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Department of
Agriculture

Forest Service

Pacific Northwest
Research Station



Recent Publications of the Pacific Northwest Research Station, Third Quarter, 2005



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Pacific Northwest Research Station

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Telephone	(503) 808-2592
Publication requests	(503) 808-2138
FAX	(503) 808-2130
E-mail	pnw_pnwpubs@fs.fed.us
Mailing address	Publications Distribution Pacific Northwest Research Station P.O. Box 3890 Portland, OR 97208-3890

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Boreal Ecology Cooperative
Research Unit
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Fairbanks, AK 99775-6780

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Pacific Northwest Research Station Publications

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Economics

05-163

McLain, R.J.; McFarlane, E.M.; Alexander, S.J.

2005. Commercial morel harvesters and buyers in western Montana: an exploratory study of the 2001 harvesting season. Gen. Tech. Rep. PNW-GTR-643. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 38 p.

This exploratory study examined aspects of the social organization of the commercial wild morel industry in western Montana during 2001. Interviews were done with 18 key informants (7 buyers and 11 pickers) and social interactions were observed at one buying station near the Kootenai National Forest and three buying stations near the Bitterroot National Forest. The key data were used to construct a picture of social interactions at field buying stations, buyer strategies for attracting pickers, changes in prices over the course of a season, and the ways in which various participants in the wild morel harvest construct their livelihoods. These findings are contrasted with the results of a recently published study on nontimber forest product harvesters in the Eastern United States, and management implications for managers and scientists are discussed.

Keywords: Nontimber forest products, special forest products, livelihood strategies, wild mushrooms.

05-168

Warren, D.D.

2005. Production, prices, employment, and trade in Northwest forest industries, all quarters 2003. Resour. Bull. PNW-RB-247. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 165 p.

This report provides current information on the timber situation in Alaska, Washington, Oregon, California, Montana, Idaho, and British Columbia, including data on lumber and plywood production and prices; timber

harvest; employment in forest products industries; international trade in logs, pulpwood, chips, lumber, and plywood; log prices in the Pacific Northwest; volume and average prices of stumpage sold by public agencies; and related items. This report was delayed by the temporary unavailability of trade data, thus all four quarters of 2003 were combined in one book in the interest of efficiency and timeliness.

Keywords: Forestry business economics, lumber prices, plywood prices, timber volume, stumpage prices, employment.

Fire

05-024

MacGregor, D.G.; Haynes, R.W.

2005. Integrated research to improve fire management decisionmaking. Gen. Tech. Rep. PNW-GTR-630. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 28 p.

The emergence of large fires of long duration (also known as siege fires) with their inherently high costs has raised numerous questions about the opportunities for cost containment. Cost reviews from the 2003 fire season have revealed how additional knowledge created through research can lead to better management and lower costs of fire incidents.

Keywords: Fire management, decisionmaking, strategic planning.

Forest Management

05-067

Zhou, X.; Haynes, R.W.; Barbour, R.J.

2005. Projections of timber harvest in western Oregon and Washington by county, owner, forest type, and age class. Gen. Tech. Rep. PNW-GTR-633. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 30 p.

The Pacific Northwest forest resource is highly dynamic. Expected changes over the next 50 years will greatly challenge some current perceptions of resource managers and various stakeholders. This report describes the current and expected future timberland conditions of western Oregon and Washington and presents the results at the county level. About 50 percent of the timber removals in this region will come from 10 west-side counties, and Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) will remain the major species removed. Forest industry will account for 50 percent of the total harvest in the Pacific Northwest West. Some inferences about the attributes of future timber and its utilization will be drawn from the projections at the county level over the next half century.

Keywords: Timber availability, forest resources, wood quality.

05-164

Rapp, V.A.

2005. Conserving old forests in a land shaped by fire. Science Update 11. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p.

