Each group of photos includes inventory information summarizing vegetation composition, structure and loading, woody material loading and density by size class, forest floor depth and loading, and various site characteristics. The natural fuels photoseries is designed to help land managers appraise fuel and vegetation conditions in natural settings.

*Keywords: Woody material, fuel loading, natural fuels, biomass, black spruce, white spruce.*

(Available from the National Interagency Fire Center, Bureau of Land Management, 3833 S. Development Avenue, Boise, ID 83705. Orders are taken by mail or fax request at (208) 387-5573. The cost for this volume is \$32.21.)

Ottmar, Roger D.; Vihnanek, Robert E.; Wright, Clinton S.

1999. Stereo photo series for quantifying natural fuels. Volume I: mixed-conifer with mortality, western juniper, sagebrush, and grassland types in the interior Pacific Northwest. PMS 830. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 73 p.

Four series of single and stereo photographs display a range of natural conditions and fuel loadings in mixed-conifer, western juniper, sagebrush, and grassland ecosystem types in the interior Pacific Northwest. Each group of photos includes inventory information summarizing vegetation composition, structure and loading, woody material loading and density by size class, forest floor depth and loading, and various site characteristics. The natural fuels photoseries is designed to help land managers appraise fuel and vegetation conditions in natural settings.

*Keywords: Woody material, fuel loading, natural fuels, biomass, Douglas-fir, ponderosa pine, western larch, grand fir, western juniper, big sagebrush, mixed conifer, grasslands.*

(Available from the National Interagency Fire Center, Bureau of Land Management, 3833 S. Development Avenue, Boise, ID 83705. Orders are taken by mail or fax request at (208) 387-5573. The cost for this volume is \$33.07.)

## Fish and Wildlife

Bisson, Peter A.

1998. One hundred years of Pacific Northwest salmon management: goals, results, and lessons learned. In: Calhoun, John M., ed. Forest policy: ready for renaissance. Seattle, WA: University of Washington, College of Forest Resources: 149-169.

Over the last century, what was once a plentiful and valuable natural resource in the region has dwindled to the point of Federal Endangered Species Act intervention. Many factors have mediated these declines, and there is little point in trying to elevate one factor above the other by placing blame; incorrect decisions have occurred

in virtually all aspects of salmon policies.

Management of publicly and privately owned forests can play an important role in salmon recovery. Both active and passive management of aquatic and riparian ecosystems in forested watersheds are needed, but the extent to which these systems can be actively managed will depend on the extent of human-caused alteration and the long-term potential for self-recovery.

*Keywords: Salmon, fisheries, management, forest policy.*

(Available from bookstores and libraries.)

Blessing, Bonnie J.; Phenix, Eriksen P.; Jones, Lawrence L.C.; Raphael, Martin G.

1999. Nests of Van Dyke's salamander (*Plethodon vandykei*) from the Olympic Peninsula, Washington. *Northwestern Naturalist*. 80: 77-81.

Van Dyke's salamander is an uncommon woodland salamander endemic to Washington. Many aspects of its ecology and life history have not been studied, and only two nest sites have been described. In spring 1997, four additional log nests were discovered on the Olympic Peninsula. Information is presented on the microhabitat of these nests and on development of the eggs.

*Keywords: Van Dyke's salamander, Plethodon vandykei, nest, reproduction, development, logs, microhabitat, Olympic Peninsula, Washington.*

(See Olympia order form.)

Bryant, Mason D.; Everest, Fred H.

1998. Management and condition of watersheds in southeast Alaska: the persistence of anadromous salmon. *Northwest Science*. 72(4): 249-267.

Numerous intact or lightly disturbed watersheds are present throughout southeast Alaska and support abundant and diverse populations of anadromous salmonids. Significant human disturbance to the watersheds of southeast Alaska did not begin until the 1950s with the start of industrial logging. Since then, management of watersheds has evolved to reduce risks to aquatic habitat, but the most intensive logging occurred during the first 20 years of timber

harvest when few restraints were placed on timber harvest in watersheds. As a result, few salmon stocks in southeast Alaska appear to be in decline, but escapement records on specific watersheds, particularly those most severely affected by management are nonexistent or qualitative. Sustainable salmon stocks can be maintained by retention of existing intact watersheds, implementation of conservative forest practices, and maintenance of adequate escapements.

