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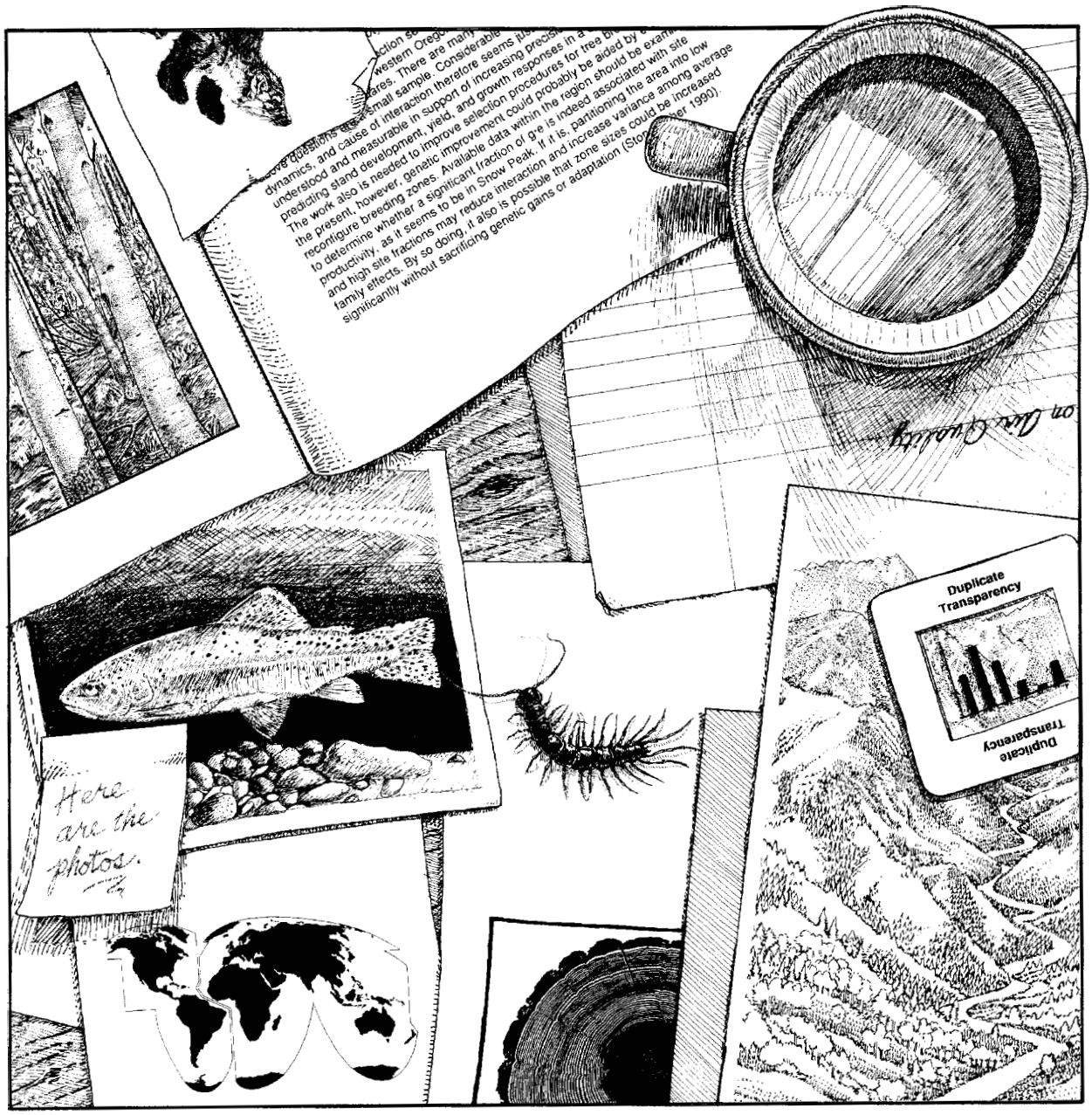
Department of
Agriculture

Forest Service

Pacific Northwest
Research Station

Recent Publications of the Pacific Northwest Research Station, Fourth Quarter 2000



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

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January 2001

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University of Alaska Fairbanks
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Fairbanks, AK 99775-6780

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Juneau, AK 99801-8545

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

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Forestry Sciences Laboratory
3625-93rd Ave., S.W.
Olympia, WA 98512-9193

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

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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.

00-259

Duncan, Sally; Miner, Cynthia
2000. Closer to the truth: 75 years of discovery in forest and range research. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 76 p.

This publication was produced to celebrate 75 years of research at the Pacific Northwest Research Station. The collage in the report portrays the value of long-term research—research that builds one step at a time on the strength of earlier steps. From surveying the forest tree by tree on horseback in the 1920s, to creating vegetation maps from satellite imagery in the 1990s, the Station has brought its scientific capability to bear on many aspects of the vast forest and rangeland resources of the Pacific Northwest.

Keywords: Pacific Northwest Research Station, forestry research, rangeland research.

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

Bibliographies

00-256

Pacific Northwest Research Station
2000. Recent publications of the Pacific Northwest Research Station, second quarter 2000. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 19 p.

Keywords: Bibliographies (forestry).

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

00-257

Pacific Northwest Research Station
2000. Recent publications of the Pacific Northwest Research Station, third quarter 2000. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 24 p.

Keywords: Bibliographies (forestry).

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

Economics

99-263

Dwyer, John F.; Nowak, David J.; Noble, Mary Heather; Sisinni, Susan M.
2000. Connecting people with ecosystems in the 21st century: an assessment of our nation's urban forests. Gen. Tech. Rep. PNW-GTR-490. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 483 p.

This report is the first national assessment of urban forest resources in the United States and details variations in urbanization and urban tree cover across the United States by state, county, and individual urban area. It illustrates local-scale variation, complexity, and connectedness of the urban forest resource and how this resource changes through time in response to a wide range of powerful forces. The report concludes by outlining future areas of emphasis that will

facilitate comprehensive, adaptive, and sustainable urban forest management and improve environmental quality, enhance human health, and connect people with ecosystems in the 21st century.

Keywords: Urban forests, urban forestry, tree cover, sustainability, adaptive management, urbanization, urban ecosystems, urban populations, metropolitan areas, RPA assessment.

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

00-217

Laufenberg, Theodore L.; Brady, Bridget K., eds. 2000. Proceedings: linking healthy forests and communities through Alaska value-added forest products. Gen. Tech. Rep. PNW-GTR-500. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 341 p.

This workshop brought together technical specialists and exhibitors from forest products industry, associations, universities, and private, state, and federal land management agencies. Topics included policy and management shifts necessary to link healthy forests, communities, and industries; silvicultural concerns for future forest potential; enhancing value in lumber, engineered timber products, processing of finished wood products, and special (craft and nontimber) forest products; and assessment of Alaska forest product industry's competitive position within state, national, and Pacific Rim markets.

Keywords: Forest products, Alaska, wood, timber, engineered products, lumber, special forest products, nontimber forest products, markets.

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

Fire

99-035

Reinhardt, Timothy E.; Ottmar, Roger D. 2000. Smoke exposure at western wildfires. Res. Pap. PNW-RP-525. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 72 p.

Smoke exposure measurements among firefighters at wildfires in the Western United States between 1992 and 1995 showed that most exposures were not significant; between 3 and 5 percent of the shift-average exposures exceeded occupational exposure limits for carbon monoxide and respiratory irritants. Exposure to benzene and total suspended particulate was not significant, although the data for the latter were limited in scope. The study found that exposure to acrolein, benzene, formaldehyde, and respirable particulate matter could be predicted from measurements of carbon monoxide.

Keywords: Smoke exposure, firefighters, occupational health, pollutants, safety, industrial hygiene, smoke hazards.

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

Forest Management

00-039

McClellan, Michael H.; Swanston, Douglas N.; Hennon, Paul E. [and others] 2000. Alternatives to clearcutting in the old-growth forests of southeast Alaska: study plan and establishment report. Gen. Tech. Rep. PNW-GTR-494. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 40 p.

An interdisciplinary study of ecosystem and social responses to alternative silvicultural systems has been established in Alaska to evaluate the ability to provide for sustainable wood production and protection of other forest values. We present the study plan and establishment report because of the large-scale and long-term nature of this study and in response to significant interest from resource managers, researchers, and the public. A short-term

retrospective study and a longer term, operational-scale, experimental study are planned. Ecosystem and social responses to be evaluated include tree regeneration, growth, and mortality; plant diversity and abundance; tree damage agents; deer habitat quality; bird diversity and abundance; headwater stream ecology; groundwater changes; slope stability; visual quality; and social acceptability.