In a recent review of the first 10 years under Northwest Forest Plan (NWFP) direction, federal agencies looked at the status and trends for late-successional and old-growth forests in the Plan area. The agencies also looked at the challenges still ahead. Within the NWFP area, at least 1.7 million acres of current mature and old forests are in dry, fire-prone, mixed-conifer forests, including the eastern slopes of the Cascade Range, Klamath Mountains, and southwestern Oregon. The ecosystem management goals for dry forests seem contradictory. Spotted owl habitat requires some significant amount of dense, multistoried forest, but reduction of fire risk requires widespread reduction of fuels. Scientists are finding ways to meet both goals.

Keywords: Northwest Forest Plan, old-growth forest, northern spotted owl, fire.

Geomorphology and Hydrology

04-067

Ager, A.A.; Clifton, C.

2005. Software for calculating vegetation disturbance and recovery by using the equivalent clearcut area model. Gen. Tech. Rep. PNW-GTR-637. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p.

The use of cumulative watershed effects models is mandated as part of interagency consultation over projects that might affect habitat for salmonids federally listed as threatened or endangered. Cumulative effects analysis is also required by a number of national forest plans in the Pacific Northwest Region (Region 6). Cumulative watershed effects in many cases are measured with the equivalent clearcut area (ECA) model, which generates an index of cumulative disturbance by considering disturbance type, extent, and recovery over time. Although the model has many limitations, it provides an index of vegetative disturbance that can be used to compare the existing condition of different watersheds, and the potential impacts among land management alternatives. Calculating ECA on multiple watersheds and management scenarios for project-level analysis is a tedious process. We automated the process with a program called Equivalent Treatment Area Calculator to streamline its application on national forests in the Blue Mountains of eastern Oregon. The program, operation, and limitations of the ECA model are described.

Keywords: ECA, equivalent clearcut area, cumulative watershed effects, equivalent roaded area.

Invasive Plants and Animals

05-002

Rapp, V.

2005. Invasive plants in 21st century landscapes.

Science Update 9. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p.

Nonnative, invasive plants can displace native plants and disrupt ecosystems in many ways. In the Pacific Northwest, invasive plants affect many ecosystems, with at least one nonnative plant species found on 70 percent of forested plots surveyed across Oregon. Scientists at the USDA Forest Service Pacific Northwest Research Station, with management partners and other scientists, are developing reliable detection and inventory techniques, integrating species biology and invasion ecology, and identifying what makes habitats vulnerable and invasive plants so successful. The scientists are integrating their research on control methods with work on habitat restoration and resilience of native plant communities.

Keywords: Invasive plants, nonnative plants, sulfur cinquefoil, research program, Blue Mountains.

Land Use Economics

05-107

Stein, S.M.; McRoberts, R.E.; Alig, R.J.; Nelson, M.D.; Theobald, D.M.; Eley, M.; Dechter, M.; Carr, M.

2005. Forests on the edge: housing development on

America's private forests. Gen. Tech. Rep. PNW-GTR-636. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 16 p.

The private working land base of America's forests is being converted to developed uses, with implications for the condition and management of affected private forests and the watersheds in which they occur. The Forests on the Edge project seeks to improve understanding of the processes and thresholds associated with increases in housing density in private forests and likely effects on the contributions of those forests to timber, wildlife, and water resources. This report, the first in a series, displays and describes housing density projections on private forests, by watershed, across the conterminous United States. An interdisciplinary team used geographic information system (GIS) techniques to identify fourth-level watersheds containing private forests that are projected to experience increased housing density by 2030. Results indicate that some 44.2 million acres (more than 11 percent) of private forests particularly in the East, where most private forests occur are likely to see dramatic increases in housing development in the next three decades, with consequent impacts on ecological, economic, and social services. Although conversion of forest land to other uses over time is inevitable, local jurisdictions and states can target efforts to prevent or reduce conversion of the most valuable forest lands to keep private working forests resilient and productive.

Keywords: Fourth-level watershed, land use change, private forest, water quality, ecological services.

Monitoring

05-034

van Hees, W.W.S.

2005. Spruce reproduction dynamics on Alaska's Kenai Peninsula, 1987–2000. Res. Pap. PNW-RP-563. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 18 p.