*Keywords: Habitat, forest management, southeast Alaska.*

(See Juneau order form.)

Carey, Andrew B.; Kershner, Janet; Biswell, Brian; Domínguez de Toledo, Laura  
1999. Ecological scale and forest development: squirrels, dietary fungi, and vascular plants in managed and unmanaged forest. *Wildlife Monographs*. 142: 1-71.

Northern flying squirrels and Townsend's chipmunks were studied in a cross-sectional, retrospective survey of managed and naturally old stands in a southwestern Oregon landscape during 1985-89. The vegetation was quantified, abundances of sciurids estimated, and diets of sciurids described in a manner that allowed identification of key ecosystem processes contributing to biodiversity and the scales at which synergistic effects emerged. Understanding ecosystem processes and spatial scale of forest development is key to managing for restoration of biodiversity, maintenance of trophic pathways, and recovery of threatened species such as the northern spotted owl.

*Keywords: Ecological scale, forest development, Galucomys sabrinus, northern flying squirrel, habitat, microhabitat, Oregon, Tamias townsendii, Townsend's chipmunk.*

(See Olympia order form.)

Cascade Center for Ecosystem Management  
1999. Quartz Creek restoration project: aquatic ecosystem response. Corvallis, OR:

Oregon State University; [U.S. Department of Agriculture, Forest Service], Pacific Northwest Research Station; [U.S. Department of Agriculture, Forest Service], Willamette National Forest, Blue River Ranger District. 4 p.

A long-term project was begun in 1988 by the Willamette National Forest and Oregon State University to evaluate the changes in the geomorphic, hydraulic, and biological attributes associated with the installation of log accumulations in a habitat restoration project. Quartz Creek was selected because relatively low amounts of wood were present in the channel owing to past disturbances and salvage logging operations. Larger size classes of wood and 48 log and boulder structures were placed in the stream in 1988. Monitoring occurred each year from 1989 to 1993. In the 10 years since treatment, the restoration reach at Quartz Creek has developed the amounts and sizes of wood that would be expected in a similarly sized stream flowing through an old-growth forest in this basin.

*Keywords: Aquatic ecosystem, woody debris, log accumulations, restoration.*

(See Corvallis order form A.)

Parrish, Donna L.; Behnke, Robert J.; Gephard, Stephen R. [and others]  
1998. Why aren't there more Atlantic salmon (*Salmo salar*)? *Canadian Journal of Fisheries and Aquatic Sciences*. 55(Suppl. 1): 281-287.

Numbers of wild anadromous Atlantic salmon (*Salmo salar*) have declined demonstrably throughout their native range. The current status of runs on rivers historically supporting salmon indicates widespread declines and extirpations in Europe and North America, primarily in southern portions of the range. Many of these declines or extirpations can be attributed to the construction of mainstem dams, pollution (including acid rain), and total dewatering of streams. Additional effects on declines during the 1960s through the 1990s included overfishing, and more recently, changing ocean conditions, and intensive aquaculture. Most factors affecting salmon numbers do not act singly, but rather in concert,



which masks the relative contribution of each factor. Salmon researchers and managers should not look for a single culprit in declining numbers of salmon, but rather, seek solutions through rigorous data gathering and testing of multiple effects integrated across space and time.

*Keywords: Atlantic salmon, Salmo salar, population status.*

(See Corvallis order form A.)

Wagner, Paul; Carey, Marion; Lehmkuhl, John  
1998. Assessing habitat connectivity through transportation corridors on a broad scale: an interagency approach. In: Evink, Gary L.; Garrett, Paul; Zeigler, David; Berry, Jon, eds. Proceedings of the international conference on wildlife ecology and transportation; 1998 February 9-12; Fort Myers, FL. [Place of publication unknown]: [Publisher unknown]: 66-67.