Keywords: Ecosystem management, clearcutting, alternative silviculture, silvicultural systems, wildlife habitat, fish habitat, visual quality, slope stability, forest ecology.

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

Genetics

00-125

Copes, Donald L.; Vance, Nan C.
2000. Effects of water suspension and wet-dry cycling on fertility of Douglas-fir pollen. Res. Note PNW-RN-527. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 9 p.

Studies were made to determine how long Douglas-fir pollen remains viable after suspension in cool water from 0 to 34 days. Linear regression analysis of in vivo and in vitro tests indicated that filled seed efficiency and pollen viability, respectively, decreased about 3 percent per day. The relation may have been nonlinear the first 6 days, because little decrease occurred during that time. An in vitro test of the effect of none, one, or two drying cycles on previously wetted pollens revealed a great decrease in pollen viability after just one drying cycle. The in vivo test of 1-, 2-, and 3-percent pollen suspensions showed that the 3-percent suspension resulted in 15 percent greater filled seed efficiency than the 2-percent and 57 percent greater than the 1-percent suspension.

Keywords: Supplemental mass pollination, seed orchard, flowering, reproduction, filled seed efficiency, Douglas-fir, Pseudotsuga menziesii*.*

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

Landscape Ecology

99-082

U.S. Department of Agriculture, Forest Service
2000. Changing the way we learn: CLAMS and the future of land use [Brochure]. Portland, OR: Pacific Northwest Research Station. [Not paged].

The coastal landscape analysis and modeling study (CLAMS) is producing tools such as landscape and habitat models to work with dynamic mapping technologies. Their uses will include regional sustainability assessments, both ecological and economic, of forested ecosystems; monitoring and evaluation of the Northwest Forest Plan; analysis of state forests; and projections through time and across multiple ownerships of how forest landscapes could change under different management policies.

Keywords: Landscape ecology, habitat models, CLAMS, regional assessments, Northwest Forest Plan.

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

Plant Ecology

00-087

Hessburg, Paul F.; Smith, Bradley G.; Kreiter, Scott D. [and others]
2000. Classifying plant series-level forest potential vegetation types: methods for subbasins sampled in the midscale assessment of the interior Columbia basin. Res. Pap. PNW-RP-524. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 59 p.

In the interior Columbia River basin midscale ecological assessment, we mapped and characterized historical and current vegetation composition and structure of 337 randomly sampled subwatersheds (9500 hectares average size) in 43 subbasins (404 000 hectares average size). We compared landscape patterns, vegetation

structure and composition, and landscape vulnerability to wildfires and 21 major forest insect and pathogen disturbances of historical and current forest vegetation coverages.

Keywords: Ecological assessment, interior Columbia River basin, potential natural vegetation, ecological site, site potential, site vegetation type.

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

98-200

Brace, Sarah; Peterson, David L.; Bowers, Darci
1999. A guide to ozone injury in vascular plants of the Pacific Northwest. PNW-GTR-446. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 63 p.

Controlled-exposure studies have shown that a number of plant species native to the Pacific Northwest are potentially sensitive to elevated ambient concentrations of tropospheric ozone. This guide reports visual and descriptive documentation of ozone symptoms for common tree, shrub, and herbaceous species in the region. Symptoms observed in leaves of these species include chlorotic mottle, pigmented stipple, necrosis, and premature senescence, with considerable variation among and within species. Resource managers and scientists can use the photo documentation in this guide to identify potential injury to plants in the field, and to distinguish ozone injury from other pathological conditions.

Keywords: Air pollution, forest health, forest pathology, ozone, vegetation injury.

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

Regional Assessments

99-097

James, Sam
2000. Earthworms (Annelida: Oligochaeta) of the Columbia River basin assessment area. Gen. Tech. Rep. PNW-GTR-491. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 13 p.

Earthworms are key components of many terrestrial ecosystems, but little is known of their ecology, distribution, and taxonomy in the eastern interior Columbia basin (ICB) assessment area. This report summarizes the main points of earthworm ecology and impact on soil physical and chemical status. Distributions of earthworm species in the ICB assessment area also are summarized from various published accounts. Effects of land use and management practices on earthworms are explored by reference to research on similar human influences in other ecosystems, because no research has been done on these issues in the Western United States. A few suggestions and recommendations for land use and future research priorities are provided.

Keywords: Earthworms, Oligochaeta, Columbia River basin, soil biota, land management.

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

Social Sciences

99-085

Christensen, Harriet H.; Mastrantonio, Louise; Gordon, John C.; Bormann, Bernard T., tech. eds.
2000. Alaska's Copper River: humankind in a changing world. Gen. Tech. Rep. PNW-GTR-480. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 20 p.

A multidisciplinary group of 16 scientists and specialists with a wide range of experience in natural resource science and education defined the Copper River ecosystem in scientific terms and described dimensions of the ecosystem

including vegetation, wildlife, land ownership, and human occupation. Opportunities for science are described followed by recommendations. A section on "Knowledge as a Management Goal" also is included.

Keywords: Copper River ecosystem, science opportunities, natural and social science, integration, ecosystem structure and function.

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

98-385

Christensen, Harriet H.; McGinnis, Wendy J.; Raettig, Terry L.; Donoghue, Ellen

2000. Atlas of human adaptation to environmental change, challenge, and opportunity: northern California, western Oregon, and western Washington. Gen. Tech. Rep. PNW-GTR-478. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 66 p.

This atlas illustrates the dimensions, location, magnitude, and direction of social and economic change since 1989 in western Washington, western Oregon, and northern California that have occurred during a major transition period in natural resource management policy as well as large decreases in timber harvests. The diversity and the social and economic health of the Northwest Forest Plan region were synthesized by examining the fundamental attributes of the region, provinces, and communities; the atlas includes information about ourselves, our settlements, and our natural resources. This is a tool for decisionmakers, civic leaders, economic development practitioners, researchers, and others interested in understanding change, easing the transition, and finding and pursuing opportunities to enrich society.

Keywords: Northwest Forest Plan, social and economic indicators, GIS, atlas, regional scale, provincial scale, county scale.

(This publication is available to download in pdf at http://www.fs.fed.us/pnw/pubs.htm. It also is available as a CD by circling **00-187** on the order form at the back.)

99-259

Fight, Roger D.; Kruger, Linda E.; Hansen-Murray, Christopher [and others]

2000. Understanding human uses and values in watershed analysis. Gen. Tech. Rep. PNW-GTR-489. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 16 p.

This paper provides a systematic approach to developing relevant information about human interaction with a watershed. The approach was originally developed as a technical supplement to the federal process for watershed analysis. This document does not address Native American traditional cultural and religious issues in depth; those are to be discussed in a separate technical supplement.

Keywords: Watershed analysis, planning, passive use, cultural use, commercial use, recreation, infrastructure, human dimensions.

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

Wildlife

99-001

Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C. [and others]

2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. Gen. Tech. Rep. PNW-GTR-485. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 529 p. 3 vol. (Quigley, Thomas M., tech. ed.; Interior Columbia Basin Ecosystem Management Project: scientific assessment).

We defined habitat requirements (source habitats) and assessed trends in these habitats for 91 species of terrestrial vertebrates on 58 million hectares (145 million acres) of public and private lands within the interior Columbia. We also summarized knowledge about species-road relations for each species and mapped source habitats in relation to road densities for four species of terrestrial carnivores. Our results indicated that habitat for species, groups, and

families associated with old-forest structural stages, with native grasslands, or with native shrublands have undergone strong, widespread decline. Our analysis also indicated that more than 70 percent of the 91 species are affected negatively by one or more factors associated with roads. A major assumption of our work was that validation research will be conducted by agency scientists and other researchers to corroborate our findings.

Keywords: Cluster analysis, habitat condition, habitat trend, interior Columbia basin, population viability, terrestrial vertebrates, spatial analysis, roads, wildlife-habitat relations.

(This publication is available to download in pdf at http://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.

Economics

Adams, Darius M.; Alig, Ralph J.; McCarl, Bruce A. [and others]

1999. Minimum cost strategies for sequestering carbon in forests. Land Economics. 75(3): 360-374.

We examined the costs of meeting explicit targets for increments of carbon sequestered in forests when both forest management decisions and the area of forests can be varied. Results show greatest change in management actions when targets require large, near-term flux increments, and land area change is largest when long-term increments are needed.

Keywords: Carbon sequestration, carbon flux.