During the past 30 years, spruce forests of Alaska's Kenai Peninsula have undergone dramatic changes resulting from widespread spruce bark beetle (*Dendroctonus rufipennis* (Kirby)) infestation. In 1987 and again in 2000, the Pacific Northwest Research Station's Forest Inventory and Analysis Program conducted initial and remeasurement inventories to assess broad-scale impacts of this infestation.

Changes in regeneration of Sitka spruce (*Picea sitchensis* (Bong.) Carr.) and white spruce (*Picea glauca* (Moench) Voss) are examined by using data collected on 130 plots. Regeneration of Sitka and white spruce in terms of mean number of seedlings per plot is not significantly different from the 1987 findings. The number of plots where seedling stocking remained at previous levels or increased, slightly exceeded the number of locations where seedling stocking declined. Almost half the plots (49 percent) had decreased numbers of seedlings, and almost 72 percent of the plots fell in the less-than-fully-stocked category in both inventories. Also, the distribution of the seedlings over the plot was not uniform. No plots had seedlings on all plot cluster sample points in either inventory.

Keywords: Forest surveys, timber resources, reproduction (spruce), Alaska (Kenai Peninsula).

Range Management

05-139

Hall, F.C.

2005. Emigrant Creek cattle allotment: lessons from 30 years of photomonitoring. Gen. Tech. Rep. PNW-GTR-639. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 37 p.

Emigrant Creek cattle allotment is located 48 km northwest of Burns, Oregon. It was photo sampled at nine original sites, starting in 1975. Photos were taken three times per year: June 15 prior to cattle grazing, August 1 at pasture rotation, and October 1 at the end of grazing. An additional four photopoints were established following disturbance

from flooding and beavers. Results reported here cover 30 years, 1975 to 2005. Cattle did not significantly impact the riparian area. Beavers (*Castor canadensis*) arrived in 1984 and departed in 1994. They seriously reduced aboveground willow biomass by harvesting stems for food and dam construction. Dams raised the water table causing a dry meadow to become moist, and increased water in a wet meadow that inhibited willow growth. Beaver departure in 1994 left dams unmaintained. A 50-year flood event in February 1996 eroded dams and created a new channel. The water table was reduced below that of the 1984 levels, causing a dry meadow to revert to pre-1984 conditions and permitting willows to vigorously expand in a wet meadow. Dynamic riverine riparian environmental conditions seriously challenge the typical range management concepts of "condition and trend." There is no "climax good condition." Instead a "state-and-transition" concept seems a more apt range management concept to describe range conditions resulting from beaver dams and flooding over a 30-year period on Emigrant Creek cattle allotment.

Keywords: Riverine, riparian, beavers, floods, condition and trend, cattle, grazing.

Resource Inventory

05-114

Gray, A.N.; Veneklase, C.F.; Rhoads, R.D.

2005. Timber resource statistics for nonnational forest land in western Washington, 2001. Resour. Bull. PNW-RB-246. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 117 p.

This report is a summary of timber resource statistics for an inventory of the 19 counties in western Washington: Clallam, Clark, Cowlitz, Grays Harbor, Island, Jefferson, King, Kitsap, Lewis, Mason, Pacific, Pierce, San Juan, Skagit, Skamania, Snohomish, Thurston, Wahkiakum, and Whatcom. The inventory in 2000 sampled all private and public lands except those administered by the National Forest System and those that were reserved from management for wood products. Area information for parks and other reserves was obtained directly from the organizations managing these areas. Statistical tables provide estimates of land area, timber volume, growth, mortality, and harvest for individual survey units for western Washington as a whole.

Keywords: Forest surveys, forest inventory, statistics (forest), timber resources, resources (forest), western Washington.

05-113

van Hees, W.W.S.

2005. Timber resource statistics of south-central Alaska, 2003. Resour. Bull. PNW-RB-248. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 24 p.