The impact of highways on wildlife recently became an issue in Washington State when the USDA Forest Service designated a portion of the Wenatchee and Mount Baker-Snoqualmie National Forests as an adaptive management area (AMA). Interstate 90 passes through the AMA, posing a challenge to the mandated requirement of maintaining habitat connectivity. A joint study was begun to identify ways to provide connectivity. The study will determine where connectivity corridors are located and where they should be maintained within the study area.

*Keywords: Transportation corridors, habitat connectivity, wildlife, adaptive management areas, interstate highways.*

(See Wenatchee order form.)

Williams, Richard N.; Bisson, Peter A.; Bottom, Daniel L. [and others]

1999. Return to the river: scientific issues in the restoration of salmonid fishes in the Columbia River. *Fisheries*. 24(3): 10-19.

The Independent Scientific Group of the Northwest Power Planning Council reviewed regional salmon management actions described in the

Columbia River basin fish and wildlife program and concluded that the current program is unlikely to recover declining salmon and steelhead stocks. Adoption of a salmon life history ecosystem concept as a guiding foundation is needed to recover depressed stocks. Increasing natural ecosystem processes and functions should rebuild salmon populations to more abundant, productive, and stable levels. Elements that would increase the needed conditions include restoration of habitat for all life history stages, reduction of mortality sources, and planning of hydropower mitigation.

*Keywords: Salmon, Columbia River basin, watershed restoration.*

(See Olympia order form.)

## **Forest Economics**

Pilz, David; Brodie, F. Douglas; Alexander, Susan; Molina, Randy

1998. Relative value of chanterelles and timber as commercial forest products.

*Ambio*. Special Report Number 9: 14-16.

Comparisons of the economic value of edible mushrooms and timber were made by using chanterelle (*Chantharellus* sp.) mushrooms collected from productive Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) forests. Discounted present net worth in perpetuity was estimated for two timber harvest regimes and three levels of chanterelle productivity. Timber was one to two orders of magnitude more valuable than mushrooms, yet while timber grows, mushroom harvesting can provide annual income to harvesters once fruiting is established.

*Keywords: Chanterelle mushrooms, Chantharellus sp., forest products, forest economics.*

(See Corvallis order form B.)

## General

Bormann, Bernard T.

1998. Adaptive management for trail systems. In: National symposium on horse trails in forest ecosystems; 1998 October 18-21; Clemson, SC. [Clemson, SC]: [Clemson University]: 1-4.

Adaptive management can be used to improve trail management through structured learning by managers with assistance from scientists and the public.

*Keywords: Ecosystem management, structured learning.*

(See Corvallis order form A.)

Liegel, Leon; Pilz, David; Love, Tom

1998. The MAB mushroom study: background and concerns. *Ambio. Special Report Number 9: 3-7.*

Pacific Northwest planners and economic developers have worked in the 1990s to create new jobs to offset steadily declining incomes from timber harvesting and processing industries. Among these new jobs are harvesting of special forest products, such as floral greenery, medicinal plants, and edible mushrooms. Some land managers, biologists, and conservation groups believe that increased harvest of nontimber forest products is not sustainable and threatens long-term resource productivity. The U.S. Man and the Biosphere program funded a research project from 1993 to 1996 to determine the impacts of nontimber harvests on human and natural systems in the Pacific Northwest.

*Keywords: Nontimber forest products, special forest products, Olympic Peninsula, sustainable ecosystems.*

(See Corvallis order form B.)

Liegel, Leon; Pilz, David; Love, Tom; Jones, Eric

1998. Integrating biological, socioeconomic, and managerial methods and results in the MAB mushroom study. *Ambio. Special Report Number 9: 26-33.*

Some three dozen biologists, resource managers, social scientists, and volunteers worked together between 1993 and 1996 to study the

biological, socioeconomic, and managerial concerns of harvesting chanterelle (*Cantharellus* sp.) mushrooms on the Olympic Peninsula of Washington State. Harvesters are wary of more regulations, higher permit fees, and contracts that restrict harvesting to those who pay the highest price. Resource managers face decreasing budgets, necessitating permits and fees to cover the actual costs of administering harvests; existing laws also require charging those who use forests for commercial purposes. Cooperation is needed between harvesters and research volunteers to conduct long-term field studies. Key elements of successful cooperation are early front-end planning and information sharing by all parties from initial project conception through data synthesis and reporting.