(See Corvallis order form.)

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

2000. Economic potential of short-rotation woody crops on agricultural land for pulp fiber production in the United States. Forest Products Journal. 50(5): 67-74.

A model of the U.S. forestry and agricultural sectors was used to simulate the consequences of growing short-rotation woody crops on agricultural lands as a fiber source for pulp and paper production. Short-rotation woody crop production causes reallocation of existing forest lands across forest species types and ownerships. This level of short-rotation woody crop production reduces the timber management intensity of U.S. forests and allows existing timberland to migrate into agricultural production.

Keywords: Short rotation, agricultural land, pulp fiber, paper production, hybrid poplar.

(See Corvallis order form.)

Barbour, R. James

1999. Wood science in resource management. In: The roles of wood science and technology in forest sustainability: Proceedings of the 1999 annual meeting of the Society of Wood Science and Technology. Madison, WI: Society of Wood Science and Technology: 11-20.

Expanding public expectations that landowners will recognize the role of forest management in sustaining biodiversity and productivity of forested lands have added a set of goals to those traditionally considered by resource managers. Understanding the economic value of the trees removed for sale, the costs associated with growing and harvesting them, and the suitability of different trees in meeting nontimber objectives allows landowners more leeway in considering practices that conserve biodiversity, provide the resources people want, and maintain the capability of the land for future generations.

Keywords: Wood utilization, forest management, forest economics, sustainable forestry.

(See Portland order form.)

Fight, Roger D.; Weigand, James F.

1998. Issues in developing and managing nonwood forest products in the United States. In: Proceedings of the Forest Products Society annual meeting. Madison, WI: Forest Products Society: 51-57.

Lack of knowledge and well-organized information remains a major obstacle to development of nonwood forest products industries. The impact of economic activity on populations of plants and fungi deserves close scrutiny. There is a need for

increased exchange of information and technology. A national information network is needed. Public policy changes are needed to foster sustainable development of nonwood forest products industries as one element of rural economic development and diversification. Basic information and scenario analysis to support needed policy proposals remains to be done.

Keywords: Nonwood forest products, nontimber forest products, special forest products, forest management.

(See Portland order form.)

Johnson, Rebecca L.; Alig, Ralph; Kline, Jeffrey [and others]

1999. Management of nonindustrial private forest lands: survey results from western Oregon and western Washington. Res. Contrib. 28. Corvallis, OR: Oregon State University, College of Forestry, Forest Research Laboratory. 39 p.

Nonindustrial private forest land owners were surveyed in 1994 in western Oregon and Washington to assess demographic characters, timber management practices, harvest decisions, attitudes toward government regulation, and their use of government assistance. These landowners are very heterogeneous with diverse objectives, ranging from timber production to the enjoyment of owning "green space." Most of the owners had harvested timber from their land by a variety of methods. A majority said they would be willing to alter the amount and timing of their harvest if it were necessary to maintain a healthy ecosystem. Most owners, however, would not be willing to give up their right to harvest timber altogether, even if offered a tax incentive.

Keywords: Forest cover dynamics, type transition, land base.

(Copies of this publication are available from Forestry Publications Office, 256 Peavy Hall, Oregon State University, Corvallis, OR 97331. You may also send an email to forspub@cof.orst.edu; include author, title, and publication number.)

Kline, Jeffrey D.; Alig, Ralph J.; Johnson, Rebecca L.

2000. Forest owner incentives to protect riparian habitat. Ecological Economics. 33: 29-43.

We examine the willingness of nonindustrial private forest owners in the Pacific Northwest to forego harvesting within riparian areas to improve riparian habitat. An empirical model was developed that describes the willingness of owners (as a function of their forest ownership objectives and socioeconomic characteristics) to accept an economic incentive to adopt a 200-foot harvest buffer along streams. Results suggest that the willingness of owners to forego harvest differs with their forest ownership objectives. Mean incentive payments necessary to induce owners to forego harvest in riparian areas are higher for owners possessing primarily timber objectives ($316 to $338 per hectare per year), than for owners possessing both timber and nontimber objectives ($133 to $170 per hectare per year) or primarily recreational objectives ($94 to $141 per hectare per year).

Keywords: Ecosystem management, endangered species, nonindustrial private forest owners.

(See Corvallis order form.)

Kline, Jeffrey D.; Alig, Ralph J.; Johnson, Rebecca L.

2000. Fostering the production of nontimber services among forest owners with heterogeneous objectives. Forest Science. 46(2): 302-311.

Programs to enhance nontimber services increasingly focus on nonindustrial private forest (NIPF) owners. These owners are believed to possess multiple objectives causing them to respond to economic forces and policies in complex and unpredictable ways. We examined forest ownership objectives of NIPF owners and their willingness to accept incentive payments to

forego harvesting to improve wildlife habitat. An empirical model was developed to describe the willingness to accept incentive payments to delay harvest, as a function of forest ownership objectives and socioeconomic characteristics. Nontimber services likely could be enhanced most effectively by targeting incentive programs at selected NIPF owners.

Keywords: Forest policy, nonindustrial private forest owners, endangered species, carbon sequestration, economics in forest management.

(See Corvallis order form.)

McCarl, Bruce A.; Adams, Darius M.; Alig, Ralph J.; Chmelik, John T.
2000. Competitiveness of biomass-fueled electrical power plants. Annals of Operations Research. 94: 37-55.

A multiperiod, regional, mathematical programming economic model is used to evaluate the competitiveness of biomass-fueled fuel for electrical power as opposed to coal. We consider fueling power plants from milling residues, whole trees, switch grass, or short-rotation woody crops. The competitiveness of biomass depends in a key way on the success of research in developing improved production methods for short-rotation woody crops without great increases in cost.

Keywords: Agriculture, U.S. forest sector, biomass energy.

(See Corvallis order form.)

Ecosystem Structure and Function

Camp, A.E.
1999. Age structure and species composition changes resulting from altered disturbance regimes on the eastern slopes of the Cascade Range, Washington. Journal of Sustainable Forestry. 9(3/4): 39-67.

This study analyzed the age distribution of 2,345 trees from 287 plots on the east side of the Washington Cascades to document increases in per-hectare tree densities and shifts in species composition since nonindigenous settlement. Diameter distributions of these trees plus an additional 814 snags, stumps, and logs were analyzed to determine the extent and pattern of structural and compositional change resulting from postsettlement fire exclusion and preferential harvest of large ponderosa pine (*Pinus ponderosa* Dougl. ex Laws.) and western larch (*Larix occidentalis* Nutt.). Per-hectare densities of most species increased following settlement, with shade-tolerant and fire-tolerant species showing the biggest gain. A comparison of diameter distributions for live and dead trees indicates existing stands may not provide snags and logs of adequate dimensions for future habitat needs. Changes in forest structure and composition over the past century increase risk for insect outbreaks, diseases, and catastrophic wildfires.

Keywords: Stand dynamics, landscape ecology, snags, succession, vegetation patterns.

(See Wenatchee order form.)

Campbell, S.; Dale, J.; Hooper, C. [and others]
2000. Forest health in West Coast forests, 1997-1999. [Salem, OR]: [Oregon Department of Forestry]. 76 p.

This report examines some forest health issues current in West Coast States in 1997, 1998, and 1999. The narrative discusses forest ecosystem disturbance, two significant forest insect and disease problems, Swiss needle cast and spruce beetle, forest fragmentation and urbanization, and introduction of exotic organisms. The forest health monitoring (FHM) program is briefly described, and aerial survey and FHM plot data are presented in the appendices.

Keywords: Swiss needle cast, spruce beetle, exotics, aerial survey, forest health monitoring, forest fragmentation, urbanization, disturbance.

(See Portland order form.)

Henshaw, Donald L.; Spycher, Gody
1999. Evolution of ecological metadata structures at the H.J. Andrews Experimental Forest long-term ecological research (LTER) site. In: Aguirre-Bravo, Celedonio; Franco, Carlos Rodriquez, comps. North American

science symposium: toward a unified framework for inventorying and monitoring forest ecosystem resources. Proceedings RMRS-P-12. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 445-449.

Intensive, research-driven site monitoring has been conducted on the H.J. Andrews Experimental long-term ecological research site since the 1950s. The resulting, diverse ecological databases are managed through the forest science data bank (FSDB), which features a metadata system to facilitate data production through the use of generic and database-specific tools. Increasing informational needs necessitate systems that are easily searchable and allow the integration of diverse types of information. Towards this end, FSCB personnel are developing an information system based on relational metadata databases. System components feature a catalog of data objects including spatial and conventional databases and research publications and related tables to permit searching for data objects by personnel, keywords, locations, and species.