Estimates of timber resources for south-central Alaska are presented. Data collection began in 2000 and was completed in 2003. All forest lands over all ownerships were considered for sampling. The inventory unit was, roughly, the region between Icy Bay to the east and Kodiak Island to the west. Forest lands within national forest wilderness study areas and recommended wilderness areas were not sampled on the ground. Tables present supply estimates of area, timber volume, growth, mortality, and harvest.

Keywords: Forest surveys, timber resources, statistics (forest), Alaska (south-central).

Silviculture

05-043

Curtis, R.O.; Marshall, D.D.

2005. Permanent-plot procedures for silvicultural and yield research. Gen. Tech. Rep. PNW-GTR-634. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 86 p.

A revision and update of a 1983 publication, this paper reviews purposes and procedures for establishing and maintaining permanent plots for silvicultural and yield research. Included are sampling and plot design, common errors, and procedures for measuring and recording data. The discussion is generally in terms of fixed-area remeasured plots and even-aged stands with one principal species, which historically are the plot type and stand condition most often used in silvicultural experiments and in construction of managed stand yield tables and simulation programs. Although some details are specific to coastal Pacific Northwest conditions, most of the material is widely applicable.

Keywords: Plot analysis, permanent sample plots, tree measurement, sample plot design, growth and yield.

05-191

Harrington, C.A.; Schoenholtz, S.H., eds.

2005. Productivity of Western forests: a forest products focus. Gen. Tech. Rep. PNW-GTR-642. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 176 p.

On August 20–23, 2004, a conference was held in Kamilche, Washington, with the title “Productivity of Western Forests: A Forest Products Focus.” The meeting brought together researchers and practitioners interested in discussing the economic and biological factors influencing wood production and value. One of the underlying assumptions of the meeting organizers was that management activities would be practiced within a framework of sustaining or improving site productivity; thus, several papers deal with methods to protect or improve productivity or discuss new studies designed to test the effects of various practices. This proceedings includes 11 papers based on oral presentations at the conference, 3 papers based on posters, and 2 papers describing the Fall River and Matlock Long-Term Site Productivity study areas visited on the field tours. The papers cover subjects on forest harvesting activities, stand establishment, silviculture, site productivity, remote sensing, and wood product technologies.

Keywords: Site productivity, forest harvesting, stand establishment, silviculture, forest products, Western forests, LIDAR, log quality, tree quality.

05-112

Miller, R.E.; Anderson, H.W.; Murray, M.; Leon, R.

2005. Comparative effects of urea fertilizer and red alder in a site III, coast Douglas-fir plantation in the Washington Cascade Range. Res. Pap. PNW-RP-565. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 28 p.

Five randomly assigned treatments were used to quantify effects of adding varying numbers of red alder (*Alnus rubra* Bong.) or nitrogen (N) fertilization on growth of a 10-year-old conifer plantation at a medium-quality site in the western Washington Cascade Range. Zero, 20, 40, and 80 alder trees per acre were retained along with about 300 conifers per acre. Nearly all conifers were coast

Douglas-fir (*Pseudotsuga menziesii* var. *menziesii* (Mirb.) Franco). A fifth treatment substituted N fertilizer for N-fixing alder. Changes in average tree height, and in numbers of trees, basal area, and volume per acre between plantation ages of 10 and 27 are compared. In pure conifer plots, gross volume growth averaged 26 percent greater on fertilized than nonfertilized plots, indicating measurable benefits of additional N. On both fertilized and nonfertilized plots, an average of 13 percent of the original conifers died. Retaining 20, 40, or 80 alder per acre (7, 13, and 27 percent of the associated conifer trees per acre, respectively) was associated with reduced numbers of Douglas-fir by about 19, 5, and 17 percent, respectively, in the next 17 years. Mortality and growth of Douglas-fir were not related to alder density, but losses of Douglas-fir were especially large on plots where relatively large red alder (20 per acre) were retained. Neither total stand nor conifer yields were changed by retaining alder. Additional comparisons are needed at other locations, especially those with known N deficiency.

Keywords: Mixed stands, competition (plant), Douglas-fir, *Pseudotsuga menziesii*, red alder, *Alnus rubra*, thinning, nitrogen fertilization, volume growth.