*Keywords: Nontimber forest products, chanterelle mushrooms, Cantharellus sp., harvests, long-term studies.*

(See Corvallis order form B.)

McLain, Rebecca; Jones, Eric; Liegel, Leon

1998. The MAB mushroom study as a teaching case example of interdisciplinary and sustainable forestry research. *Ambio. Special Report Number 9: 34-35.*

The MAB mushroom study was designed to promote sustainable natural and human communities and to involve multiple stakeholders having widely varying styles and knowledge of forest management. An interdisciplinary approach brought together biologists, social scientists, land managers, and volunteers from academic, federal and state government, and commercial sectors. Study developers were awarded a second grant to summarize their work as one of four academic teaching case examples for Oregon State University's Sustainable Forestry Partnership.

*Keywords: Forestry research, interdisciplinary research.*

(See Corvallis order form B.)

## Logging

Klepac, John; Reutebuch, Stephen E.; Rummer, Bob

1999. An assessment of soil disturbance for five harvesting intensities. In: 1999 ASAE annual international meeting; 1999 July 18-22; Toronto, Ontario. Pap. 99-5052. St. Joseph, MI: ASAE. 16 p.

Surface soil disturbance was compared among a commercial thinning, group selection, patch cut, two-age, and clearcut. The thinning, group selection, and patch cut units had significantly higher percentages of undisturbed area. The two-age unit had a significantly higher percentage of area disturbed with litter in place. The clearcut unit had a significantly higher percentage of area with litter removed and soil exposed. The clearcut, two-age, patch cut, and group selection units had significantly higher percentages of litter and soil mixed when compared to the thinning unit. No significant differences were found among the units that had more than 4 inches of soil exposed. The clearcut and two-age units had significantly higher percentages of area with newly deposited litter.

*Keywords: Timber harvest, soil disturbance, litter.*

(See Seattle order form.)

McGaughey, Robert J.

1998. Techniques for visualizing the appearance of forestry operations. *Journal of Forestry*. June: 9-14.

Properly used, computer visualizations are powerful tools for educating people about forestry operations and comparing management alternatives. Four techniques are suitable for depicting the results of timber harvests: geometric modeling, video imaging, a hybrid combining geometric modeling and video imaging, and image draping. Which is most appropriate depends on the intended use. Criteria for selecting the best technique are the size of the project area, the

goal of the visualization, the level of detail that must be shown, and the data available for describing the area.

*Keywords: Visualization, timber harvest, modeling, video imaging, image draping.*

(See Seattle order form.)

Reutebuch, Stephen E.; Fridley, James L.; Johnson, Leonard R.

1999. Integrating realtime forestry machine activity with GPS positional data. In: 1999 ASAE annual international meeting; 1999 July 18-22; Toronto, ON. St. Joseph, MI.; ASAE. 18 p. Paper 99-5037.

Global positioning system (GPS) receivers and dataloggers were used for 4 months to track activities of a crawler tractor, hydraulic shovel, and feller-buncher operating in five different canopy conditions. Two types of GPS receivers were used. A simple custom-built datalogger was used by equipment operators to record activities via button presses. Datalogger data were analyzed to determine average cycle times for the crawler tractor and the feller-buncher. Datalogger and GPS data were combined to develop cycle time equations for the crawler tractor.

*Keywords: GPS, forestry machine activity, dataloggers, logging.*

(See Seattle order form.)

## Plant Ecology

Pilz, David; Molina, Randy; Liegel, Leon

1998. Biological productivity of chanterelle mushrooms in and near the Olympic Peninsula biosphere reserve. *Ambio*. Special Report Number 9: 8-13.

