



United States
Department of
Agriculture

Forest Service

Pacific Northwest
Research Station



Recent Publications of the Pacific Northwest Research Station, Third Quarter 1999



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October 1999

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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.

Atmosphere

97-280

Ferguson, Sue A.

1998. Air quality climate in the Columbia River basin. Gen. Tech. Rep. PNW-GTR-434. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 23 p. (Quigley, Thomas M., ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).

Aspects of climate that influence air quality in the Columbia River basin of the Northwestern United States are described. A few, relatively simple, analytical tools were developed to show the spatial and temporal patterns of mean-monthly mixing heights, precipitation scavenging, upper level and surface trajectory winds, and drought that inhibit pollution uptake. Potential changes in air quality from the effects of greenhouse gases also are discussed.

Keywords: Air quality, air pollution, mixing heights, trajectory winds, pollution trajectories, pollution scavenging, drought, global change, Columbia River basin.

98-087

Ferguson, Sue A.

1999. Climatology of the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-445. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 31 p. (Quigley, Thomas M., ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).

This work describes climate in each of three major ecological zones and 13 ecological reporting units in the interior Columbia River

basin by using paleoclimatic evidence and historical records. Also, some impacts of changes in climatic means and trends on ecological conditions in the basin are described.

Keywords: Climate, Columbia River basin, climatology, climate variability, temperature, precipitation, snowfall.

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

Economics in Forest Management

97-236

Horne, Amy L.; Haynes, Richard W.

1999. Developing measures of socioeconomic resiliency in the interior Columbia basin. Gen. Tech. Rep. PNW-GTR-453. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 41 p.

Measures of socioeconomic resiliency were developed for the 100 counties studied in the Interior Columbia Basin Ecosystem Management Project. These measures can be used for understanding the extent to which changes in policies for management of Federal lands may affect socioeconomic systems coincident with those lands. Sixty-seven percent of the basin's residents live in areas of high resiliency; these represent only 20 percent of the land base. Whereas 68 percent of the land base has low socioeconomic resiliency, only 18 percent of the people live in those areas. These findings allow land managers to gauge the impacts of land management actions.

Keywords: Well-being, Federal land management, ecosystem management.

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

Economics in Wood Industry

98-032

Crone, Lisa K.; Haynes, Richard W.; Reyna, Nicholas E.

1999. Different perspectives on economic base. Res. Note PNW-RN-538. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 21 p.

Two general approaches for measuring the economic base are discussed. Each method is used to define the economic base for each of the counties included in the Interior Columbia Basin Ecosystem Management Project area. A more detailed look at four selected counties results in similar findings from different approaches. Limitations of economic base analysis also are noted.

Keywords: Economic base, functional economies, Columbia River basin.

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

Ecosystem Function

98-053

Beardsley, Debby; Bolsinger, Charles; Warbington, Ralph

1999. Old-growth forests in the Sierra Nevada: by type in 1945 and 1993 and ownership in 1993. Res. Pap. PNW-RP-516. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 45 p.

This paper presents estimates of old-growth forest area in the Sierra Nevada by forest type and ownership in 1993 and by type in 1945. Old-growth stand characteristics as they existed in 1993 are described by forest type. Estimates

are based on a sample of 2,455 ground plots and on ecological old-growth definitions for each forest type and site class.

Keywords: Old growth, inventory, forest stands, forest area, California, National Forests, Douglas-fir, white fir, red fir, Jeffery pine, ponderosa pine, lodgepole pine, mixed conifer, mountain hemlock, mixed subalpine.

Fire

96-239

Reinhardt, Tim E.; Ottmar, Roger D.; Hallett, Michael J.

1999. Guide to monitoring smoke exposure of wildland firefighters. Gen. Tech. Rep. PNW-GTR-448. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 17 p.

Fire managers and safety officers concerned with smoke exposure among their fire crews can use electronic carbon monoxide (CO) monitors to track and prevent overexposure to smoke. Commonly referred to as dosimeters, these lightweight instruments measure the concentration of CO in the air firefighters breathe. This guide outlines the protocol developed for sampling smoke exposure among firefighters with CO dosimeters. It provides a basic template for managers and safety officers interested in establishing their own smoke-exposure monitoring program.

Keywords: Fire, smoke, human health, occupational exposure, safety, smoke exposure.

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

98-044

Schmoltdt, Daniel L.; Peterson, David L.; Keane, Robert E. [and others]

1999. Assessing the effects of fire disturbance on ecosystems: a scientific agenda for research and management. Gen. Tech. Rep.

PNW-GTR-455. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 104 p.

A team of fire scientists and resource managers compiled scientific recommendations for future activities on (1) links among fire effects, fuels, and climate; (2) fire as a large-scale disturbance; (3) fire-effects modeling structures; and (4) managerial concerns, applications, and decision support. Although more large-scale fire-effects data clearly are needed, it would be better to improve and link existing models that simulate fire effects in a georeferenced format while integrating empirical data as they become available. This effort should focus on improved communication between modelers and managers and on predicting the interactions of fire and potential climatic change at very large spatial scales.

Keywords: Analytic hierarchy process, ecological disturbance, fire effects, large-scale fire, modeling.

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

Fish and Wildlife

98-094

Bull, Evelyn L.; Blumton, Arlene K.

1999. Effect of fuels reduction on American martens and their prey. Res. Note PNW-RN-539. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 9 p.

The effect of a fuels reduction treatment on small mammals was investigated in lodgepole pine (*Pinus contorta*) and mixed conifer stands by trapping and track surveys in northeastern Oregon. The number of red squirrel (*Tamiasciurus hudsonicus*) and snowshoe hare (*Lepus americanus*) tracks decreased in all lodgepole pine treatments after harvest. Only two snowshoe hare tracks were detected in harvested stands of mixed conifer, compared with 46 tracks in

unharvested stands. In most treatments the number of red-backed voles (*Clethrionomys gapperi*) decreased and chipmunks (*Tamius* spp.) increased after harvesting.