Social Sciences

05-077

Cervený, L.K.

2005. Tourism and its effects on southeast Alaska communities and resources: case studies from Haines, Craig, and Hoonah, Alaska. Res. Pap. PNW-RP-566. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 147 p.

Tourism has become integral to southeast Alaska's regional economy and has resulted in changes to the social and cultural fabric of community life as well as to natural resources used by Alaskans. This study incorporates an ethnographic approach to trace tourism development in three rural southeast Alaska communities featuring different levels and types of tourism. In addition, the effects of tourism from the perspectives of local residents are explored, including economic effects, sociocultural effects, and effects on human uses of natural resources.

Keywords: Tourism, community effects, social sciences, anthropology, Alaska.

05-022

Kennedy, J.J.; Haynes, R.W.; Zhou, X.

2005. Line officers' views on stated USDA Forest Service values and the agency reward system. Gen. Tech. Rep. PNW-GTR-632. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 72 p.

To update and expand a study done in 1989, a survey was done of the views of USDA Forest Service (FS) line officers attending the third National Forest Supervisors' Conference in January 2004 (chief, associate chief, deputy chiefs, regional foresters, directors of the International Institute of Tropical Forestry and State and Private Forestry North-eastern Area, and forest supervisors), along with a 40-percent sample of district rangers, about FS values and the agency reward system.

These line officers believed in 2004, as did their line colleagues in 1989, that the U.S. public values national forest "outputs" of recreation, wildlife, and water much more than they value traditional commodities of wood or grazing. The public values mirror the personal and professional priorities of line officers in both 1989 and 2004. In 1989, however, line officers believed their agency valued wood much more than line officers or the public did; by 2004 the agency roughly valued all national forest uses equally. The 2004 line officer sample ranked the six most rewarded FS "operational values" as: teamwork, agency loyalty, meeting targets, professional competency, hard work, and promoting a good FS image—the same six (ranked somewhat differently) as given in 1989. Similarly, the values that the 2004 line officer sample believed should be rewarded—care for ecosystems, professional competency, consensus building, care for employee development, responsiveness to local publics, and concern for future generations—are the same as those given in 1989, and are similar to the values prominently stated in the 1986 FS vision statement of Caring for the Land and Serving People. Although line officers believe their agency reward system supports more of these "should be rewarded values" in 2004 than it did in 1989, this recent survey still illustrates opportunities to improve the FS reward system.

Keywords: Management values, ethics, organizational culture, organizational reward system, USDA Forest Service.

05-196

Mazza, R.; Kruger, L.E., tech. eds.

2005. Social conditions and trends in southeast Alaska. Gen. Tech. Rep. PNW-GTR-653. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 91 p.

In 1997, scientists at the Pacific Northwest Research Station initiated several social science studies in response to information gaps identified while developing the Tongass Land Management Plan. Results presented here summarize findings from studies of demographic trends and tourism trends in the region based on data available through 2002. Demographic trends suggest that despite having many unique geographic, climatic, and physical characteristics, southeast Alaska exhibits many social conditions and trends similar to those statewide, as well as in the greater United States and nonmetropolitan United States. Much variation exists at the community level, however, when measuring change in population and income in southeast Alaska. In the last decade, tourism has been one of the fastest growing components of Alaska's economy and an important source of export-based income. Natural resource management and use in Alaska will affect and will be affected by trends in tourism growth and activities.

Keywords: Tourism, community change,

05-069

Rapp, V.

2005. The Kenai experience: communities and forest health. Science Update 10. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11 p.

Over the last 15 years, spruce bark beetles have killed 80 to 90 percent of the trees in large areas on the Kenai Peninsula in south-central Alaska. In response, the USDA Forest Service Pacific Northwest Research Station, along with partners, has scientists working on new control methods, wood product opportunities, and spruce regeneration. One challenge turned out to be understanding how communities respond to forest health issues and how managers can most productively work with communities. New work by a social scientist from the Pacific Northwest Research Station suggests that to address large-scale forest health problems, it is vital to understand the complexity of social systems as well as the complexity of ecosystems.