Burgeoning commercial harvests of wild edible fungi (*Cantharellus formosus* and *C. subalbidus*) from the forests of the Pacific Northwest have prompted land managers and scientists to begin monitoring the nature and impacts of this activity. This pilot study explored the unique sampling challenges that wild mushroom monitoring entails, especially the large sample areas (0.4 hectare or greater) and repeated visits (three to six) needed to obtain reasonable estimates of unit-area productivity, given the spatial and

temporal clustering of mushroom fruiting. The application of results from this study to future forest mushroom monitoring is considered.

*Keywords: Chanterelle mushrooms, Cantharellus formosus, Cantharellus subalbidus, ecosystem monitoring.*

(See Corvallis order form B.)

## Plant Pathology

Trummer, L.M.; Hennon, P.E.; Hansen, E.M.; Muir, P.S.

1998. Modeling the incidence and severity of hemlock dwarf mistletoe in 110-year-old wind-disturbed forests in southeast Alaska. *Canadian Journal of Forest Research*. 28: 1501-1508.

A model was developed to predict the severity of dwarf mistletoe (*Arceuthobium tsugense* (Rosendahl) G.N. Jones) in western hemlock trees (*Tsuga heterophylla* (Raf.) Sarg.) within forests of southeast Alaska that experienced near-catastrophic windthrow in the late 1800s. The model suggests that the degree of dwarf mistletoe severity was significantly and positively correlated with levels of dwarf mistletoe infection and basal area in large and small residual trees that survived the wind disturbance. No significant relations were found between severity level and any other factors, including site productivity, density of coexisting Sitka spruce (*Picea sitchensis* (Bong.) Carr.), or slope.

*Keywords: Western hemlock, dwarf mistletoe, Alaska, wind disturbance, windthrow.*

(See Juneau order form.)

## Remote Sensing

Lefsky, M.A.; Cohen, W.B.; Acker, S.A. [and others]

[1998]. Lidar remote sensing of forest canopy structure and related biophysical parameters at the H.J. Andrews Experimental Forest, Oregon, USA. In: Greer, Jerry Dean, ed. *Natural resource management using remote sensing and GIS: Proceedings of the 7<sup>th</sup> Forest Service remote sensing*

*applications conference; 1998 April 6-10; Nassau Bay, TX. [Place of publication unknown]: [Publisher unknown]: 79-91.*

A new, three-dimensional approach to interpreting lidar waveforms was developed to characterize the total volume of vegetation and empty space within the forest canopy and the spatial organization. By using the method, both biomass and leaf area index (LAI) were predicted from the volumes of four classes of canopy structure. Estimates also were made of other stand structure attributes, including the mean and standard deviation of diameter at breast height, the number of stems greater than 100 centimeters in diameter, and independent estimates of the basal area of Douglas-fir and western hemlock.

*Keywords: Forest structure, spatial properties.*

(See Corvallis order form A.)

## Social Sciences

Clark, Roger N.; Stankey, George H.; Brown, Perry J. [and others]

1999. Toward an ecological approach: integrating social, economic, cultural, biological, and physical considerations. In: Johnson, N.C.; Malk, A.J.; Sexton, W.T.; Szaro, R., eds. *Ecological stewardship: a common reference for ecosystem management*. Oxford, England: Elsevier Science Ltd.: 297-318.

An improved conceptualization of integration as a process is developed by arguing that integration requires new ways of thinking, as well as organizing, and that integrated outcomes are not possible unless underlying planning, management, and research processes are reformed. How human values and uses can be effectively integrated with biophysical considerations in land management decisions and activities also is examined.

*Keywords: Integration, human values, land management.*

(Available in bookstores and libraries.)

Clark, Roger N.; Stankey, George H.; Shannon, Margaret A.

1999. The social component of the Forest Ecosystem Management Assessment Team (FEMAT). In: Cordell, H. Ken; Bergstrom, John C., eds. Integrating social sciences with ecosystem management: human dimensions in assessment, policy, and management. Champaign, IL: Sagamore Publishing: 237-264. Chapter 15.