Keywords: Fuels reduction, American marten, small mammals, squirrels, hares, downed wood.

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

96-192

Lohr, Samuel C.; Bryant, Mason D.

1999. Biological characteristics and population status of steelhead (*Oncorhynchus mykiss*) in southeast Alaska. Gen. Tech. Rep. PNW-GTR-407. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 29 p.

Existing data were reviewed to determine the range and distribution of steelhead in southeast Alaska, biological characteristics were summarized, and population status of steelhead stock was determined. Unique or sensitive stocks that may require consideration in planning land management activities are identified within the range of data reviewed. Data sources were personal communications, reports, and unpublished data files of state and Federal agencies. Only eight winter-run stocks in southeast Alaska and two summer-run stocks in southeast Alaska had sufficient data to evaluate biological characteristics.

Keywords: Steelhead, stock assessment, Alaska, management, biological review.

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

97-170

Maloney, S.B.; Tiedemann, A.R.; Higgins, D.A. [and others]

1999. Influence of stream characteristics and grazing intensity on stream temperatures in eastern Oregon. Gen. Tech. Rep. PNW-GTR-459. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 19 p.

Stream temperatures were measured during summer months, 1978 to 1984, at 12 forested watersheds near John Day, Oregon, to determine temperature characteristics and to assess effects of three range management strategies of increasing intensity. Maximum stream temperatures on four watersheds exceeded 24 °C, the recommended short-term maximum for rainbow trout and chinook salmon. Although highest temperatures were observed in the most intensively managed watersheds, the effect of range management strategy was not definitive. It was confounded by watershed characteristics and about 100 years of grazing before initiation of this study.

Keywords: Forested watersheds, grazing management strategies, grazing intensity, fisheries, fish habitat, chinook salmon, steelhead trout, cutthroat trout, Dolly Varden trout.

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

98-241

Parks, Catherine G.; Conklin, David A.; Bednar, Larry; Maffei, Helen

1999. Woodpecker use and fall rates of snags created by killing ponderosa pine infected with dwarf mistletoe. Res. Pap. PNW-RP-515. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p.

Ponderosa pine (*Pinus ponderosa* Dougl. ex Laws.) killed as part of a forest management project to reduce dwarf mistletoe (*Arceuthobium* sp.) in the Gila National Forest, New Mexico,

were evaluated for wildlife value. One hundred and two dwarf mistletoe-infected trees were killed by basal burning, basal girdling, or a combination of the two. Trees began to fall within 2 years. Most killed trees (96 percent) served as forage substrate for woodpeckers. Twenty percent of the trees contained woodpecker nest cavities and stood longer than small-diameter trees. The probability of cavity presence was best predicted by regression that included diameter and decay class. Standing life of the snag was not a significant predictor of cavity presence. The use of predictive models for analyzing the utility of snag-creation treatments is discussed.

Keywords: Girdling, fire-killed trees, wildlife trees, cavity nesters, Arceuthobium sp.

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

General

97-197

Curtis, Robert O.; DeBell, Dean S.; Harrington, Constance A. [and others]

1998. Silviculture for multiple objectives in the Douglas-fir region. Gen. Tech. Rep. PNW-GTR-435. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 123 p.

The historical development of silviculture in the Pacific Northwest is discussed, and silvicultural practices currently available to forest managers are reviewed. These silvicultural practices can be modified and used to maintain and produce wildlife habitat, diverse stand structures, and pleasing scenery, while also producing wood products. Most of the silvicultural knowledge needed to design and implement regimes for integrated production of these multiple values already exists.

Keywords: Ecosystem management, multiple use, silvicultural systems, wildlife habitat, thinning, landscape management, forest ecology, Douglas-fir.

General, Nontechnical

99-009

Pacific Northwest Research Station
1999. Recent publications of the Pacific Northwest Research Station, fourth quarter
1998. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 15 p.

Keywords: Bibliographies (forestry).

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

99-064

Pacific Northwest Research Station
1999. Recent publications of the Pacific Northwest Research Station, first quarter
1999. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 17 p.

Keywords: Bibliographies (forestry).

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

Range Management

97-012

Tiedemann, A.R.; Quigley, T.M.; White, L.D. [and others]
1999. Electronic (fenceless) control of livestock. Res. Pap. PNW-RP-510. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 23 p.

During June and August 1992, a new technology designed to exclude cattle from specific areas such as riparian zones was tested. The technology consisted of an eartag worn by an animal that provides an audio warning and electrical impulse to the ear as the animal approaches the zone of influence of a transmitter. The transmitter emits a signal that narrowly defines the

desired area of exclusion. Tests on cattle indicated that the technology is about 90 percent effective at excluding animals.

Keywords: Grazing animals, grazing control, animal training, electrical stimulus, audio stimulus.

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

Social Science

98-042

Shindler, Bruce; Cheek, Kristin Aldred; Stankey, George H.

1999. Monitoring and evaluating citizen-agency interactions: a framework developed for adaptive management. Gen. Tech. Rep. PNW-GTR-452. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 38 p.

By using the general principles of adaptive management—which stress monitoring, evaluation, and adjustment—this report provides a comprehensive framework to help agency personnel and citizens to work together. This report describes the adaptive management concept, summarizes research about the goals and characteristics of successful public involvement, and lays out a framework for monitoring and evaluating citizen-agency interactions. Although designed for adaptive management settings, the framework is well suited to other situations where improving these interactions is a priority.