Keywords: Information science, database management systems, metadata, ecological monitoring.

(See Corvallis order form.)

Nagle, Gregory N.; Ritchie, Jerry C.
1999. The use of tracers to study sediment sources in three streams in northeastern Oregon. Physical Geography. 20(4): 348-366.

This pilot study used sediment tracers to identify general source areas of channel bottom sediment within three tributaries of the Umatilla and upper Grande Ronde basins in northeastern Oregon. Land use around each stream was dominated by agriculture, logging, or grazing. The radionuclide ^{137}Cs, carbon, and nitrogen were used as tracers to fingerprint sediment sources. Sediment was collected from the stream bottom inside the active channels and compared to samples from the surface horizon and channel banks. A simple mixing model was used to estimate the relative portion of channel bottom sediment derived from the surface horizon and channel banks. The ^{137}Cs proved unexpectedly useful in identifying and dating recent alluvial deposits.

Keywords: Bank erosion, sediment tracers, ^{137}Cs, Columbia basin, nonpoint sediment sources.

(See Corvallis order form.)

Schimel, David; Melillo, Jerry; Tian, Hanqin [and others]
2000. Contribution of increasing CO_2 and climate to carbon storage by ecosystems in the United States. Science. 287: 2004-2006.

We modeled the effects of CO_2 and climate on net carbon storage in terrestrial ecosystems of the conterminous United States for the period 1895 to 1993 by using new, detailed historical climate information. For 1980 through 1993, results from three models agreed within 25 percent by simulating a land carbon sink from CO_2 and climate effects of 0.08 gigaton of carbon per year. The best estimates of the total sink from inventory data are about three times larger (about 0.3 gigaton of carbon per year), thereby suggesting that processes such as regrowth on abandoned agricultural land or in forests harvested before 1980 have effects as large or larger than the direct effects of CO_2 and climate. The modeled sink varies by about 100 percent from year to year as a result of climate variability, which suggests that any future policy or management measures based on estimates of net carbon storage must take this variability into account.

Keywords: Global carbon cycle, carbon storage, climate change, model, simulation, elevated CO_2.

(See Corvallis order form.)

Swanson, Frederick J.
2000. Not just trees: the legacy of a Douglas-fir forest by Jane Claire Dirks-Edmunds [Book review]. Portland, OR: Oregon Historical Society, Oregon Historical Quarterly. 100(4): 462-463.

This review covers a book on forest ecosystem studies in the Oregon Coast Range conducted by faculty and students from Linfield College, Oregon, during the 1930s and 1940s.

Keywords: Forest ecology, old growth, environmental research.

(See Corvallis order form.)

Winter, Linda Ellen
2000. Five centuries of structural development in an old-growth Douglas-fir stand in the Pacific Northwest: a reconstruction from tree-ring records. Seattle, WA: University of Washington. 134 p. Ph.D. dissertation.

In view of the increased emphasis on old-growth ecosystems, our limited knowledge about how old-growth structures developed over the centuries has been of concern. In particular, little information exists about (1) tree recruitment and growth during the stand initiation phase and (2) tree responses to minor disturbances. This study addressed some of these uncertainties by using tree-ring records to reconstruct a detailed history of the structural development over the life of an old-growth Douglas-fir stand.

Keywords: Old-growth forest, snags, succession, canopy gaps, structural diversity.

(Available only through library or interlibrary loan.)

Fire

Alvarado, Ernesto; Sandberg, David V.; Bare, Bruce B.
1999. Analysis of area burned by wildfires through the partitioning of a probability model. In: Gonzalez-Caban, Armando; Omi, Philip N., tech. eds. Proceedings of the symposium on fire economics, planning, and policy: bottom lines. Gen. Tech. Rep. PSW-GTR-173. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station: 59-68.

An analysis of forest fires by partitioned probability distribution is presented. Area burned during a fire was fitted into a probability model that is partitioned into small, medium, and large fires. Conditional expected values were computed for each partition. Two cases are presented: the two-parameter Weibull and the Trucated Shifted Pareto probability models. The methodology allows a comparison of area burned and costs for small, medium, and large fires under different attack strategies. The partitioned functions also may be used as a basis to refocus fire management optimization with a multiple objective formulation.

Keywords: Wildfires, probability, area burned.

(See Seattle order form.)

Donnegan, Joseph A.
1999. Climatic and human influences on fire regimes in Pike National Forest. Boulder, CO: University of Colorado. 111 p. Ph.D. dissertation.

Fire regimes were investigated in the context of interannual and multidecadal changes in climate and long-term human land use in Pike National Forest, Colorado. Interannual and multidecadal proxies for long-term moisture availability were developed from tree-ring chronologies calibrated to monthly instrumental records of temperature and precipitation. Fire occurrence was strongly tied to interannual drought conditions and El Niño-Southern Oscillation cycles. Fire events tended to occur in years of reduced moisture availability and often were preceded by 2 to 4 years of increased moisture availability. Multidecadal impacts through land use were evident in the record of fire occurrence during nonindigenous settlement and fire suppression periods. Fire occurrence increased sharply with nonindigenous settlement and abruptly declined with the start of active fire suppression.

Keywords: Fire regimes, climate, land use.

(Available only through library or interlibrary loan.)

Ferguson, S.A.

2000. Climatology of biomass smoke in wildland areas of the United States. In: Proceedings: 3rd symposium on fire and forest meteorology. Boston, MA: American Meteorological Society: 43-48.

A spatial database of ventilation potential is being generated at 2.5 minutes of latitude and longitude for the entire United States and at less than 30-second intervals for selected subdomains. The data include 40-year time series of surface wind and mixing height (ventilation index) and will be used in assessing the risk from prescribed wildland fires to air quality and visibility. This work describes the preliminary stages of development.

Keywords: Wind, mixing height, valley inversion, ventilation, air quality, visibility.

(See Seattle order form.)

Ferguson, S.A.

2000. Real-time mesoscale model forecasts for fire and smoke management: an update. In: Proceedings: 3rd symposium on fire and forest meteorology. Boston, MA: American Meteorological Society: 61-65.

Ongoing work of the Pacific Northwest Regional Modeling Consortium to provide 48-hour forecasts of mesoscale weather and air quality is described. Value-added products include color maps, cross-sections, time series, and sounding plots. In addition, a ventilation index is calculated and mapped, and plans to map forecasts of the Haines index and NFDRS values are underway. Links to smoke dispersion models now make possible the real-time monitoring of biomass smoke emissions.

Keywords: Mesoscale meteorology, fire weather, smoke management, weather forecasting.

(See Seattle order form.)

McIver, James; Youngblood, Andrew; Niwa, Chris [and others]

2000. Hypotheses on the ecological effects of alternative fuel reduction methods. In: Proceedings of the Society of American Foresters 1999 convention. Bethesda, MD: Society of American Foresters: 552-555.

Hypotheses on the consequences of prescribed fire and thinning and removal for fuel reduction are presented. Short- and long-term ecological response to four treatments (control, burn, thin, thin and burn) will be compared at the Hungry Bob study site in ponderosa pine forest of northeastern Oregon. Core variables capture the response of the system most meaningful to forest managers, including soil and stand productivity, fuels, large woody structure, bark beetle population dynamics, and wildlife-habitat relations. These variables are discussed within the context of five hypotheses that focus the discussion on how the fuel reduction treatments will affect the system, and how that effect will change over time.

Keywords: Prescribed fire, thinning, historic fire regimes.

(See La Grande order form.)

Ottmar, Roger D.; Alvarado, Ernesto; Hessburg, Paul F.

1998. Linking recent historical and current forest vegetation patterns to smoke and crown fire in the interior Columbia River basin. In: Proceedings: 13th fire and forest meteorology conference. [Place of publication unknown]: International Association of Wildland Fire: 523-533.

We compared fuel loading, potential smoke production, fire behavior, and crown fire of historical and current time periods based on vegetative attributes in 337 subwatersheds on public and private ownerships within the interior Columbia River drainage. The fuel loading increase was responsible for increases in potential fuel consumption, smoke production by

wildfires, fireline intensity, rate of spread, and flame length over time. Under current conditions, potential PM10 emissions production from wildfire was two to four times the amount from a prescribed fire.

Keywords: Air quality, emissions, fire risk assessment, fire management, smoke management, fuel loading.

(See Seattle order form.)