Chapter 7 of the Northwest Forest Plan requires a comprehensive, region-wide understanding of the effects of the selected option for Federal land management on communities, tribal rights and values, recreational opportunities, and amenity values. This paper describes the social assessment, responds to criticism made of it, and discusses lessons learned.

*Keywords: Social assessment, forest management, Northwest Forest Plan.*

(Available in bookstores and libraries.)

Love, Thomas; Jones, Eric; Liegel, Leon

1998. Valuing the temperate rainforest: wild mushrooming on the Olympic Peninsula biosphere reserve. *Ambio*. Special Report Number 9: 16-25.

Commercial, recreational, and subsistence harvesting of chanterelle mushrooms (*Cantharellus formosus (cibarius)* and *C. sub-albidus*) in the Olympic Peninsula biosphere reserve was investigated during three fall harvest seasons (1994-96). This article describes (1) sociocultural characteristics of harvesters, (2) the organization of harvesting, and (2) economic values derived from commercial harvesting.

*Keywords: Nontimber forest products, chanterelle mushrooms, Cantharellus formosus, Cantharellus subalbidus, Olympic Peninsula.*

(See Corvallis order form B.)

Stankey, George H.; McCool, Stephen F.; Clark, Roger N.; Brown, Perry J.

1999. Institutional and organizational challenges to managing natural resources for recreation: a social learning model. In: Jackson, Edgar L.; Burton, Thomas L., eds.

Leisure studies: prospects for the twenty-first century. State College, PA: Venture Publishing, Inc.: 435-450. Chapter 26.

The importance of natural resource settings to outdoor recreation is clear and widely accepted, but management is both complex and contentious. These settings are important for the production of a range of other goods and services, from commodity outputs such as timber to the role in the provision of conservation values such as biodiversity. Management for one set of purposes leads to changes that have consequences for outdoor recreation. Experiences in the development of planning and management frameworks designed to deal with conflicts are discussed.

*Keywords: Outdoor recreation, natural resource management.*

(Available in bookstores and libraries.)

## Timber Management

Deal, Robert L.

1999. The effects of partial cutting on stand structure and growth and forest plant communities of western hemlock-Sitka spruce stands in southeast Alaska. Corvallis, OR: Oregon State University. 191 p. Ph.D. dissertation.

This study evaluated the effects of partial cutting on stand structure and growth, patterns of conifer regeneration, stand mortality and disease, and understory plant diversity and abundance. Seventy-three 0.20-hectare plots were established in 18 partially cut stands throughout southeast Alaska. The cuts occurred from 12 to 96 years ago and removed 16 to 96 percent of the original stand basal area. Partial cutting resulted in stands with complex structures, and these structures appear similar to uncut old-growth stands. It seems that silvicultural systems using single-tree selection or small openings can be successful for timber management in southeast Alaska.

*Keywords: Forest management, silviculture, partial cutting, forest structure.*

(Available only through library or interlibrary loan.)

McGaughey, Robert J.

1997. Quantifying stand structure using a percent canopy cover model (PERCOVE). In: Teck, Richard; Moeur, Melinda; Adams, Judy, comps. Proceedings: forest vegetation simulator conference; 1997 February 3-7; Fort Collins, CO. Gen. Tech. Rep. INT-GTR-373. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station: 133-138.

Stand structure, often quantified by using the percentage of canopy cover associated with various structural layers, is an important characteristic used when modeling ecosystem diversity and function. A model, PERCOVE, is presented that classifies individual trees in a stand into structural layers through user-defined rules, models the spatial arrangement of trees, creates a map showing tree crowns, and uses the map to compute an estimate of the percentage of canopy cover associated with the structural layer. The model, interfaced with the forest vegetation simulator (FVS), can be used to evaluate the structure of existing stands represented by inventory data and stands projected with FVS.

*Keywords: Stand structure, canopy cover, modeling, ecosystem diversity.*

(See Seattle order form.)

## **Watershed Management**

Bilby, Robert E.; Bisson, Peter A.

1998. Function and distribution of large woody debris. In: Kantor, Sylvia, ed. River ecology and management: lessons from the Pacific coastal ecoregions. Washington, DC: Springer-Verlag: 324-346. Chapter 13.