Keywords: Adaptive management, public involvement, monitoring, evaluation.

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

Supply and Demand

99-080

Warren, Debra D.

1999. Production, prices, employment, and trade in Northwest forest industries, fourth quarter 1997. Resour. Bull. PNW-RB-230. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 130 p.

Provides current information on lumber and plywood production and prices; employment in the forest industries; international trade in logs, lumber, and plywood; volume and average prices of stumpage sold by public agencies; and other related items.

Keywords: Forestry business economics, lumber prices, plywood prices, timber volume, stumpage prices, employment (forest products industries), marketing (forest products), imports and exports (forest products).

Timber Management

97-177

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

1999. Growth of ponderosa pine thinned to different stocking levels in central Oregon: 30-year results. Res. Pap. PNW-RP-508. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 27 p.

Periodic annual increments (PAI) for survivor diameters decreased curvilinearly with increasing stand density. Gross volume and basal areas PAIs increased linearly with increasing stand density. Growth of basal area and volume for the 20 largest trees per acre were reduced curvilinearly with increasing stand density. Bark beetles were the primary cause of mortality. No mortality occurred at the lowest density.

Keywords: Growth, yield, mortality, thinning, pandora moth, mountain pine beetle.

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

Publications Available Elsewhere

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

Atmosphere

Sohngen, Brent; Mendelsohn, Robert; Neilson, Ronald

1998. Predicting CO₂ emissions from forests during climatic change: a comparison of natural and human response models. *Ambio*. 27(7): 509-513.

This paper compares transient carbon fluxes to and from forests during climatic change in a natural model of ecosystem adjustment and also in a model that captures human response to these changes. Both models incorporate forest dieback and regeneration, forest redistribution, and changes in ecosystem production during climatic change. The natural model predicts that forested ecosystems in the United States will release 2.5 to 6.3 petagrams carbon during the next seven decades under climate change.

Keywords: Forests, climate change, biosphere feedback, economics, land management.

(See Corvallis order form B.)

Economics in Forest Management

Kline, Jeffrey D.; Alig, Ralph J.

1999. Does land use planning slow the conversion of forest and farm lands? *Growth and Change*. 30: 3-22.

A model of land use was developed based on socioeconomic factors, land rent, and land-owners' characteristics, to examine how well Oregon's land use planning program has

protected forests and farmland from development. Even though Oregon's land use planning program has successfully concentrated development within urban growth boundaries and other growth zones, it is not possible to reject the hypothesis that development has continued unabated.

Keywords: Farmland and open space preservation, growth management, land use planning, zoning.

(See Corvallis order form B.)

Ecosystem Function

Chen, Hua

1999. Root decomposition in three coniferous forests: effects of substrate quality, temperature, and moisture. Corvallis, OR: Oregon State University. 218 p. Ph.D. dissertation.

The overall goal of this study was to understand how substrate quality, temperature, and moisture content control root decomposition and nitrogen release in the Pacific Northwest. These processes were examined at three sites across an environmental gradient in Oregon: Cascade Head Experimental Forest, H.J. Andrews Experimental Forest, and Pringle Falls Experimental Forest. Five dominant species, Sitka spruce, Douglas-fir, western hemlock, lodgepole pine, and ponderosa pine, were used in this root decomposition study.

Keywords: Decomposition, roots, nitrogen cycling.

(Available only through library or interlibrary loan.)

Flanagan, Paul T.; Morgan, Penelope; Everett, Richard L.

1998. Snag recruitment in subalpine forests. *Northwest Science*. 72(4): 303-309.

Information on snag locations and densities is useful for managing many species of wildlife. By using a combination of belt transects, fixed plots, and aerial photographs, snag species, locations, and causal agents of tree mortality in subalpine forests were recorded for the Entiat watershed in Washington. The overall snag density (all standing dead trees) was 51 per hectare. Subalpine fir (*Abies lasiocarpa*) and lodgepole pine (*Pinus contorta*) were the most common species of snags. Weather-related effects created more snags than any other disturbance in the period between stand-replacing fires. The density of intermediate and suppressed snags was highest on steep south-facing slopes; snag densities were lowest in stand-initiation and open stem-exclusion structural stages. More study is needed to determine if fire history data combined with aerial photo-interpretation offer a potential method of estimating snag densities in subalpine forests.

Keywords: Tree mortality, snag recruitment, wildlife habitat, snag management strategies.

(See Wenatchee order form.)

Harrod, Richy J.; McRae, Bradner H.; Hartl, William E.

1999. Historical stand reconstruction in ponderosa pine forests to guide silvicultural prescriptions. *Forest Ecology and Management*. 114: 433-446.

The historical stand structure and spatial patterning of fire-maintained ponderosa pine forests along the east side of the Cascade Range in Washington were reconstructed to develop and design silviculture prescriptions to restore historical structure and composition. By using spatial point pattern analysis, significant clumping at fine scales (0 to 15 meters) was found to exist historically. Spatial patterning of present day and historical trees of four comparable plots suggests that although strong clumping exists in present day stands, the largest trees today exhibit less clumping than did large historical

trees. Historical stand density index for dominant overstories was nearly the same as threshold for serious beetle mortality for ponderosa pine. Cut-tree marking was carried out within 15-meter radius circles, as guided by the spatial patterning analysis, and by using a slide scale of trees per circle by quadratic mean diameter.

Keywords: Stand reconstruction, silviculture prescriptions, historical stand structure, restoration management.

(See Wenatchee order form.)

Wright, Pamela J.

1998. The effect of fire regime on coarse woody debris in the west central Cascades, Oregon. Corvallis, OR: Oregon State University. 109 p. M.S. thesis.