Keywords: Kenai Peninsula, Alaska, forest health, communities, spruce bark beetle.

Wildlife

05-159

Bull, E.L.

2005. Ecology of the Columbia spotted frog in northeastern Oregon. Gen. Tech. Rep. PNW-GTR-640. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 45 p.

The Columbia spotted frog (*Rana luteiventris*) is one of several amphibians in the Western United States experiencing population declines. The breeding, postbreeding, and overwintering habitat and ecology of this species were investigated in 10 study sites in northeastern Oregon from 1997 through 2004. A variety of habitats with permanent water were used as breeding sites and as postbreeding habitat during the summer. Ice-covered ponds, warm springs, rivers, and seeps in forested habitats were used for overwintering. Diet consisted of a wide variety of mollusks and arthropods with beetles, ants, wasps, and flies composing more than 50 percent. Population size was as high as 135 females at one site, and ratios of males to females ranged from 1.0 to 2.8. The oldest male and female were 9.7 and 8.7 years old, respectively, based on skeletochronology. Males reached sexual maturity at 1 year 9 months after metamorphosis and most females at 2 years 9 months after metamorphosis. One female laid eggs in up to 3 consecutive years. Size (snout-vent length) was not a good indicator of age in frogs older than 2 years. Long-term monitoring is necessary to determine the effects of a variety of disturbance factors and chytrid fungus that could influence spotted frog populations in northeastern Oregon.

Keywords: Columbia spotted frog, Rana luteiventris, northeastern Oregon, amphibian ecology.

Publications Available Elsewhere

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

Biometrics

Barrett, T.; Fried, J.S.

2004. Modeling. In: Burley, J.; Evans, J.; Youngquist, J. Encyclopedia of forest sciences. New York: Elsevier: 426–433.

Modeling is used extensively in forest inventory applications. Models, which could be described as “deliberate abstractions of a system,” are used to calculate forest attributes that cannot be easily measured, to understand how forest ecosystems function, to extrapolate forest attributes over space, and to project how forests change over time.

Keywords: Simulation, optimization, spatial, temporal, modeling, growth and yield, stand projection, imputation.

(See Portland order form.)

Ecosystem Structure and Function

Bachelet, D.; Neilson, R.P.; Lenihan, J.M.;

Drapek, R.J.

2004. Regional differences in the carbon source-sink potential of natural vegetation in the U.S.A. Environmental Management. 33(Suppl. 1): S23–S43.

The dynamic vegetation model MC1 was used to simulate the change in carbon storage potential under historical conditions (1895–1994) in the six regions of the conterminous United States, delineated for the U.S. Global Climate Change National Assessment. The largest variations in carbon fluxes occur in the Midwest, where large fire events affect vegetation biomes. Projections in to the future with the CGCM1 climate scenario show the Northeast becoming mostly a carbon source, the Southeast becoming the largest carbon source in the 21st century, and the two westernmost regions becoming carbon sinks in the second half of the 21st century.

Keywords: Carbon storage, future projections, dynamic vegetation model, regional differences.

(See Corvallis order form.)

Fire

Booze, T.F.; Reinhardt, T.E.; Quiring, S.J.;

Ottmar, R.D.

2004. A screening-level assessment of the health risks of chronic smoke exposure for wildland firefighters. Journal of Occupational and Environmental Hygiene. 1: 296–305.

A screening health risk assessment was performed to assess the upper-bound risks of cancer and noncancer adverse health effects among wildland firefighters performing wildfire suppression and prescribed burn management. Fifteen substances of potential concern were identified in wildland fire smoke, including aldehydes, polycyclic aromatic hydrocarbons, carbon monoxide, benzene, and respirable particulate matter. Obtained were data defining average and reasonable maximum daily exposures to smoke at prescribed burns and wildfires, potential days of exposure in a year, and career lengths. Of the 15 substances in smoke that were evaluated, only benzene and formaldehyde posed a significant excess cancer risk, whereas only acrolein and respirable particulate matter posed significant noncancer health risks. Upper-bound health risks ranged from 1.3 to 220 excess cancers per million, and noncancer hazard indices ranged from 8.9 to 352, depending on the exposure group. The magnitude of all risks was in the range considered acceptable for occupational exposures by regulatory agencies.