Wood is more abundant in streams in the Pacific coastal ecoregions than in streams anywhere else in North America. Abundance of large woody debris decreases with increasing channel size, but size of pieces increases with channel size. Input of large wood to stream channels occurs as a result of chronic bank cutting, windthrow, stem suppression, and catastrophic occurrences, such as debris torrents, floods, and fires. Large woody debris is removed from stream channels by leaching, microbial decomposition,

fragmentation by invertebrates, physical fragmentation, and downstream transport. The relative importance of these processes differs with stream size. Particulate organic matter accumulated by large woody debris is an important food source for many stream-dwelling invertebrates. Addition of wood to channels causes increased abundance of macroinvertebrates and changes species composition.

*Keywords: Woody debris, river ecology, riparian management.*

(Available from bookstores and libraries.)

Bormann, Bernard T.; Kramer, Marc G.

1998. Can ecosystem-process studies contribute to new management strategies in coastal Pacific Northwest and Alaska? Northwest Science. 72(Special issue 2): 77-83.

The question of whether ecosystem process studies can be made relevant to new, emerging management strategies to achieve ecosystem sustainability on Federal lands is addressed by examining a small sample of studies underway in the Pacific Northwest and Alaska. Management studies, designed with help from ecosystem-process researchers, are a viable method to link process research with management for ecosystem sustainability.

*Keywords: Ecosystem-process studies, forest management, ecosystem sustainability.*

(See Corvallis order form A.)

Buffington, John M.

1998. The use of streambed texture to interpret physical and biological conditions at watershed, reach, and subreach scales. Seattle, WA: University of Washington. 147 p. Ph.D. dissertation.

Physical controls on bed-surface grain size and consequent implications for aquatic habitat were examined at a variety of spatial scales. Bed-surface textures were classified by using a new procedure that combines visual and quantitative measurements of patch grain-size distributions and offers reasonable statistical discrimination of differences in both mean grain size and variance



between textural patches. The correspondence between bed shear stress and surface grain size in two forest pool-riffle channels also was examined by using a theoretical shear-stress partitioning model.

*Keywords: Watershed, streambed texture, aquatic habitat.*

(Available only through library or interlibrary loan.)

Levesque, Stephen P.

1998. Evaluation of culvert condition and road closure methods in southern southeast Alaska. Corvallis, OR: Oregon State University. 38 p. M.S. thesis.

This study evaluated the condition of culverts in order to address current maintenance and road closure strategies within the Ketchikan Area of the Tongass National Forest. A total of 671 drainage structures associated with 40 road segments were examined. Overall, 47 percent of drainage structures were operating with at least a 10-percent reduction in culvert end area. Structural damage was the most frequent reduction mechanism observed (34 percent), closely followed by accumulation of sediment (23 percent) and wood debris (21 percent) at the culvert inlet. There was no significant difference in culvert condition for open and closed roads where culverts have been left in place and native vegetation has been allowed to become established on the road prism. Loss of culvert end area

appears to trigger a disturbance cascade, often resulting in the diversion of surface water past the culvert inlet and subsequent fluvial erosion.

*Keywords: Forest roads, drainage systems, road maintenance.*

(Available only through library or interlibrary loan.)

Post, D.A.; Jones, J.A.; Grant, G.E.

1998. An improved methodology for predicting the daily hydrologic response of ungauged catchments. *Environmental Modeling and Software*. 13: 395-403.

To model fluxes of water from the land surface to the atmosphere and from one grid cell to another in climate models, predictions of hydrologic response are required for catchments where hydrologic data are not available. A methodology has been presented previously that has the capability of producing estimates of catchment-scale hydrologic response for ungauged catchments on a daily timestep. This paper shows that daily predictions of hydrologic response can be improved by incorporating information about the hydrologic response of the catchment on a longer timestep.

*Keywords: Water balance, hydrologic processes, streamflow, experimental watershed studies, hydrological modeling.*

(See Corvallis order form A.)

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