This study examined the effect of fire regime on coarse woody debris (CWD) mass by using a combination of field data and modeling. The objectives were to use field sampling to determine how CWD differs between two areas that have had different fire regimes and to investigate how fire frequency and severity, stand growth and development, decomposition, and mortality rates affect the amount of CWD for sites experiencing two different fire regimes.

Keywords: Biomass (debris), fire history, coarse woody debris-terrestrial.

(Available only through library or interlibrary loan.)

Fish and Wildlife

Ben-David, M.; Bowyer, R.T.; Duffy, L.K. [and others]

1998. Social behavior and ecosystem processes: river otter latrines and nutrient dynamics of terrestrial vegetation. *Ecology*. 79(7): 2567-2571.

Stable isotope analysis was used to investigate the effects of scent-marking behavior by river otters on terrestrial vegetation of beach-fringe forests in Alaska. Analysis of otter furs and feces indicated that river otters fed mainly on intertidal and subtidal fish. Plants growing in otter latrine sites had significantly higher concentrations of high stable nitrogen than did those of

nonlatrine sites. Elevated total nitrogen concentrations, however, occurred only in grasses and mosses. The results indicated that through their scent-marking behavior, river otters transfer marine-derived nitrogen into the beach-fringe forest and thus fertilize the terrestrial vegetation in the terrestrial-marine interface.

Keywords: Alaska, stable isotope, nitrogen, river otters, forest.

(See Juneau order form.)

Ben-David, M.; Hanley, T.A.; Schell, D.M.
1998. Fertilization of terrestrial vegetation by spawning Pacific salmon: the role of flooding and predator activity. *Oikos*. 83: 47-55.

The influence of spawning salmon on terrestrial vegetation was investigated by using stable-isotope analysis. Terrestrial vegetation near streams or in areas with activity of piscivorous predators was expected to show higher ¹⁵N values compared with the same species growing elsewhere. The influence of spawning salmon as observed in elevated ¹⁵N in terrestrial consumers also was investigated. Concentrations of ¹⁵N in vegetation increased with increasing proximity to streams and sites frequently used by piscivorous predators. Decreasing concentrations of ¹⁵N coupled with increasing concentrations of ¹³C in muscles of small mammals, with increasing distance from streams, indicated an indirect assimilation of marine-derived nitrogen through terrestrial vegetation rather than through direct consumption of salmon. These results indicated that salmon carcasses contribute to the nitrogen pool available to riparian vegetation and terrestrial consumers.

Keywords: Salmon, nitrogen, flooding, riparian forests, bears, southeastern Alaska.

(See Juneau order form.)

Parker, Katherine L.; Gillingham, Michael P.; Hanley, Thomas A.; Robbins, Charles T.

1999. Energy and protein balance of free-ranging black-tailed deer in a natural forest environment. *Wildlife Monographs*. 143: 1-48.

Protein and energy intake, activity budgets, and changes in body mass of free-ranging animals in a natural forest environment were measured in relation to availability and nutritional quality of forage, snow, and temperature over 2 years. Those observations of intake were compared with modeled predictions of requirements. Daily protein intake remained above demands during all months except February, whereas deer were unable to meet energy requirements for more than half the year. Compounded with increased demands associated with lactation and snow, the availability of digestible energy is potentially the greatest nutritional limiting factor for black-tailed deer in Alaska. Changes in body mass were directly related to the ratio of energy intake to requirement. Body reserves accumulated during summer with abundant digestible energy were critical to winter survival. Reductionist studies of nutritional and physiological processes provided a strong mechanistic basis for understanding and predicting animal-habitat interactions in a natural environment.

Keywords: Alaska, black-tailed deer, deer, doubly-labeled water, energy balance, energy expenditure, energy intake, nutrition, Odocoileus hemionus, protein balance, protein intake.

(See Juneau order form.)

Sieving, Kathryn E.; Willson, Mary F.
1998. Nest predation and avian species diversity in Northwestern forest understory. *Ecology*. 79(7): 2391-2402.

Distribution of predation risk for artificial bird nests in the understory of coniferous and deciduous forest in southeast Alaska and adjacent western Canada was examined to

determine whether habitat-specific nest predation pressure could be a factor influencing habitat selection and, in turn, breeding bird diversity. Natural and artificial nest predation losses were comparable to deciduous forest, but artificial nests were more susceptible than natural nests in coniferous forest understory. Artificial nest losses reflected the distribution of predators, especially red squirrels, and were negatively associated with breeding bird diversity in Northwestern forest understory, confirming that nest predation pressure is one (of several) plausible determinants of avian habitat selection and assemblage organization.

Keywords: Alaska, avian species diversity, Canada, coniferous, deciduous, habitat selection, nest predation, Northwestern forest understory, Stellar's jay, gray jay, red squirrel, small mammals.

(See Juneau order form.)

Swindle, Keith A.

1997. Landscape composition around northern spotted owl nests, central Cascade mountains, Oregon. Corvallis, OR: Oregon State University. 97 p. M.S. thesis.

This study describes the composition of forest landscapes surrounding northern spotted owl nests in the central Cascade Range of Oregon.

Keywords: Northern spotted owl, wildlife, old growth, landscape ecology.

(Available only through library or interlibrary loan.)

General

Gray, Andrew

1998. Research and learning assessment for the Northern Coast Range Adaptive Management Area. Corvallis, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 74 p.

This assessment is intended to help those people who wish to learn more about the issues, questions, and approaches facing forest managers in the northern Oregon Coast Range and to provide a review of past research and where it has led us.

Keywords: Adaptive management, ecosystem, ecosystem management.

(See Corvallis order form A.)

Haynes, Richard W.; Graham, Russell T.; Quigley, Thomas M.