Keywords: Firefighters, risk assessment, smoke exposure, health.

(See PWFSL order form.)

Fish

Wissmar, R.C.; Bisson, P.A., eds.

2003. Strategies for restoring river ecosystems: sources of variability and uncertainty in natural and managed systems. Bethesda, MD: American Fisheries Society. 276 p.

Restoring complex river ecosystems is hard to do. Major difficulties arise from spatial and temporal variability in natural processes and uncertainty regarding present and future management practices affecting river corridors and their adjoining landscapes. Uncertainty occurs when factors influencing natural and human systems within river drainages are imperfectly understood and are therefore unpredictable. Environmental variability contributes to uncertainty when knowledge about natural change is incomplete. The purpose of this book is to bring together perspectives on sources of variability in physical and biological processes in rivers, and origins of uncertainty when managing these systems, to help develop prudent strategies for renewing and conserving them.

Keywords: Salmon recovery, ecosystem management.

(Available in bookstores and libraries. It can also be purchased from the American Fisheries Society, phone (678) 366-1411.)

Forest Management

Ashley, M.V.; Willson, M.F.; Pergams, O.R.W.

[and others]

2003. Evolutionarily enlightened management. *Biological Conservation*. 111: 115–123.

The underemphasis of selectionist thinking in resource management may lead to a variety of unintended negative consequences. Potential effects of management on selection are illustrated by a series of examples ranging over numerous fields of resource management, with differing levels of documentation. Incorporating selectionist thinking in risk assessments would allow more informed management decisions.

Keywords: Microevolutionary changes, evolutionary thinking, conservation biology, resource management.

(See Juneau order form.)

Turner, D.R.

2004. Productivity of a small cut-to-length harvester in northern Idaho. Moscow, ID: University of Idaho. 52 p. M.S. thesis.

Natural resource managers are increasingly interested in using small cut-to-length harvesters in forest stands with small-diameter trees. This paper describes the productivity of the Neusson 11002 HV harvester in a clearcut with reserves and a thinning treatment of a Douglas-fir stand with tussock moth damage. An elemental time study was conducted by using video footage of harvest operations to determine machine productivity. Production costs are estimated at \$5.54/m³ in the clearcut and \$6.22/m³ in the thinned stand. Statistical analysis showed that brush density, machine travel distance, and tree diameter at breast height influenced harvest time in both situations. The harvester was found to be cost effective in the small-diameter stands tested.

Keywords: Small-diameter timber, harvesting, cut-to-length harvester.

(Available only through library or interlibrary loan.)

Walburger, K.J.; DelCurto, T.; Vavra, M.;

Pulsipher, G.D.

2004. The long-term effects of cattle and(or) big game herbivory and logging on the subsequent diet quality of steers grazing grand fir (*Abies grandis*) habitats in northeastern Oregon. *Proceedings, Western Section, American Society of Animal Science*. 55: 253–256.

Cattle grazing on forested rangelands is a common practice in North America. The objective of this study was to document the effects of logging and herbivory on the diet quality for steers grazing grand fir (*Abies grandis*) habitat. Treatments were arranged in a split-plot design with 3×3 factorial arrangement of treatments. Diet quality was determined by using ruminally cannulated steers in June and August 2001 and 2002. In general, crude protein and neutral detergent fiber content were modestly influenced by grazing and logging treatments. This study suggests that timing of grazing had a greater influence on diet quality than did previous grazing and(or) logging.

Keywords: Herbivory, diet quality, logging, cattle, elk, mule deer.

(See La Grande order form.)

Landscape Ecology

Aukema, J.E.

2003. Vectors, viscin, and Viscaceae: mistletoes as parasites, mutualists, and resources. *Frontiers in Ecology and the Environment*. 1(3): 212–219.