Ottmar, Roger D.; Reinhardt, Timothy E.; Castilla, Carlos [and others]
1998. Rural community exposure to smoke from biomass burning in Rondônia, Brazil. In: Proceedings: 13th fire and forest meteorology conference. [Place of publication unknown]: International Association of Wildland Fire: 103-111.

We assessed the exposure of rural residents in the small community of Theobroma, Brazil, to the smoke generated from widespread agricultural and forest burning during August and September 1995. The particulate matter concentrations were well above the 24-hour standards of 140 microgram per cubic meter for both Brazil and the United States. To mitigate this impact, the best strategy may be to support and expand the efforts of the Brazilian Organization for Agricultural Research and the International Centre for Research in Agroforestry to manage the burning in the Amazon region and protect the long-term health of the Amazon ecosystem.

Keywords: Fire, community health, smoke exposure, air quality, emissions, smoke management, Brazil.

(See Seattle order form.)

Ottmar, Roger D.; Vihnanek, Robert E.
1999. Stereo photo series for quantifying natural fuels. Volume V: Midwest red and white pine, northern tallgrass prairie, and mixed oak types in the central and Lake states. PMS 834. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 99 p.

Three series of stereo photographs display a range of natural conditions and fuel loadings in Midwest red and white pine, northern tallgrass prairies, and mixed oak ecosystem types in the central and Lake States. Each group of photos includes inventory information summarizing vegetation composition, structure and loading, and, as appropriate, 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, red pine, Pinus resinosa*, eastern white pine,* Pinus strobes*, oak,* Quercus*, hickory,* Carya*, northern tallgrass prairie, grassland, prairie.*

(Available from the National Interagency Fire Center, Bureau of Land Management, 3833 S. Development Avenue, Boise, ID 83705. Order NFES #2579. Orders are taken by mail or fax request at (208) 387-5573. The cost for this volume is $36.52.)

Tiedemann, Arthur R.; Klemmedson, James O.; Bull, Evelyn L.
2000. Solution of forest health problems with prescribed fire: Are forest productivity and wildlife at risk? Forest Ecology and Management. 127: 1-18.

We consider the potential effects of prescribed fire on two key aspects of forest management—productivity and wildlife. It is apparent that large-scale prescribed fire is a simplistic solution to a

complex problem that has long-term ramifications for these and other resources. Before implementation, we need to understand the range of effects of fire on all resources and values. We suggest a conservative approach until the scope of prescribed fire effects is better understood.

Keywords: Biomass, decomposition, down wood, forest floor, fuels, nutrients (soil and biomass), snags.

(See La Grande order form.)

Fish

Baigun, Claudio R.; Sedell, James; Reeves, Gordon

2000. Influence of water temperature in use of deep pools by summer steelhead in Steamboat Creek, Oregon (USA). Journal of Freshwater Ecology. 15(2): 269-279.

This study examined use by adult summer steelhead in Steamboat Creek, Oregon, of deep pools (greater than 0.8 meter mean depth) based on temperature. Steamboat Creek had a heterogenous thermal profile, with some segments exceeding the preferred termperature of steelhead. Deep pools were scarce (4 percent of the total habitat types), and 39 percent were identified as cool pools (mean bottom water temperature of 19 °C). Adult summer steelhead were found primarily in deep pools, avoiding other habitats such as glides, riffles, and even cool tributary junctions. Adult abundance in deep pools did not show significant variation between years and was inversely associated with mean bottom temperature. Use of cool pools was estimated to be 11 times the use of warm pools. However, the presence of unoccupied cool pools suggested that other ecological variables also may be involved in pool selection.

Keywords: Steelhead trout, water temperature.

(See Corvallis order form.)

Forest Management

Carey, Andrew B.; Lippke, Bruce R.; Sessions, John

1999. Intentional systems management: managing forests for biodiversity. Journal of Sustainable Forestry. 9(3/4): 83-125.

Our goal was to ascertain if intentional management and principles of conservation of biodiversity could be combined into upland and riparian forest management strategies that would be applicable to various land ownerships and, consequently, help resolve land allocation problems associated with timber supply and threatened wildlife. Computer simulations were used to model three divergent management strategies for Pacific Northwest western hemlock forests: preservation with no manipulation, maximizing net present value through timber and fiber production, and conservation of biodiversity with intentional ecosystem management. No manipulation resulted in long periods of competitive exclusion that could cause species declines or extirpations. Intentional management based on conservation of biodiversity is a net benefit solution for multiple use and trust lands.

Keywords: Biodiversity, biotic integrity, conservation, economics, ecosystem management, forestry, landscape management, sustainability.

(See Olympia order form.)

Hennon, Paul E.; Wittwer, Dustin T.; Stevens, John; Kilborn, Ken

2000. Pattern of deterioration and recovery of wood from dead yellow-cedar in southeast Alaska. Western Journal of Applied Forestry. 15(2): 49-58.

The retention of bark and sapwood; the penetration of stain, decay, and weather checks; and the volume and grade of lumber recovered were contrasted from live yellow-cedar (*Chamaecyparis nootkatensis*) trees and five classes of

snags dead up to 81 years. The results indicated little or no measurable difference of recovered wood from live trees and the first three snag classes, dead up to 26 years, and a modest reduction in volume and grade in snags dead up to 81 years.

Keywords: Yellow-cedar, Chamaecyparis nootkatensis*, snag, salvage.*

(See Juneau order form.)

Genetics

St. Clair, Brad; Sara Lipow
2000. Pacific Northwest forest tree conservation group. Western Forester. March/April: 17.

Conservation of genetic diversity is an important requirement of sustainable forest management. The Pacific Northwest forest tree gene conservation group is a group of forest geneticists representing government, university, and private interests that have come together with the mission to design and promote cooperative efforts to ensure that the adaptation and evolutionary potential of important forest trees in the region are maintained. Current efforts are focused on a gap analysis to evaluate the current conservation of genetic resources in eight conifer species in western Oregon and Washington.

Keywords: Gene conservation, genetic diversity, cooperatives.

(See Corvallis order form.)

Geomorphology and Hydrology

Braudrick, Christian A.; Grant, Gordon E.
2000. When do logs move in rivers? Water Resources Research. 36(2): 571-582.

Results are reported of a series of flume experiments conducted at the St. Anthony Falls Hydraulic Laboratory, MN, where entrainment of individual logs in streams was modeled. These experiments were designed to test a simple entrainment model based on the balance of forces exerted on individual logs by moving water.

Keywords: Woody debris, fluvial dynamics, wood movement, geomorphology, flume studies, debris dams.

(See Corvallis order form.)

Chanson, Hubert
1999. Comment on “Critical flow constrains flow hydraulics in mobile-bed streams: a new hypothesis” by G.E. Grant. Water Resources Research. 35(3): 903-905.

Comments on a 1997 paper by Gordon E. Grant, titled “Critical flow constrains flow hydraulics in mobile-bed streams: a new hypothesis,” published in volume 33 of Water Resources Research. The author comments on the definition of critical flow, the calculation of bed shear stress in near-critical flows, and the applicability of Grant’s hypothesis.

Keywords: Streamflow, geomorphology, sedimentation.

(See Corvallis order form.)

Copstead, Ronald L.; Johansen, David Kim
1998. Water/road interaction: examples from three flood assessment sites in western Oregon. 9877 1805—SDTDC. San Dimas, CA: U.S. Department of Agriculture, Forest Service, San Dimas Technology and Development Center. 15 p.

Assessments are reported of damage from storms in 1995 and 1996 to three forest road segments in the Detroit Ranger District, Willamette National Forest, Oregon. Consequences to roads and road-related structures are

discussed. Changes are suggested for the three example road segments in the design and materials used for road surfacing and road drainage structures, including ditches and cross drains. Information is based on that developed and reported in other publications in the technology series for water-road interactions.

Keywords: Flood damage, roads, road-related structures, road drainage.

(Copies are available from the San Dimas Technology and Development Center by calling (909) 599-1267.)

Grant, Gordon E.
1999. Reply. Water Resources Research. 35(3): 907.

The author replies to Hubert Chanson's comments on the author's 1997 paper titled, "Critical flow constrains flow hydraulics in mobile-bed streams: a new hypothesis," published in volume 33 of Water Resources Research. Hubert Chanson commented on the definition of critical flow, the calculation of bed shear stress in near-critical flows, and the applicability of Grant's hypothesis.

Keywords: Critical flow, hydraulics, channel geomorphology, flume studies, step-pools.

(See Corvallis order form.)