1998. A framework for ecosystem management in the interior Columbia basin. *Journal of Forestry*. October: 4-9.

This framework for ecosystem management was developed to guide the science efforts for the Interior Columbia Basin Ecosystem Management Project. The framework incorporates a general planning model for ecosystem management that has four iterative steps: monitoring, assessment, decisionmaking, and implementation. In this effort, people were recognized as part of ecosystems. Stewardship has to resolve tough challenges to meet multiple demands with finite resources.

Keywords: Ecosystem management, interior Columbia River basin.

(See Portland order form.)

Johnson, K. Norman; Swanson, Frederick; Herring, Margaret; Greene, Sarah, eds.
1999. *Bioregional assessments: science at the crossroads of management and policy*. Washington, DC: Island Press. 398 p.

Bioregional assessments have been a crossroads for science, management, and policy as society addresses difficult ecological, water resources, and natural resource issues at the regional scale. Seven case study regional assessments (Great Lakes, FEMAT, Interior Columbia basin, northern forest lands, southern California coastal area, Sierra Nevada ecosystem project, and Everglades) are addressed from science, management, policy, and in some cases, legal perspectives.

Keywords: Bioregional assessments, social assessments, social surveys, human dimension.

(Available in bookstores and libraries.)

McKee, Arthur
1998. H.J. Andrews Experimental Forest. *Bulletin of the Ecological Society of America*. 79(4): 241-246.

The H.J. Andrews Experimental Forest is located about 50 miles east of Eugene, Oregon, on the west slope of the Cascade Range. Established in 1948, the Forest has become a world center for research and education on the ecology and management of forests and streams. This paper describes the site, research projects, education programs, publications, people, facilities, databases, and information management.

Keywords: Experimental forests.

(See Corvallis order form A.)

Swanson, Frederick J.; Greene, Sarah
1999. Perspectives on scientists and science in bioregional assessments. In: Johnson, Norman K.; Swanson, Frederick; Herring, Margaret; Green, Sarah, eds. *Bioregional assessments: science at the crossroads of management and policy*. Washington, DC: Island Press: 55-69. Chapter 4.

The roles of scientists and science in bioregional assessments are very different from those in traditional science. The special characteristics of these roles in assessments can be traced through the stages leading up to, through, and following assessments. Professional benefits and pitfalls confront scientists at each stage.

Keywords: Resource management, regional assessments, forest planning, FEMAT, forest policy.

(Available at bookstores and libraries.)

Genetics

Johnson, G.R.; King, J.N.
1998. Analysis of half diallel mating designs. I: A practical analysis procedure for ANOVA approximation. *Silvae Genetica*. 47: 74-79.

The article offers a methodology of using standard statistical software to analyze half diallel mating designs. The authors demonstrate the procedure with the SAS software package. The procedure is relatively simple and provides unbiased estimates for balanced designs and gives good approximations for unbalanced data.

Keywords: Diallel matings, variance estimates, GCA, SCA.

(See Corvallis order form B.)

Johnson, Randy
1999. Potential for breeding Douglas-fir resistant to Swiss needle cast. *The Genetic Forest*. Portland, OR: Daniels and Associates; January: 6.

This newsletter article describes two series of progeny tests that evaluated the possibility of breeding for resistance and tolerance to Swiss

needle cast. Results suggested that the genetic resistance mechanisms may not function on severely impacted sites.

Keywords: Douglas-fir, Swiss needle cast, breeding.

(See Corvallis order form B.)

King, J.N.; Carson, M.J.; Johnson, G.R.
1998. Analysis of disconnected diallel mating designs. *Silvae Genetica*. 47: 80-87.

Genetic parameters from a second-generation disconnected diallel progeny test of the New Zealand radiata pine tree improvement program are presented. Heritability estimates of growth and yield traits of 0.2 are similar to progeny test results of the previous generations. Coefficients of variation for additive genetic and phenotypic variances also are similar between generations. Quality traits are presented and parameters also are comparable for the first-generation tests. A trend of declining dominance genetic variance and increasing additive variance with test age was noted. This trend probably represents artifacts affecting early growth of the full-sib cross, such as seed size effects or other environmental biases rather than changing gene action.

Keywords: Diallel analysis, radiata pine, heritability, GCA, SCA.

(See Corvallis order form B.)

Insects

Mason, Richard R.; Paul, H. Gene
1999. Long-term dynamics of lodgepole needle miner populations in central Oregon. *Forest Science*. 45(1): 15-25.

A 30-year time series of larval densities was constructed for studying the dynamics of lodgepole needle miner (*Coleotechnites* sp. nr. *Milleri*) populations in central Oregon. The series included parts of two needle miner outbreaks

and an extended interval between outbreaks when populations were at low densities. Analyses revealed two kinds of cycles: 8- to 10-year oscillations in needle miner density caused by regulatory feedback of natural enemies, and recurrent outbreaks at 20 to 25 years dependent on an overall recovery rate of the population between outbreaks and the abundance of susceptible host trees. It is hypothesized that accelerated thinning and harvesting of lodgepole pine and stand-replacing outbreaks of mountain pine beetle (*Dendroctonus ponderosae* Hopkins) over the last two decades have increased overall resistance of lodgepole stands in central Oregon.

Keywords: Insect defoliators, insect outbreaks, natural regulation, time-series analysis, host-tree resistance.

(See La Grande order form.)

Mensuration

Busing, R.T.; Liegel, L.H.; LaBau, V.J.
1996. Overstory mortality as an indicator of forest health in California. *Environmental Monitoring and Assessment*. 42: 285-295.