Mistletoes are stem hemiparasitic plants. Seed dispersers are the mistletoe's mutualists and disease vectors for the host. Mistletoes are similar to vector-borne macroparasites. Mistletoe vectors and some other disease vectors exhibit a preference for infected hosts. Mistletoes-disperser coevolution is thought to be partially responsible for mistletoe diversification. Mistletoes are important, patchily distributed resources for many organisms including their mutualistic pollinators. Mistletoes are important elements of the landscape that influence the distribution in space of ecosystem resources. The patchy distribution and complex interactions of these parasites makes their biology intriguing but their management and conservation challenging.

Keywords: Mistletoe, parasitism, mutualism, disease, landscape.

(See Olympia order form.)

Resource Inventory

Fiala, A.C.S.

2004. Forest canopy structure in western Oregon: characterization, methods for estimation, prediction, and importance of avian species. Corvallis, OR: Oregon State University. 335 p. M.S. thesis.

Characterization of canopy structure, the horizontal and vertical distribution of the tree crowns in a forest, is important for the management of forests in the Pacific Northwest. The canopy is an important habitat element for many wildlife species; canopy structure affects understory development and influences many natural processes, such as the intensity of propagation of wildfire. Thus, improving our understanding of canopy structures and trends can aid forest management. The overall goal of this study was to characterize vertical and horizontal structure.

Keywords: Canopy structure, inventory, wildlife.

(Available only through library or interlibrary loan.)

Wildlife

Bowyer, R.T.; Kie, J.G.

2004. Effects of foraging activity on sexual segregation in mule deer. *American Society of Mammalogists*. 85(3): 498–504.

Retrospective testing was done of whether differences in activity patterns and foraging efficiency by males and females were responsible for sexual segregation in mule deer (*Odocoileus hemionus*). Activity did not differ among types of deer social groups (mixed-sex, adult male, or adult female), but was greater during the dry season than in the wet season. Foraging efficiency (percentage of active deer feeding) was greater in mixed-sex groups than in either adult female groups during both wet and dry seasons. Moreover, when variation in group size was corrected for, male and female deer did not differ in foraging efficiency during either dry or wet seasons and did not lessen feeding efficiency when in mixed-sex groups. The hypothesis that differences in activity or foraging efficiency lead to spatial segregation of the sexes in mule deer was rejected; there is no aspect of that hypothesis that will explain why sexes use space or other resources differently over long periods. Proposed is a new approach that incorporates niche theory and reconciles past difficulties in how best to interpret sexual segregation in ungulates.

Keywords: Activity patterns, behavior, California, foraging efficiency, group size, mule deer, niche theory, Odocoileus hemionus, sexual segregation.

(See La Grande order form.)

Wood Utilization

Barbour, R.J.; Parry, D.; Todoroki, C. [and others].

2002. Within and between log variation in lumber grade yield as demonstrated by using AUTOSAW. In: Nepveu, G., ed. Fourth workshop IUFRO S5.01.04. Nancy, France: Laboratoire d'Etude des Ressources Forêt Bois, INRA-ENGREF: 450–455.

The AUTOSAW sawing simulator was used in a systematic examination of the sources of variation in both the lumber volume recovery and lumber grade yield encountered in empirical lumber recovery studies. Log position (rotation) and shape (sweep) were explored as possible sources of variation for 64 logs from 22 western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) trees. The trees came from a variety of forest conditions representing the range of young-growth hemlock in the U.S. Pacific Northwest. Log diameter, branch location, and knot size data were converted into AUTOSAW input files and “sawn” by using AUTOSAW. The sawing simulation results suggest that sweep reduces the overall lumber grade yield. The levels of variation observed for simulated sawing are similar to those observed in several empirical studies for the same species.

Keywords: Sawing simulation, wood products, hemlock.

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Drapek, R.J.**
Regional differences in the carbon source-sink potential of natural vegetation in the U.S.A.

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Effects of foraging activity on sexual segregation in mule deer.

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