Invasive Plants and Animals

Shanafelt, Bonita Joy
2000. Effects of control measures on diffuse knapweed, plant diversity, and transitory soil seed-banks in eastern Washington. Pullman, WA: Washington State University. 96 p. M.S. thesis.

Diffuse knapweed (*Centaurea diffusa* Lam.) is an invasive exotic species that has disrupted succession in much of the intermountain northwestern United States and adversely affected land productivity and plant diversity. This project was intended to determine the combination of herbicide, grass interseeding, and hand pulling that would best control knapweed and minimize negative effects on nonweedy vegetation. Twelve treatments were applied. Plant species density and biomass, vegetative diversity, and soil seed-bank population changes were measured to determine treatment success.

Keywords: Centaurea diffusa*, picloram, invasive species, plant diversity, seasonal herbicide application, hand pulling, grass interseeding.*

(Available only through library or interlibrary loan.)

Landscape Ecology

Spies, Thomas A.; Turner, Monica G.
1999. Dynamic forest mosaics. In: Hunter, Malcolm L., Jr. Maintaining biodiversity in forest ecosystems. [Place of publication unknown]: Cambridge University Press: 95-160. Chapter 4.

This chapter synthesizes some of the more recent findings about the temporal and spatial variability in forests and examines their implications for maintaining biological diversity.

Keywords: Disturbance ecology, ecosystem dynamics, landscape ecology.

(Available in bookstores and libraries.)

Plant Ecology

Arft, A.M.; Walker, M.D.; Gurevitch, J. [and others]
1999. Responses of tundra plants to experimental warming: meta-analysis of the international tundra experiment. Ecological Monographs. 69(4): 491-511.

We compiled one to four years of experimental data from 13 different international tundra experiment (ITEX) sites and used meta-analysis to analyze responses of plant phenology, growth, and reproduction to experimental warming. Results indicated that key phenological events such as leaf bud burst and flowering occurred earlier in warmed plots throughout the study period; however, there was little impact on growth

cessation at the end of the season. The observed differential responses to warming between the high Arctic and low Arctic suggest that the primary forces driving the response differ across climatic zones, functional groups, and through time.

Keywords: Arctic, tundra, experimental warming, global change, global warming, international tundra experiment, ITEX.

(See Fairbanks order form.)

Epstein, Howard E.; Walker, Marilyn D.; Chapin, F. Stuart, III; Starfield, Anthony M.
2000. A transient, nutrient-based model of arctic plant community response to climatic warming. Ecological Applications. 10(3): 824-841.

We developed a nutrient-based, plant community, and ecosystem model (ArcVeg) designed to simulate the transient effects of increased temperatures on the biomass and community composition of a variety of arctic ecosystems. The model is currently parameterized for upland, mesic ecosystems in high Arctic, low Arctic, treeline, and boreal forest climate zones. Simulations of climatic warming, which increase nitrogen mineralization and growing season length, suggested an increase in total biomass for high and low Arctic zones over 200 years and an increase in shrub biomass at the expense of other plant functional types. Long-term response (decades to centuries) differed in both direction and magnitude from initial responses. In addition, warming resulted in the formulation of novel, stable plant communities after 200 simulation years that were not typical of current zonal vegetation types in the Arctic of northwestern North America.

Keywords: Arctic, climate change, dynamic vegetation modeling, moist acidic tundra, nitrogen, plant functional types, transient dynamics, tussock tundra.

(See Fairbanks order form.)

Gerson, Elizabeth A.; Kelsey, Rick G.
1999. Foliar storage and extraction methods for quantitative analysis of piperidine alkaloids from ponderosa pine (*Pinus ponderosa*). Phytochemical Analysis. 10: 322-327.

Yields of 2,6-disubstituted piperidine alkaloids from ponderosa pine (*Pinus ponderosa*) foliage were compared for the classical liquid-liquid partitioning method and a solid-phase partitioning (SPP) method using Extrelut™ columns. Both methods were reasonably accurate, but the SPP method was more time efficient and required less solvent. Biological variation in alkaloid content was much greater than variability in either extraction method. For ecological studies where numerous samples are required to detect differences against high background variation, the SPP method is recommended. Zinc dust treatment to reduce possible alkaloid N-oxides failed to increase yields, thereby suggesting the absence of such compounds. Oven-drying pine needles for 3 days, then storing for 5 weeks, provided stable alkaloid yields. Air-drying or freezing foliage resulted in more variable alkaloid yields. Thus, it is not necessary to freeze samples in the field, which greatly simplifies the collection process.

Keywords: 2,6-disubstituted piperidine alkaloids, foliage, storage, N-oxides, Pinus *spp., Extrelut, methodology, quantitation.*

(See Corvallis order form.)

van Hees, Willem W.S.; Mead, Bert R.
2000. Ocular estimates of understory vegetation structure in a closed *Picea glauca/ Betula papyrifera* forest. Journal of Vegetation Science. 11: 195-200.

This study investigated consistency and repeatability of measurements on plots designed to describe forest understory vegetation structure. Twenty circular, 100-square-meter plots were measured by six independent observers, three times over the course of summer 1997. Consistency and repeatability of measurements were

evaluated by examining components of variance. The response variable in the analysis was relative canopy cover. Results indicated observers were not consistent relative to each other from one plot to the next, and from one measurement period to the next, and measurements were not repeatable.

Keywords: Structure (vegetation), forest (understory), Alaska.

(See Anchorage order form.)

Remote Sensing

Helmer, E.H.; Brown, S.; Cohen, W.B.
2000. Mapping montane tropical forest successional stage and land use with multidate Landsat imagery. International Journal of Remote Sensing. 21(11): 2163-2183.

Steep topography in montane regions of the tropics presents remote sensing challenges to mapping land use and forest successional stage that have not been formally addressed. In addition to the influences of sun angle on spectral responses of land covers, elevational changes affect the distance from Earth to Sun and type of ecological zone present. By using reference data from field observations, aerial photos, and multidate, Landsat Thematic Mapper imagery, we developed a classification scheme that identified secondary forests, agricultural lands, and old-growth forests in a tropical montane region.

Keywords: Deforestation, classification, forest structure, land cover, Landsat TM, spectral properties.

(See Corvallis order form.)

Resource Inventory

Curtis, Robert O.; Marshall, David D.
2000. Why quadratic mean diameter? Western Journal of Applied Forestry. 15(3): 137-139.

Quadratic mean diameter is the measure of average tree diameter conventionally used in forestry, rather than the arithmetic mean diameter. The historical and practical reasons for this convention are reviewed.

Keywords: Forest mensuration, forest measurements, terminology, stand description.

(See Olympia order form.)

Silviculture

Filip, Gregory; Kanaskie, Alan; Kavanagh, Kathleen [and others]
2000. Silviculture and Swiss needle cast: research and recommendations. Res. Contrib. 30. Corvallis, OR: Oregon State University, College of Forestry, Forest Research Laboratory. 16 p.

This paper discusses the impact of silvicultural operations on Swiss needle cast (SNC) in the Coast Ranges of Oregon and Washington. The paper gives suggested silvicultural operations for stands with different degrees of SNC damage. Suggestions are based on the limited information available from current research and from observations of field foresters. In areas of moderate to severe SNC infestation, silvicultural operations that promote mixed-conifer forests are suggested.

Keywords: Swiss needle cast, Phaeocryptopus gaeumannii, *silviculture.*

(Copies are available from the Forestry Publications Office, 256 Peavy Hall, Oregon State University, Corvallis, OR 97331 or via email to forspub@cof.orst.edu. Include author, title, and publication number.)

Social Sciences

Swanson, Frederick J.

2000. Advocacy by scientists—a federal scientist's view. Corvallis, OR: Oregon State University, Department of Philosophy. Special issue 4: 12.

Scientists operate in a work environment offering a wide range of opportunities to take stances of advocacy that range from simply advocating the use of science in decisionmaking to advocating a particular outcome of the decisionmaking process.

Keywords: Ecosystem management, forest policy.

(See Corvallis order form.)

Threatened, Endangered, Sensitive Species

Smith, Winston Paul

1999. A unique observation of a fisher (*Martes pennanti*) in Grand Teton National Park. Northwestern Naturalist. 80: 33-34.

Meso-carnivores, especially mustelids, are quickly becoming one of the most threatened taxonomic guilds across North America. The present-day distribution of fisher is only a fraction of its historical geographic range, but recent expansions have been documented. This note describes a unique observation of fisher in Grand Teton National Park. This observation was significant for three reasons: (1) this individual was observed with a fish in its mouth, and there are few published references to fish as a diet item of fishers; (2) the precise distribution of fishers in Wyoming is in question; and (3) any information regarding the occurrence of fisher in previously undocumented regions may have significant implications for its conservation and future management.