The interagency forest health monitoring program has a network of about 4,200 forested plots on a triangular grid across the United States. Data are presented on recent mortality for trees 27.9 centimeters in diameter or larger from the first 3 years of measurements in California, 1992-94. Three plot sizes (0.07, 0.40, and 1 hectare) were used at each site. Field tallies showed few cases of recent overstory mortality in the smallest plot size. Cumulative distribution functions of recent dead tree densities in the 0.07-hectare subplot clusters were significantly different from those in the 1-hectare plots. The authors concluded that an aggregate area of 0.07 hectare in four small subplots is unsuitable to assess and monitor overstory mortality status in Pacific coast forests.

Keywords: Tree mortality, permanent plots, forest decline, Pacific coast forest health monitoring.

(See Corvallis order form B.)

Mycorrhizae

Massicotte, Hugues B.; Tackaberry, Linda E.; Ingham, Elaine R.; Thies, Walter G.

1998. Ectomycorrhizae establishment on Douglas-fir seedlings following chloropicrin treatment to control laminated-root rot disease: assessment 4 and 5 years after outplanting. *Applied Soil Ecology*. 10: 117-125.

Following an initial assessment of organisms 2 years after application of the fumigant, chloropicrin, a reassessment of the establishment of ectomycorrhizae on Douglas-fir seedlings was undertaken after 4.5 and 5.5 years. In areas around stumps treated with 20 percent and 100 percent of the labeled dosage and in areas around nontreated stumps, chloropicrin did not adversely affect the formation of ectomycorrhizae on young Douglas-fir seedlings by naturally occurring fungi. No significant effect on the abundance or type of mycorrhizae was detected. On this site, chloropicrin did not affect these mycorrhizal associations, at least for 5 years following application.

Keywords: Ectomycorrhizal, Douglas-fir, laminated-root rot, *Phellinus weirii*.

(See Corvallis order form B.)

Pilz, David; Smith, Jerry; Amaranthus, Michael P. [and others]

1999. Mushrooms and timber: managing commercial harvesting in the Oregon Cascades. *Journal of Forestry*. March: 4-11.

American matsutake (*Tricholoma magnivelare*), which are harvested from National Forests in the southern Oregon Cascade Range, provide commercial, recreational, subsistence, and cultural opportunities to forest users. The Winema and Deschutes National Forests have used collection permits and educational programs to address concerns about harvesters' activities and resource sustainability. Research on matsutake productivity shows that silvicultural

options may reduce fire danger and provide revenue, jobs, and wood while improving forest health and increasing the availability of mushrooms.

Keywords: Matsutake mushrooms, *Tricholoma magnivelare*, mushroom harvesting.

(See Corvallis order form B.)

Physiology

Kelsey, Rick G.; Joseph, Gladwin; Gerson, Elizabeth A.

1998. Ethanol synthesis, nitrogen, carbohydrates, and growth in tissues from nitrogen fertilized *Pseudotsuga menziesii* (Mirb.) Franco and *Pinus ponderosa* Dougl. ex Laws. seedlings. *Trees*. 13: 103-111.

Douglas-fir and ponderosa pine seedlings were fertilized with nutrient solutions containing 140 parts per million nitrogen (+N) or 0 parts per million nitrogen (-N) in a greenhouse. Constitutive and induced ethanol concentrations were higher for +N seedlings than -N seedlings of both species. Ponderosa pine tissues from both fertilizer treatments synthesized more ethanol than Douglas-fir when incubated in N₂ in part because the former probably allocates a greater proportion of its nitrogen for anaerobic enzymes, or more active anaerobic isozymes. Light was found to affect ethanol synthesis in foliar tissues when incubated in N₂.

Keywords: *Pseudotsuga menziesii*, *Pinus ponderosa*, anoxia, hypoxia, anaerobic respiration.

(See Corvallis order form B.)

Plant Ecology

Bermejo, Teresa; Traveset, Anna; Willson, Mary F.

1998. Post-dispersal seed predation in the temperate rainforest of southeast Alaska. *Canadian Field-Naturalist*. 112(3): 510-512.

Postdispersal predation on seeds of vertebrate-dispersed plants (*Rubus spectabilis*, *Olpanax horridus*, and *Streptopus amplexifolius*) of the temperate rain forest of southeast Alaska was

experimentally examined by comparing “clean” seeds with seeds embedded in feces of bears, important dispersers in the area, and also by comparing different microhabitats where seeds may be dropped or defecated. It was found that seed removal was significantly higher for clean seeds than for seeds within bear feces, and that levels of seed predation were similar for seeds under plants of the same species and for seeds under plants of other species. These results indicate that seed predators (presumably mostly rodents) use neither fecal material nor the presence of a conspecific plant as a clue to the location of seeds.

Keywords: Southeast Alaska, seed predation, seed dispersal, rain forest, bears, rodents.

(See Juneau order form.)

Harrod, Richy J.; Everett, Richard L.
1999. Characteristics and dispersal of *Cypripedium fasciculatum* (Orchidaceae) seeds. *Douglasia Occasional Papers*. 7(1): 29-36.

Knowledge of the capability of rare plants, such as *Cypripedium fasciculatum*, to disperse to new, suitable habitats is important for developing conservation strategies. The purpose of this study was to measure seed dispersal in field and laboratory settings. Seed dispersal in the field was measured by using horizontal and vertical collection screens 20 centimeters wide and 200 centimeters long and systematically placed around a cluster of plants. By using seed buoyancy in air, a model was developed that accurately predicted seed dispersal in a laboratory experiment and supported seed dispersal measured in the field. Under low wind speeds (1 to 2 meters per second), seeds traveled about 1 meter from a source. The results of this study indicated that *C. fasciculatum* population numbers are limited by seed dispersal. A conservation strategy might include artificially dispersing seeds to suitable habitat sites.

Keywords: *Cypripedium fasciculatum*, conservation strategies, rare plants, seed dispersal.

(See Wenatchee order form.)

London, Sharon Gail

1999. Spatial distribution of understory vegetation in tree canopy gaps of the Pacific Northwest. Corvallis, OR: Oregon State University. 104 p. M.S. thesis.

Understory vegetation in artificially created tree canopy gaps in the Pacific Northwest was studied to determine (1) variation in understory vegetation cover between gap edges and gap centers, as well as between control and treatment plots; (2) spatial patterns of biomass and difference in biomass patterns among plots; (3) individual species responses to gap creation; and (4) the relations between species dominance and diversity by site and treatment.

Keywords: Understory vegetation, canopy gaps, old growth.

(Available only through library or interlibrary loan.)

Parks, Catherine G.; Bednar, Larry; Tiedemann, Arthur R.

1998. Browsing ungulates—an important consideration in dieback and mortality of Pacific yew (*Taxus brevifolia*) in a north-eastern Oregon stand. *Northwest Science*. 72(3): 190-197.

Survey results of a declining Pacific yew stand show that 89 percent of all yew stems had wounds. Assessment of wounding indicated that bark stripping by deer and elk was the primary cause and suggests that this factor is important in dieback and death of Pacific yew in the study area. Severe damage to mature stems and lack of seedling recruitment (presumably because of ungulate browsing) raise questions about the continued viability of Pacific yew in this area.

Keywords: Animal damage, Blue Mountains, herbivory, Pacific yew, *Taxus brevifolia*.

(See La Grande order form.)

Plant Pathology

Kelsey, Rick G.; Joseph, Gladwin

1998. Ethanol in Douglas-fir with black-stain disease (*Leptographium wageneri*). Canadian Journal of Forest Research. 28: 1207-1212.

Sapwood from above the root collar of Douglas-fir trees infected with black-stain root disease, *Leptographium wageneri*, contained significantly higher concentrations (4 to 24 times) of ethanol than the sapwood from healthy trees in all months of the year, except January and June. Sapwood from above the root collar of ponderosa pine trees infected with *L. wageneri* contained significantly higher ethanol concentrations (30 times) than sapwood from healthy trees in June. The ethanol concentrations varied substantially among positions on a tree. Ethanol may play an important role in the biology of *L. wageneri* root disease and beetle-pathogen interactions.

Keywords: *Pseudotsuga menziesii*, *Pinus ponderosa*, *anaerobic respiration*, *fermentation*, *bark beetle-pathogen interactions*, *root disease*.

(See Corvallis order form B.)

Kelsey, Rick G.; Joseph, Gladwin; Thies, Walter G.

1998. Sapwood and crown symptoms in ponderosa pine infected with black-stain and annosum root disease. Forest Ecology and Management. 111: 181-191.

Healthy and diseased ponderosa pine were uprooted to measure the proportion of each root system affected by black-stain root disease (*Leptographium wageneri* var. *ponderosum*), annosum root disease (*Heterobasidion annosum*), or both. Sapwood near the root collar was analyzed for volatile compounds by gas chromatography. Acetaldehyde was selected statistically to be the best predictor of tree health. Methanol was positively correlated with the percentage of nonfunctional root area

caused by the disease. These volatiles may identify trees with root disease before they reach an advanced stage, and possibly estimate the percentage of a root system that is diseased and nonfunctional.

Keywords: *Black-stain root disease*, *annosum root disease*, *Pinus ponderosa*, *Leptographium wageneri*, *Heterobasidion annosum*, *headspace chromatography*, *acetaldehyde*, *ethanol*, *methanol*.

(See Corvallis order form B.)

Regeneration

Harrington, Constance A.; Lodding, Cynthia C.; Kraft, Joseph M.

1999. Extraction and germination of Pacific madrone seed. In: Rose, Robin; Haase, Diane L., eds. Symposium proceedings: native plants—propagating and planting; 1998 December 9-10; [Location of meeting unknown]. Corvallis, OR: Oregon State University, College of Forestry, Nursery Technology Cooperative: 38-42.

Pacific madrone (*Arbutus menziesii*) seeds can be extracted and cleaned in a procedure that uses a mortar and pestle, a blender with a rubber blade, and several sieves. The method involves several steps but is not difficult and can result in a large amount of seed in little time. Following extraction, the seeds can be dried and stored at low moisture content (6 percent) in sealed containers at 3 to 5 °C or given a cold stratification treatment and then sown. Cold stratification periods of 60 days or longer increased the initial rate of germination compared to seeds stratified for 40 days but resulted in seed losses due to premature germination during stratification. For lots from the Puget Sound lowlands, cold stratification for 40 days is inadequate; seeds in stratification longer than 40 days should be monitored closely for premature germination.

Keywords: *Pacific madrone*, *Arbutus menziesii*, *stratification*.

(See Olympia order form.)

Remote Sensing

Cohen, Warren B.; Fiorella, Maria; Gray, John [and others]

1998. An efficient and accurate method for mapping forest clearcuts in the Pacific Northwest using Landsat imagery. *Photogrammetric Engineering and Remote Science*. 64(4): 293-300.

Conversion of mature and old-growth forest to young forest and nonforest uses is a problem of global proportions having a potentially tremendous effect on biodiversity, water quality and quantity, and fluxes of greenhouse gases. By using a temporal sequence of Landsat images, forest harvest activity in a dense conifer forest region was accurately mapped.

Keywords: Change detection, remote sensing, error assessment.

(See Corvallis order form A.)

Lefsky, Michael A.; Harding, D.; Cohen, W.B. [and others]

1999. Surface lidar remote sensing of basal area and biomass in deciduous forests of eastern Maryland, USA. *Remote Sensing of Environment*. 67: 83-98.