Keywords: Diet, fish, fisher, Martes pennanti, *geographic range, Grand Teton National Park.*

(See Juneau order form.)

Whitworth, Darrell L.; Nelson, S. Kim; Newman, Scott H. [and others]

2000. Foraging distances of radio-marked marbled murrelets from inland areas in southeast Alaska. The Condor. 102: 452-456.

We radio-tagged seven female and two male marbled murrelets (*Brachyramphus marmoratus*) of undetermined breeding status and followed their movements through the inner passages of southeast Alaska during the breeding season (May to July) in 1998. We recorded 46 locations at sea, averaging 78 kilometers and up to 124 kilometers from inland sites during the period June 19 to July 16. We detected murrelets at inland sites and at sea on the same day on 20 occasions with an average distance between these locations of 75 kilometers. The majority of murrelets were located at sea in western Icy Strait, a productive feeding area at the entrance of Glacier Bay. This study provides the first direct evidence that marbled murrelets in southeast Alaska are consistently traveling considerable distances between potential nesting and foraging areas. These findings have important implications for murrelet conservation and management efforts in southeast Alaska.

Keywords: Marbled murrelet, Brachyramphus marmoratus*, foraging range, Glacier Bay, Icy Strait, radiotelemetry, southeast Alaska.*

(See Juneau order form.)

Watershed Management

Johnson, A.C.; Swanston, D.N.; McGee, K.E.

2000. Landslide initiation, runout, and deposition within clearcuts and old-growth forests of Alaska. Journal of the American Water Resources Association. 36(1): 17-30.

Over 300 landslides and debris flows were triggered by an October 1993 storm on Prince of Wales Island, southeast Alaska. Initiation,

runout, and deposition patterns of landslides that occurred within clearcuts, second-growth and old-growth forests were examined. Blowdown and snags associated with cedar decline and "normal" rates of mortality were found adjacent to at least 75 percent of all failures, regardless of land use. Nearly 50 percent of the landslides within clearcuts occurred within 1 year of timber harvest; more than 70 percent of these sites had hydrophytic vegetation directly above failures. Significantly more erosion per area occurred within clearcuts than in old-growth forests on slopes with gradients of 16 to 54 percent. Runout length, controlled by hillslope position within deglaciated valleys, was typically longer in old-growth forests than in second growth and clearcuts. Most landslides and debris flows were deposited on the valley floor before reaching the main stem channels used by anadromous fish. Slide deposits in old-growth forests were composed of a higher proportion of woody debris than deposits derived from slides in second-growth or clearcuts.

Keywords: Landslides, debris flows, land use planning, erosion and deposition, woody debris, deglaciated valleys, Alaska, anadromous fish.

(See Juneau order form.)

Reynolds, Keith M.; Jensen, Mark; Andreasen, James; Goodman, Iris

2000. Knowledge-based assessment of watershed condition. Computers and Electronics in Agriculture. 27: 315-333.

The USDA Forest Service and the Environmental Protection Agency have cooperatively developed a knowledge base for assessment and monitoring of ecological states and processes in sixth code watersheds. The knowledge base provides a formal logical specification for evaluating watershed processes, patterns, general effects of human influences, and specific effects on salmon habitat. The knowledge base was designed in the NetWeaver knowledge base development system and evaluated in the Ecosystem Management Decision Support system.

Keywords: Watershed analysis, hydrologic integrity, ecosystem management, knowledge base, decision support, landscape analysis, watershed assessment.

(See Corvallis order form.)

Wildlife

Bowyer, R. Terry; Van Ballenberghe, Victor; Kie, John C.; Maier, Julie A.K.

1999. Birth-rate selection by Alaskan moose: maternal strategies for coping with a risky environment. Journal of Mammalogy. 80(4): 1070-1083.

We studied birth-site selection in Alaska moose (*Alces alces gigas*) from 1990 to 1994 in Denali National Park and Preserve in interior Alaska. An inverse relation between visibility and availability of forage indicated that female moose made tradeoffs between risk of predation and food in selecting sites to give birth. Thus, maternal females coped with a risky environment; they gave birth at sites that helped them minimize risk of predation but exhibited risk-averse behavior with respect to the forage necessary to support the high cost of lactation. We hypothesize that risk of predation prevented moose from seeking birth sites with more forage and, hence, a greater nutritional reward, which reduced the variance in forage availability at birth sites.

Keywords: Alces alces*, Alaskan moose, maternal strategies, birth-site selection, risk-averse foraging, risk of predation, interior Alaska.*

(See Anchorage order form.)

Kilgo, John C.; Miller, Karl V.; Smith, Winston P. 1999. Effects of group-selection timber harvest in bottomland hardwoods on fall migrant birds. Journal of Field Ornithologists. 70(3): 404-413.

Due to projected demands for hardwood timber, development of silvicultural practices that provide for adequate regeneration in southeastern U.S. bottomland hardwoods without causing undue harm to wildlife resources is critical. Group-selection silviculture involves harvesting a small group of trees, which creates a canopy gap. Our objectives were to determine the extent of use of group-selection harvest gaps by fall migrant birds; to compare, experimentally, use of three sizes of gaps (10-, 20-, and 40-meter radius); and to compare use of locations within gaps (center, edge, and adjacent forest). We captured 210 birds of 36 species in 1,692 mist-net hours. Total captures were greater in 40-meter radius gaps than in 20- and 10-meter radius gaps and were greater in gap centers than at gap edges and adjacent forest. Though reasons for greater capture success in gaps are unclear, forest interior Neotropical and short-distant migrants apparently shifted their habitat preferences during fall to include forest gap habitat.

Keywords: Bottomland forests, canopy gaps, forest birds, group-selection, habitat use, Neotropical migrants, short-distant migrants.

(See Juneau order form.)

Leban, Frederick A. 1999. Performance of five resource selection methods under different sampling designs: a case study with elk radio-telemetry data. Moscow, ID: University of Idaho. 52 p. M.S. thesis.

Forty-two elk were intensively monitored at the Starkey Experimental Forest and Range in northeast Oregon from April to November 1994. From these data, elk locations were resampled by varying the season, time of day, sample size, and sampling design under 1,000 simulations in relation to six habitat types. Elk selection differed more between periods of day than between seasons. Accuracy of resource selection conclusions increased with increasing number of locations per animal and increasing number of radio-collared animals that were monitored. A minimum of 20 radio-collared animals with 50 locations per animal is needed to adequately determine resource selection patterns. This result has implications for design of radio-telemetry studies, which often do not meet these minimum sampling criteria.

Keywords: Experimental design, radio-telemetry research, resource selection, resource selection methods, wildlife.

(Available only through library or interlibrary loan.)

Olson, Deanna H., ed. 1999. Survey protocols for amphibians under the survey and manage provision of the Northwest Forest Plan. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; U.S. Department of the Interior, Bureau of Land Management, Regional Ecosystem Office. 310 p.

Survey protocols are presented for amphibians under the survey and manage provision of the Northwest Forest Plan. These protocols were developed to screen proposed project areas on federal lands for the presence of five endemic plethodontid salamanders associated with terrestrial habitats in the western forested landscape.

Keywords: Survey methods, protocol, presence, salamanders, plethodon, Northwest Forest Plan, survey and manage.

(This document only is available in electronic format to download at `http://www.or.blm.gov/surveyandmanage/SP/Amphibians99/protoch.pdf`.)

Rowland, Mary M.; Wisdom, Michael J.; Johnson, Bruce K.; Kie, John G.

2000. Elk distribution and modeling in relation to roads. Journal of Wildlife Management. 64(3): 672-684.

We tested performance of three aspects of an elk (*Cervus elaphus nelsoni*)-road density model during spring and summer 1993-95 at the Starkey Experimental Forest and Range, northeast Oregon. Selection ratios were calculated by using more than 100,000 locations of 89 radiocollared female elk, with locations mapped in relation to 0.1- kilometer-wide distance bands away from the open roads. Selection ratios increased with increasing distance from open roads and differed between seasons but not between years or individual animals. Our results suggested that (1) management of roads and related human activities during spring and summer remains an important consideration for modeling and managing the elk resource, and (2) a spatially explicit road component is needed for elk habitat models.

Keywords: Cervus elaphus nelsoni*, disturbance, elk, forest management, habitat effectiveness models, Oregon, radiotelemetry, roads, road density, Starkey project.*

(See La Grande order form.)

Smith, Winston P.

1999. Relations of small mammal populations to even-aged shelterwood systems: a comment. Journal of Wildlife Management. 63(4): 1376-1380.

An article by Von Trebra et al. (1998) in the *Journal of Wildlife Management* concluded that shelterwood harvesting of subboreal spruce forest did not negatively affect small mammal populations. However, apparent problems with their experimental design leave us without a clear understanding of small mammal responses to forestry practices. I offer statistical and biological rationales as to why their experimental design was inappropriate to test the hypothesis that "shelterwood silvicultural systems would reduce small mammal populations." These objections emphasize issues of ecological scale which suggest that small mammal population results reported in their paper may not have reflected the habitat condition of individual experimental blocks, much less treatment units. Finally, I discuss implications to forest management, notably conservation of sensitive species, of inferring conclusions and offering management recommendations from dubious results. I emphasize that such studies may further impede integration of credible science into policy or management decisions, without which achieving sustainable use of forest resources is highly unlikely.

Keywords: Red-backed vole, Clethrionomys gapperi*, experimental design, forest management, hypothesis testing, sensitive species, shelterwood harvest, small mammals, spruce forest, statistical independence, subboreal zone.*

(See Juneau order form.)

Wilson, Todd M.

1999. Population analysis of northern flying squirrels in the Puget Trough, Washington, using microsatellite DNA. Olympia, WA: The Evergreen State College. 50 p. M.S. thesis.

Genetic structure of three populations of northern flying squirrels was investigated from 1993 through 1997 by using four polymorphic microsatellite loci. Most squirrels were from two second-growth forests at Fort Lewis, Washington–an unthinned 60-year-old Douglas-fir forest with little understory and a residual component of large decadent trees and coarse woody debris, and a 70-year-old twice-thinned forest with a moderately developed understory, few residual trees, and little coarse woody debris. Twenty-two squirrels were from a mixed deciduous-conifer stand more than 70 years old in Capitol Forest surrounded by clearcuts and young Douglas-fir

plantations. The Capitol Forest population differed markedly from Fort Lewis populations, with fewer alleles, lower heterozygosity, and variation in allelic forms. Sharp population decline caused by thinnings and predation reduced allele frequency by more than one-third in the Fort Lewis population. Management for flying squirrels should consider landscape permeability to maintain genetic diversity. The synergy of genetics, ecology, and forest management should provide a richer, more thorough understanding of flying squirrels, and how to better manage for them across forested landscapes in the Pacific Northwest.

Keywords: Northern flying squirrels, Washington, genetics, Fort Lewis, Douglas-fir, Capitol Forest.

(Available only through library or interlibrary loan.)

Wisdom, Michael J.; Wales, Barbara C.; Holthausen, Richard S. [and others]

1999. Wildlife habitats in forests of the interior Northwest: history, status, trends, and critical issues confronting land managers. Transactions of the 64th North American Wildlife and Natural Resources Conference (1999): 69-93.

Habitat for wildlife is declining rapidly across all areas of the world. In the United States, habitat declines are responsible for the exponential rate at which species are now being listed under the federal Endangered Species Act. In response to such problems, managers of federal lands are moving increasingly to broad-scale, ecosystem-based strategies for conserving and restoring habitats for species at risk. In this paper, we summarize results of large-scale landscape and wildlife habitat assessments that were conducted as part of the Interior Columbia Basin Ecosystem Management Project; these assessments form the foundation for the project's ecosystem management plan for terrestrial species.

Keywords: Species at risk, terrestrial species management, ecosystem management, wildlife habitat management.

(See La Grande order form.)

Zollner, Patrick A.; Smith, Winston P.; Brennan, Leonard A.

2000. Home range use by swamp rabbits (*Sylvilagus aquaticus*) in a frequently inundated bottomland forest. American Midland Naturalist. 143: 64-69.

Home range size of six swamp rabbits in south-central Arkansas was estimated by radiotelemetry from February 1991 through March 1992. Average home range size was much larger than previously reported estimates. The difference was partly attributable to the large number of observations per rabbit in this study but also may be explained by our inclusion of numerous locations of swamp rabbits during periods of deep inundation. All the individual rabbits tracked used different areas where the study site was flooded. These results provide the first quantitative description of the response of swamp rabbits to flooding.

Keywords: Bottomland forest, flooding, home range, movements, swamp rabbit, Sylvilagus aquaticus.

(See Juneau order form.)

Wood Utilization

Barbour, Jamie; Lowell, Eini C.; Todoroki, Christine L. [and others]

1999. Simulating North American lumber grade recovery with AUTOSAW using externally visible branch and stem form characteristics. In: Nepveu, G., ed. Proceedings of the 3rd workshop–connection between silviculture and wood quality through modeling approaches and simulations software. Nancy, France: Institutational National de la Recherche Agronomique: 494-503.

Empirical wood product recovery studies conducted in sawmills, veneer mills, or other processing plants relate to conditions in a specific mill and cannot compare alternative breakdown methods by assessing the effects of a change of product or different processing equipment. We tested the hypothesis that a sawing simulation model can provide a low-cost alternative to empirical wood product recovery studies for estimating product yields from a given resource. AUTOSAW, a sawing simulation program developed by the New Zealand Forest Research Institute Ltd., was used to evaluate lumber volume recovery and grade yield from logs with known morphological characteristics. Output from AUTOSAW was compared with empirical results for lumber volume recovery and grade yield.

Keywords: Lumber grade recovery, AUTOSAW, grade yield.

(See Portland order form.)

Hummel, S.

2000. Height, diameter and crown dimensions of *Cordia alliodora* associated with tree density. Forest Ecology and Management. 127: 31-40.

To investigate the responses of *Cordia alliodora* associated with tree density, three permanent Nelder plots and 31 temporary 0.09 hectare plots in northern Costa Rica, representing a range of densities, ages, and elevation, were measured between 1993 and 1996. Tree height, age, stem diameter at breast height, and crown diameter were analyzed with regression techniques. The height of *C. alliodora* was significantly associated with tree age and stem diameter but not with density. Stem diameter decreased with increasing tree density. Results were consistent with competition-density patterns observed in temperate forest trees. The ratio between the crown diameter and stem diameter in *C. alliodora* was not significantly related to density, although this ratio varied directly with tree age. These results suggested that the merchantable yield of *C. alliodora* in the low-elevation moist tropics of Costa Rica may be increased via stand-density management. Study results also indicated that silvicultural research techniques developed in temperate forests can be used to study tropical species. Tropical trees that regenerate in even-age stands and that permit an estimate of age are the best candidates for such techniques.

Keywords: Nelder density plots, competition density relations, Costa Rica.

(See Portland order form.)

Hummel, S.

2000. Understory development in young *Cordia alliodora* plantations. New Forests. 19: 159-170.

The biomass and composition of the understory plant community associated with *Cordia alliodora* planted at 2-meter by 2-meter spacing are characterized for the first (1992) and fifth (1996) years after stand establishment. The study plantations comprise three replicates each of *C. alliodora* monocultures and *C. alliodora* interplanted with perennial monocots (polycultures), part of an experiment in northern Costa Rica. In the first year, there was no significant difference in the mean aboveground understory biomass between the monocultures of *C. alliodora* and the polycultures of trees and monocots. After 5 years, the understory biomass in the monocultures increased, while in the polycultures it decreased. In contrast to the first year, by the fifth year the understory biomass differed significantly between the two types of plantations

Keywords: Biomass, Costa Rica, La Selva, monoculture, species diversity.

(See Portland order form.)

Lowell, Eini C.; Funck, James W.; Brunner, Charles C.

2000. Small-diameter trees in the Pacific Northwest: A resource for dimension lumber or cut stock? In: Gazo, Rado, ed. Issues related to handling the influx of small-diameter timber in western North America. Madison, WI: Forest Products Society: 15-20.

Many forest stands in the Pacific Northwest are densely stocked, have insect damage and disease problems, or contain an unfavorable mix of species. Dimension lumber production may not be the most suitable use of this small-diameter resource. Therefore, the production of cut stock material was investigated as an alternative, value-added product. Yields for both boards and dimension lumber increased as board width and grade increased, with board grade having the most significant impact. Yield cannot be looked at independent of price. The yields have enough value to make this a valuable raw material for secondary manufacturers, although an additional process, sorting of the lumber by width and grade, would be necessary.

Keywords: Small-diameter, dimension lumber, cut stock, lumber production.

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