A method of predicting two forest stand structure attributes, basal area and aboveground biomass, from measurements of forest vertical structure was developed and tested by using field and remotely sensed canopy structure measurements, in a stand of tulip-poplar/oak near Annapolis, Maryland. Regressions between the field measured indices of canopy height and stand basal area and biomass were developed by using the chronosequence dataset. These regression equations were then applied to height indices calculated from the remotely sensed canopy height profiles from the stemmap dataset.

Keywords: Forest structure, spatial properties.

(See Corvallis order form A.)

Means, Joseph E.; Acker, Steven A.; Harding, David J. [and others]

1999. Use of large-footprint scanning airborne lidar to estimate forest stand characteristics in the western Cascades of Oregon. *Remote Sensing of Environment*. 67: 298-308.

Important structural attributes of forests, such as biomass and height, are difficult to characterize from conventional remotely sensed images. Scanning lidar, a relatively new type of sensor that explicitly measures canopy height, may provide improved measurements of forest structure. To investigate performance of lidar over a wide range of total aboveground and foliage biomass, lidar and ground data were compared for conifer forests of the Pacific Northwest, where old forests can develop high values of aboveground biomass (over 1000 Mg per hectare) and leaf area (over 10 m²/m²).

Keywords: Forest structure, lidar.

(See Corvallis order form A.)

Soil, Site, Geology

Valachovic, Yana S.

1998. Leaf litter chemistry and decomposition in a Pacific Northwest coniferous forest ecosystem. Corvallis, OR: Oregon State University. 74 p. M.S. thesis.

This paper discusses the procedures that are involved in improving proximate analysis and the link between leaf chemistry and 1-year decomposition rates.

Keywords: Leaf litter, decomposition, nutrient cycling.

(Available only through library or interlibrary loan.)

Wondzell, Steven M.; Swanson, Frederick J.
1999. Floods, channel change, and the
hyporheic zone. *Water Resources Re-
search*. 35(2): 555-567.

The influence of flood-induced channel changes on the hyporheic zone of fourth- and fifth-order reaches of a mountain stream network was investigated. Types and scales of change caused by major floods were examined in subsurface flow paths and the areal extent of the hyporheic zone. Preflood and postflood channel and valley floor morphology were studied at three sites.

Keywords: Alluvial deposits, alluvial forms, channel geomorphology, hydrology, hyporheic zone.

(See Corvallis order form A.)

Watershed Management

Bredensteiner, Kim C.

1998. An investigation of vegetation–hydrology interactions in watershed 1 at the H.J. Andrews Experimental Forest. Corvallis, OR: Oregon State University. 168 p. M.S. thesis.

The primary objective of this study was to investigate the influence of early successional vegetation on summer streamflow levels. The long-term data records from watershed 1 at the H.J. Andrews Experimental Forest provided a case study of vegetation dynamics and streamflow changes during the first three decades following clearcut harvest. This study documents the vegetation dynamics in watershed 1, based on long-term vegetation plot data and aerial photos. Hypotheses about the mechanisms by which vegetation influences streamflow levels are presented and explored through a spatially explicit watershed model, MAPSS-W.

Keywords: Streamflow, hydrology, hydrology modeling, vegetation succession.

(Available only through library or interlibrary loan.)

Ringold, Paul L.; Mulder, Barry; Aleria, Jim [and others]

1999. Establishing a regional monitoring strategy: the Pacific Northwest Forest Plan. *Environmental Management*. 23(2): 179-192.

This paper identifies lessons learned and issues raised during the development of an ecosystem monitoring strategy intended to support the Northwest Forest Plan.

Keywords: Northwest Forest Plan, monitoring, ecosystem management, adaptive management, adaptive monitoring.

(See Corvallis order form A.)

Wemple, Beverley Coghill

1998. Investigation of runoff production and sedimentation on forest roads. Corvallis, OR: Oregon State University. 168 p. Ph.D. dissertation.

Forest roads constructed in steep mountain landscapes have been associated with a number of effects on hydrologic and geomorphic processes. The effects of forest roads on the flow of water and sediment were examined in drainage basins in the Cascade Range of western Oregon. The results point to the importance of roads in both modifying physical processes and in routing material through drainage basins. The findings have significant implications for the management of roads in forested landscapes.

Keywords: Hydrology, road effects, disturbance, erosion, experimental watershed studies.

(Available only through library or interlibrary loan.)

Wood Utilization

Barbour, R. James

1999. Relationship between diameter and gross product value for small trees. In: Conference proceedings: wood technology clinic and show; 1999 March 24-26; Portland, OR. [Place of publication unknown]: [Publisher unknown]: 39-46.

Wood processing facilities are designed to operate efficiently with a specific distribution of log diameters. Unfortunately, with the recent shift to harvesting of small-diameter trees (4 to 7 inches in diameter at breast height) forest managers have been asking what minimum diameters mills can process rather than what distribution of diameters are required for efficient processing. This can result in confusion over the mix of logs that the mill can process at a profit. Information is provided about the optimum diameter distributions for many types of processing facilities currently handling small-diameter wood.

Keywords: Wood utilization, forest management, sawmilling, veneer, chips.

(See Portland order form.)

Barbour, R. James; Keegan, Charles E., III; Van Hooser, Dwane D.

1998. Changing timber quality in the Western United States. In: Forest management into the next century: what will make it work?; 1997 November 19-21; Spokane, WA. Madison, WI: Forest Products Society: 126-135.

Timber harvested in western North America has become smaller and younger. This has resulted in changes in wood quality that can be tied to past management. Current management practices determine what part of the existing resource is cut and, therefore, the quality of the resource available for processing.

Keywords: Timber yield, wood quality, timber management.

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